Select Committee on Wind Turbines

Submission from Pacific Hydro Pty Ltd

May 2015

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Introduction

Submission to the Select Committee on Wind Turbines (2014)

Pacific Hydro is pleased to provide a response to this Inquiry regarding the significant role played by wind energy in Australia's energy supply system, emissions reduction, jobs and investment. We also outline the results of independent research on issues raised by the Terms of Reference for the Committee.

Within Australia, Pacific Hydro owns and operates eight (8) wind farms with 170 turbines and a capacity of 306.55 Megawatts (MW), in addition to a number of projects at earlier stages of design/development. We strongly support the need for scrutiny of all aspects of electricity generation infrastructure development to ensure ongoing development and operational standards are maintained.

However, we are concerned that the scope of this inquiry unnecessarily duplicates similar inquiries and reviews of recent years. The terms of reference have already been extensively assessed by over a dozen earlier Federal (and State) based inquiries in recent years. We stress to the Committee that consistent conclusions have been reached by these recent inquiries and reports, which have assessed the economics of wind turbines, the impact of wind turbines on the environment and the communities, noise and health impacts, aerial operations and firefighting, compliance and governance and lifecycle costs and emissions. The recent "Warburton" inquiry found that any scenario in which the Renewable Energy Target (RET) is reduced would result in higher power prices for consumers and that lower prices for consumers will be realised by more renewable energy.

Wind farms provide much needed economic stimulus in regional Australia creating job opportunities, driving regional and rural investment as well as providing support for social and community initiatives.

Wind energy is a low-cost pathway to reliable and low-emissions electricity generation in Australia; the planning and compliance components are working effectively; there is no bona-fide, scientific or medical evidence that wind farms lead to adverse health impacts; and polling consistently shows that the communities in which wind turbines operate - and the Australian population in general - continue to support the generation of electricity by wind turbines in Australia[1].

A selection of the aforementioned and most recent Federal reports are listed below and included in Appendix A for the Committee's reference:

(1) Climate Change Authority Review of the Renewable Energy Target (RET), 2014

(2) Warburton Review of the RET including assessment of economic costs and benefits, 2014

(3) Climate Change Authority Review of the RET, 2012

(4) Senate Committee investigating the Social and Economic Impact of Rural Wind Farms, 2011

Please note that Pacific Hydro would welcome the opportunity to engage in further stages of this Inquiry, including formal hearings and facilitating site visits to wind farms.

Who is Pacific Hydro?

Pacific Hydro is a global clean energy solutions provider with headquarters in Melbourne.

Operating for over 20 years, we develop, build and operate renewable energy projects and sell electricity and carbon abatement products to customers in our chosen markets.

With hydro, wind and geothermal power projects at varying stages of development, construction and operation in Australia, Brazil and Chile, our vision is to create economic, social and environmental value by being our customers' preferred clean energy solutions provider.

1 Newgate Research, 2014, Energy Source Preferences: The Trend, available at: http://reneweconomy.com.au/2014/graph-of-the-day-solar-most-popular-energy-source-28238

Globally, we have over 850MW of operating hydro and wind assets and a further 2,000+ MW in our project development pipeline. Our operating assets abate an estimated 1.5 million tonnes of greenhouse gas pollution every year.

We are also active in the carbon market, with proven success in the production and trading of carbon credits from our run-of-river hydro projects, registered under the Clean Development Mechanism of the Kyoto Protocol.

Pacific Hydro is wholly owned by the IFM Australian Infrastructure Fund, which is managed by IFM Investors. IFM Investors is a uniquely-structured global fund manager with $54 billion of assets under management across infrastructure, debt investments, equities and private capital. IFM Investors is wholly owned, through Industry Super Holdings, by 30 Australian superannuation funds. Through its ownership structure, Pacific Hydro provides sustainable infrastructure investment opportunities for around 5 million Australian members of Industry Superannuation Funds.

For more information visit www.pacifichydro.com.au

Select Committee Terms of Reference and Pacific Hydro's Response

Terms of Reference	Summary response
a) the effect on household power prices, particularly households which receive no benefit from rooftop solar panels, and the merits of consumer subsidies for operators;	Electricity price impacts are low and known. Considering wholesale and retail price impacts, electricity generated by wind turbines delivers a net positive outcome for consumers. Increasing retail competition and ensuring network costs are reined in will have a far greater consumer impact (and actually reduce bills in a noticeable way) than any adjustment to the Renewable Energy Target (RET). The benefits of the RET are multiple and broad while the electricity price impacts are low, stable and limited. Analysis by various bodies, including the Warburton Review, continue to show the fallacy in the assertion that LRET is "a major cost driver" or "significant burden" on consumers. It is clear from regular analysis by the Australian Energy Markets Commission that the RET has a limited impact on retail bills.
b) how effective the Clean Energy Regulator is in performing its legislative responsibilities and whether there is a need to broaden these responsibilities;	The Clean Energy Regulator is performing in accordance with its administrative function. Existing State based approvals processes are rigorous in determining the social, environmental and economic impacts and requiring appropriate management and mitigation processes be employed by proponents to ensure compliance. Any consideration of nationalising land-use planning approvals process and/or associated guidelines for wind farms and in isolation from all other major infrastructure development is not warranted.
c) the role and capacity of the National Health and Medical Research Council in providing guidance to state and territory authorities;	Following 24 published reports globally, there is currently no consistent evidence that wind farms cause health effects in humans. The NHMRC is Australia's peak body with respect to rigorous and ethical health and medical research for the Australian community, health professionals and government. The NHMRC has been considering the alleged health impacts of wind energy since at least 2010 and it is submitted that it is inappropriate for any political influence to be brought to bear on the NHMRC's guidance.
d) the implementation of planning processes in relation to wind farms, including the level of information available to prospective wind farm hosts;	Federal and state planning legislation is effective in guiding the siting, development and operations of wind farms in Australia. Any new wind farm development must comply with stringent planning requirements determined by each state government, in addition to any relevant federal legislation (e.g. EPBC Act). To achieve this, wind farm proponents must work closely with project stakeholders, regulatory authorities and communities to ensure that impacts on the environment, cultural heritage (indigenous and European), landholders, the broader community and the landscape are assessed ;and furthermore, that suitable and effective management and mitigation processes are employed.
e) the adequacy of monitoring and compliance governance of wind farms;	The monitoring and compliance governance of wind farms in Australia is designed to ensure that wind farms meet technical compliance regulations imposed by consents and legislation.

f) the application and integrity of national wind farm guidelines;	Whilst a potentially useful reference tool, national guidelines risk the duplication of and inconsistency with planning processes and guidelines which State and Local jurisdictions have already developed and deployed. Consultation on the draft Guidelines highlighted the potential for inconsistencies, inefficiencies and additional regulatory/ compliance burden where the national Guidelines would sit in parallel and potential conflict with State based jurisdictional planning frameworks and processes. There is no evidence to suggest that the functionality of existing jurisdictional assessment and compliance processes for wind farms are not meeting their intended objectives.
g) the effect that wind towers have on fauna and aerial operations around turbines, including firefighting and crop management;	Whilst individual developments can impact on fauna, it has been demonstrated that impacts on fauna are negligible and not on the same scale as the fauna impacts attributable to other forms of electricity generation. Existing approval processes require that wind farm proponents assess potential flora and fauna impacts and that regulators should not allow significant detrimental impacts on species of conservation significance. Where projects are approved, operators must adequately monitor, manage and mitigate potential impacts on fauna in accordance with approval conditions. Crop spraying has not been identified as a constraint in relation to any Pacific Hydro projects and it has not been raised as a matter of concern or complaint at any of our operational sites. Proposed wind farm developments are preceded by Aviation Risk Assessments which include the notification of and consultation with various aviation stakeholders. The presence of wind turbines does not adversely impact on aerial fire-fighting. Both the Victorian CFA and the South Australian CFS have made statements that wind turbines do not significantly impact their operations and they are viewed as per any other vertical obstacle in the landscape such as high voltage power lines or telecommunications masts. The New South Wales (NSW) Rural Fire Service (RFS) submission to this Inquiry also makes statements consistent with this view. It is noted that the Victorian CFA's submission to this inquiry includes a number of pictures demonstrating the ability of aerial fire-fighting to be undertaken in between and around turbines.
h) the energy and emission input and output equations from whole-of-life operation of wind turbines; and	Wind turbines are estimated to emit a median of 10 grams CO2 eq/kWH over the life of a wind turbine. This is approximately 1% of the equivalent emissions from coal fired power plant. Wind turbines "pay-back" these emissions within months in comparison to non-renewable energy sources which continue further and further into emissions deficit each and every day that they operate.
i) any related matter.	Polling consistently shows that the communities in which wind turbines operate - and the Australian population in general - continue to support the generation of electricity by wind turbines in Australia. Australia's energy investment trends are influenced by global and

local market factors. Across the world, there is a clear move away from fossil fuel generation technologies to cleaner forms across all technology options.

A smooth but rapid transition to cleaner energy systems is in the national interest. Increasing the proportion of renewable energy within Australia will not only reduce emissions; it attracts investment, will provide lower prices to consumers and reduces health and environmental costs.

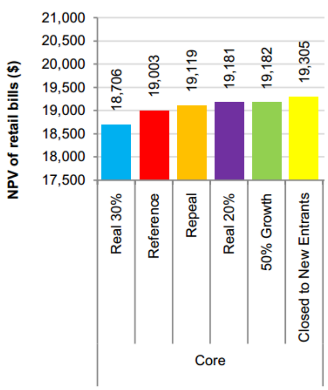
Scientific evidence and peak health organisations consistently find that widespread health benefits accrue from a transition away from the air pollution and greenhouse gas emissions caused by fossil fuel based energy sources. The Australian Medical Association, Victorian Department of Health and the NHMRC have all found that there is no evidence of direct health impacts associated with wind turbines. Appendix B includes a list and summary of the main conclusions reached in 25 reviews published since 2003 of the research literature on wind farms and health.

Response to the Select Committee Terms of Reference

a) the effect on household power prices, particularly households which receive no benefit from rooftop solar panels, and the merits of consumer subsidies for operators;

Analysis by various bodies continues to show the fallacy in the assertion that the Large Scale Renewable Energy Target (LRET) is "a major cost driver" or "significant burden" on consumers. The Federal government's own modelling by ACIL Allen, commissioned as part of the Warburton-led RET Review, found that the overall effect for consumers for both the 'Reference' and 'Real 30%' case is net positive given the Renewable Energy Target's effect on the wholesale market[2].

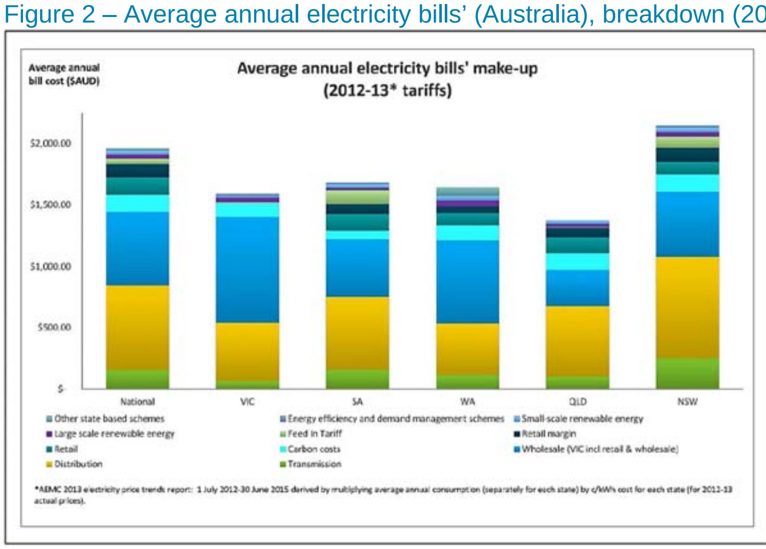
Figure 1: Total average household expenditure on electricity 2015-2040 (NPV), core case



Source: ACIL Allen Consulting, 2014

In relation to retail bill impacts, it is clear from regular analysis by the Australian Energy Markets Commission that the RET has a limited impact on retail bills. In 2014, the impact of the RET on household power prices was less than $2 per week split between an LRET average cost, which is $0.75/week (2% of an average bill) and SRES at $0.69/week (around 2% of an average bill)[3]. This cost is also offset by the contribution of renewable energy supply in holding down wholesale costs given that renewables do not face fuel input costs.

Figure 2 – Average annual electricity bills' (Australia), breakdown (2012-13 tariffs)



2 ACIL Allen Consulting, 2014, RET Review Modelling, Market Modelling of Various RET Policy Options, available at: https://retreview.dpmc.gov.au/sites/default/files/files/ACIL_Report_Exec_Summary.pdf

3 Australian Energy Market Commission (2013), Residential Electricity Price Trends, December 2013, p.12

The Australian Energy Market Operator (AEMO) found in their 2014 South Australian Electricity Market Economic Trend Report[4], that:

"South Australian renewable energy generation is dominated by wind farms which have low operating costs and tend to offer energy to the market at low prices. When wind generation is available it places downward pressure on RRPs (Regional Reference Prices)."

Numerous other modelling exercises have been undertaken on the RET in recent years. All have reached a similar conclusion; that any reduction in the LRET target results in an increase in revenue for fossil fuel generators and that the overall impacts of repealing the RET on household electricity bills is modest.

To put the impact of the RET on household power bills into perspective, the largest contributors to electricity bill increases in recent years have been network costs.

Network costs have put significant pressure on households in the last few years, but these costs are set to stabilise or fall over the next few years as regulators and state governments focus on ensuring expenditure is better aligned to necessary work and that any savings are passed onto customers.

- the Australian Energy Market Commission (AEMC) predicts that residential electricity price increases will moderate in the next few years, due "largely to a stabilisation in regulated network costs".[5]
- the Australian Energy Regulator's recent decision on ACT and NSW distribution network charges argued that the network owners had over-estimated capital expenditure from 2009-2014 and not spent what they asked for. The Regulator will require these businesses to pass their savings onto consumers at between $19-$38 per year for residential customers and between $29-$60 per year for small business customers.[6]
- the QLD Government has announced it will relax the "gold plating" requirement for network reliability which should result in lower network costs for QLD households.[7]

The significant competitive pressure at the large scale generation end, driven by renewable energy supply, is also holding down wholesale power prices. This effect is clearly shown in analysis for the CEC from ROAM Consulting.[8]

ROAM's key conclusions, which are consistent with other analyses from Schneider Electric[9] and SKM[10], show that:

- wholesale price increases are limited by the RET;
- the cost of the RET is largely offset by reductions in wholesale prices in the near-term through the encouragement of additional, zero-marginal cost capacity into the market at a time of falling demand; and repealing the RET will increase retail power bills[11];

4 AEMO(2014), South Australian Electricity Market Economic Trend Report, available online: http://www.aemo.com.au/Electricity/Planning/South-Australian-Advisory-Functions/South-Australian-Electricity-Market-Economic-Trends-Report

5 26 AEMC (2013). Final Report 2013 Residential Electricity Price Trends. P ii

6 AER. (2014). Media Release – AER decision will lower prices for ACT and NSW electricity customers. 16 April 2014.

7 Vogler, S. (2014). Courier Mail – Power play saves bill shock – consumers tipped to win as electricity firms reduce their network costs. 16 April 2014. P. 3

8 ROAM Consulting (2014), Report to Clean Energy Council, RET Policy Analysis, available at: https://www.cleanenergycouncil.org.au/dam/cec/policy-and-advocacy/ret/roam-modelling-april-2014/RET-policy-analysis-full-report/RET%20policy%20analysis%20-%20full%20report.pdf

9 Schneider Electric (2014). Australia's large-scale renewable energy target: three consumer benefits.

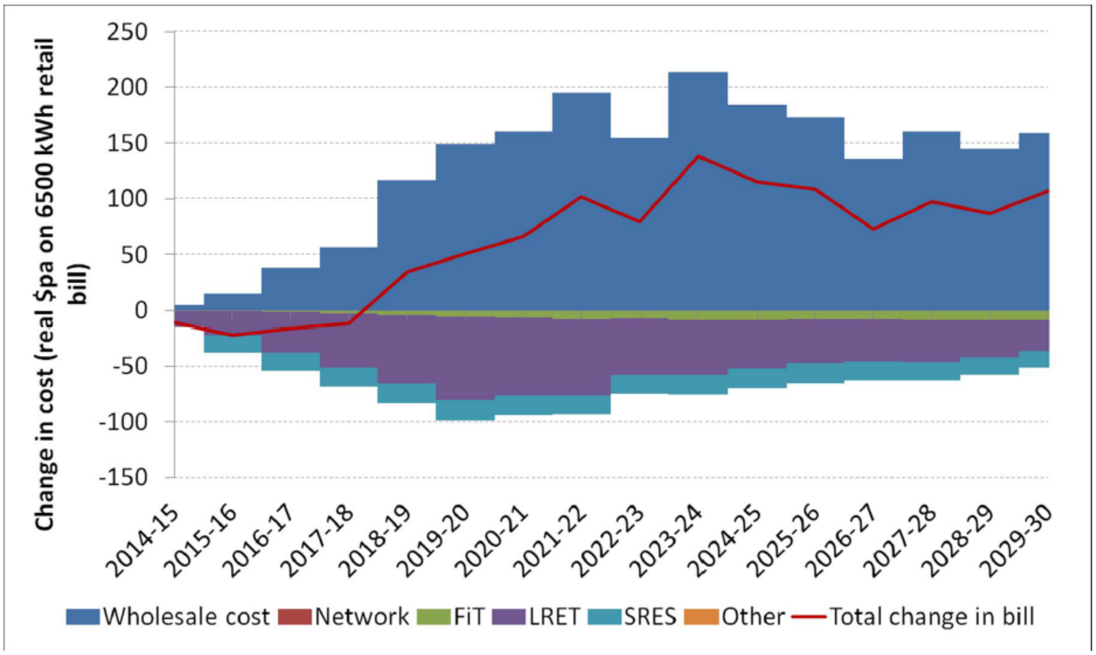
10 SKM (2012). Benefit of the Renewable Energy Target to Australia's Energy Markets and Economy. Report to the Clean Energy Council.

11 ACIL Allen Consulting, 2014, RET Review Modelling, Market Modelling of Various RET Policy Options, available at: https://retreview.dpmc.gov.au/sites/default/files/files/ACIL_Report_Exec_Summary.pdf

- retaining the policy and encouraging renewable energy deployment at a wide scale delivers lower costs to consumers; and
- increased competition in retail energy can deliver significant cost savings for consumers and is one of the most meaningful actions governments can take to ease cost of living pressures.

ROAM Consulting's assessment concluded that there is a big risk that for all the pain of reducing or removing the RET, the benefit to consumers will be low or negative[12]. ROAM's analysis is consistent with recent work from Schneider Electric looking at large energy users[13] and with US research into the consumer benefits that are evident through deployment of wind energy.[14] This US research, using Department of Energy data, showed that consumers in the US states that use the most wind energy have seen lower overall energy bills than consumers in states that use less wind energy.[15]

Figure 3 - Change in retail price components in No RET scenario relative to BAU (existing target) scenario.



Source: ROAM Consulting RET Policy Analysis (2014)

The renewable energy encouraged under the RET is adding significant competition into the Australian electricity market. New entrant renewable energy generators have entered a market dominated by a few large incumbent operators, many of which appear to have been unprepared for changes that are now key features of the market.

At the small scale level, embedded small scale renewable generation and displacement technologies all reduce the demand for grid-supplied electricity, reducing the need for the wholesale market to bring in more expensive generation to meet the consumption needs.

It is estimated that more than 4-5 TWh of PV will be installed by 2020. As outlined in the ROAM Consulting report for the Clean Energy Council, rooftop PV is estimated to generate 7,610 GWh in 2020 and over 16,000 GWh in 2030.[16] Others have suggested a range for PV of up to 20 GW in 2030.

12 ROAM (2014), Report to CEC – RET Policy Analysis.

13 Schneider Electric (2014). Australia's large-scale renewable energy target: three consumer benefits.

14 AWEA (2014). Wind power consumer benefits. Available at: www.awea.org

15 ibid

16 ROAM (2014). Report to CEC – RET Policy Analysis.

Electricity consumers (residential, commercial and industrial) are ultimately responsible for subsidising the funds for the Small-scale Renewable Energy Scheme (SRES) as electricity retailers are required to surrender certificates created from renewable energy from small-scale technologies. However, at the residential scale, ACIL Allen found in their modelling commissioned for the Warburton Review of the RET that these costs were estimated to consist of approximately 1.6 per cent of an average household electricity bill.[17]

Subsidies

The issue of assistance for renewable energy must be seen in the context of the broader energy market and the circumstances under which it has evolved to the point where we enjoy the relatively low cost energy we have today.

Up until recently the Australian energy generation sector was almost exclusively made up of publically financed thermal power stations. These thermal plants were built by the state, some more than fifty years ago, with the primary objective of ensuring sufficient supplies of electricity rather than commercial objectives of private or merchant plant owners we see in today's market.

These thermal power stations, having enjoyed the benefit of public funding and ownership for many decades can now produce electricity at relatively low cost. This, along with the absence of a cost associated with their emissions and substantially below market cost for water, provides them with a substantial, consumer supported advantage. We make these comments not as a criticism of the decisions of governments of the past, or of the operators and owners of thermal plant, but to provide greater context to the renewable energy subsidy discussion.

With this in mind, the Renewable Energy Target (RET) is a consumer subsidy (approximately 4% of power bills) to offset the higher initial cost of renewable electricity generation development. The RET has, until recent political uncertainty, been a bipartisan supported policy to reduce Australia's electricity sector generated greenhouse gas emissions. This subsidy amounts to approximately $2 billion per year and results in approximately $18 billion of investment into renewable energy development in Australia, the creation of 21,000 jobs and an estimated 20 million tonne reduction in carbon emissions[18].

Most new technologies have at the earlier stages of their development curve been supported to some extent by government subsidies. The assistance being offered for renewables, in the form of the Renewable Energy Certificates, is a market-based incentive through the historically bipartisan supported Renewable Energy Target. In any case, 'subsidies' to renewables are a fraction of that provided in the past to the coal, oil and gas and nuclear industries in their formative years and it is clear that these industries continue to be heavily subsidised through various mechanisms in Australia and other countries.

Environment Victoria and Market Forces in 2014[19] summarised government estimates of federal tax measures that encourage the production and use of fossil fuels, finding that the Australian Government will spend over $40 billion on tax rebates and concessions, foregone revenue and expedited write down of assets in the year 2013/14 to 2016/17. This figure does not include direct grants or State government measures.

The International Energy Agency estimated that fossil fuel subsidies amounted to more than $US550 billion in 2010 and outstripped subsidies for clean energy technology by a ratio of almost 10 to one in the past few years. Australian fossil fuel industries still benefit enormously from subsidies in various forms. Studies from the Institute for Sustainable Futures (2007) and Australian Conservation Foundation (2011) confirm that

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17 ACIL Allen Consulting, 2014, RET Review Modelling, Market Modelling of Various RET Policy Options, available at: https://retreview.dpmc.gov.au/sites/default/files/files/ACIL_Report_Exec_Summary.pdf

18 The Climate Institute(2014), Renewable Energy Target – Explainer, Fact Check, available at: http://climateinstitute.org.au/news/renewable-energy-target.html/section/2025

19 Environment Victoria and Market Forces (2014), Pre-Budget Briefing Paper – Ending the fossil fuel industry's age of entitlement: An analysis of Australian Government tax measures that encourage fossil fuel use and more pollution, available at: http://environmentvictoria.org.au/newsite/sites/default/files/useruploads/EV%20&%20MF_Fossil%20fuel%20subsidies%20in%202014_FINAL.pdf

fossil fuel subsidies outweigh renewable and energy efficiency subsidies by a large margin (12 to 1 or more).[20]

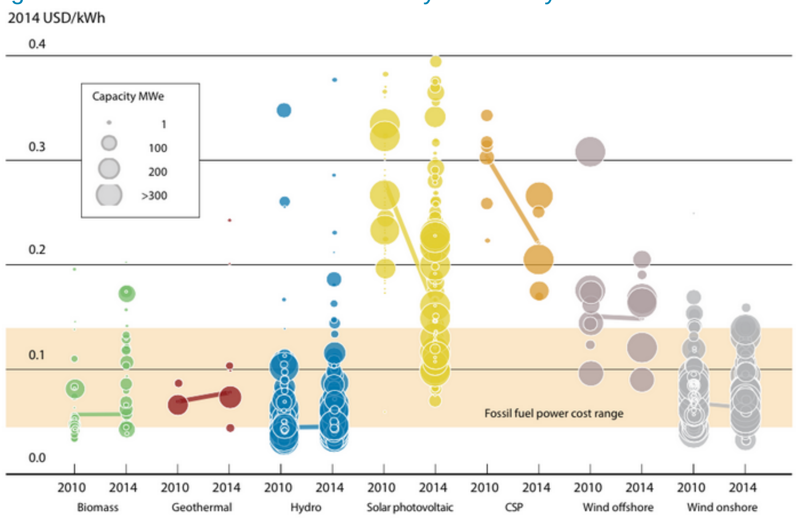
We note that in Australia the mining industry receives $4 billion in annual diesel fuel rebates and NSW provides an estimated annual subsidy of $1.5 billion for coal associated with its 2010 electricity asset sale. The Federal Government recently handed out $1 billion to brown coal-fired generators to help them cope with the initial impact of the carbon price, and allowed billions more to heavy industry through the allocation of free permits. Whilst wind energy generators receive RECs this must be seen in the context of various incentive mechanisms throughout the energy sector.

Cost of renewable technologies

The Warburton review completed in 2014 found that the RET has driven installation of renewable power stations with a total capacity of more than 5,000 MW. This is equivalent to approximately 10% of Australia's current grid connected capacity.[21]

The International Renewable Energy Agency (IRENA) found in their latest 'Renewable Power Generation Costs in 2014' report[22] that the Levelised Cost of Electricity[23] (LCOE) for renewable technologies including onshore wind are firmly within the range of LCOE's for fossil-fuel powered plant.

Figure 4: The levelised cost of electricity from utility-scale renewable technologies, 2010 and 2014



Source: IRENA Renewable Cost Database.
Note: Size of the diameter of the circle represents the size of the project. The centre of each circle is the value for the cost of each project on the Y axis. Real weighted average cost of capital is 7.5% in OECD countries and China; 10% in the rest of the world.

The IRENA report also undertook a LCOE comparison which included two vital external costs not included in standard LCOE comparisons: the costs of integrating into the grid 'variable' generation like that produced by wind turbines, and the environmental and health impacts attributed to electricity generation, using a conservative social cost of carbon in the range $US20 - $US80[24]. The integration of these externalities, resulting in a net effect of increasing the cost-competitiveness of wind, is shown in Figure 5.

20 ISF (2007). Energy and Transport Subsidies in Australia. http://www.isf.uts.edu.au/publications/riedy2007subsidies.pdf; Australian Conservation Foundation, September 2011. Drill now, Pay Later: The growing cost of tax breaks for the oil and gas industry in Australia.

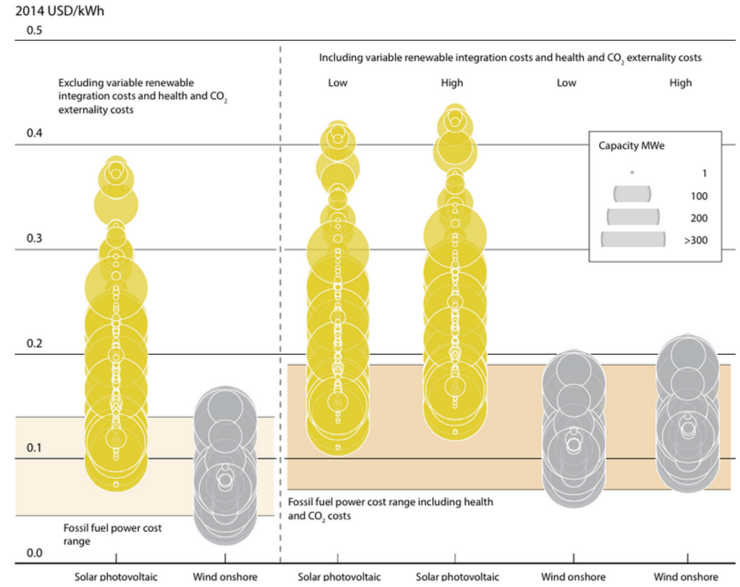
21 Climate Change Authority (2014), Renewable Energy Target Review Report

22 International Renewable Energy Agency(2014), Renewable Power Generation Costs in 2014, available at: http://www.irena.org/menu/index.aspx?mnu=Subcat&PriMenuID=36&CatID=141&SubcatID=494

23 LCOE consists of capital and fuel costs, operating and maintenance costs, and financing costs, as well as the assumed rate of utilization. It does not include externalized costs, either positive (subsidies) or negative (health or environmental damages).

24 International Renewable Energy Agency (2014), Renewable Power Generation Costs in 2014, available at: http://www.irena.org/menu/index.aspx?mnu=Subcat&PriMenuID=36&CatID=141&SubcatID=494

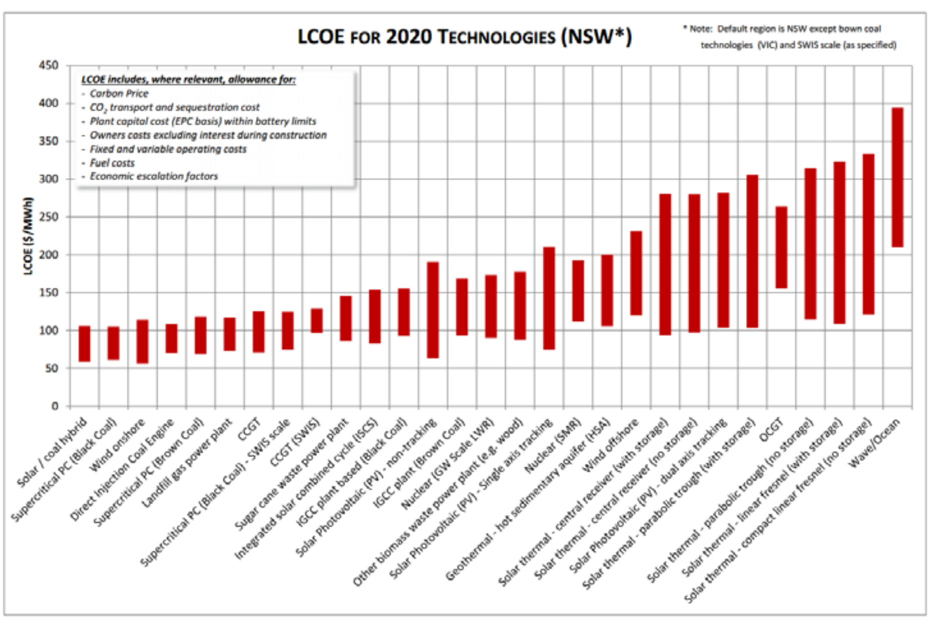
Figure 5: The LCOE of variable renewables and fossil fuels, including grid integration costs (at 40% variable renewable penetration) and external health and CO_2 costs



Source: IRENA Renewable Cost Database and analysis.
Note: Fossil fuel power costs for 26 REMAP countries. Real weighted average cost of capital of 7.5% in OECD countries and China; 10% in the rest of the world.

Consistent with the findings of the Warburton report, the Bureau of Resources and Energy Economics (BREE) published the Australian Energy Technology Assessment (AETA) which illustrated that by 2020 renewable energy is expected to be amongst the lowest cost of new build electricity generation in Australia.[25] BREE's assessment of the LCOE for a range of generation technologies projected out to 2020 is included in Figure 6 below.

Figure 6: Updated LCOEs for AETA 2013 Model technologies, values for 2020 (NSW), carbon price set to zero



Source: BREE (2012)

25 Bureau of Resources and Energy Economic (2012), Australian Energy Technology Assessment, available at: http://industry.gov.au/industry/Office-of-the-Chief-Economist/Publications/Pages/Australian-energy-technology-assessments.aspx

b) how effective the Clean Energy Regulator is in performing its legislative responsibilities and whether there is a need to broaden these responsibilities;

The Clean Energy Regulator (CER) is performing in accordance with its administrative function as provided for in legislation.

Pacific Hydro does not foresee any requirement for expanding the scope of the CER's legislative responsibilities. A number of other Federal and State based regulatory agencies play an essential role in monitoring and enforcing compliance with the suite of regulatory approvals required to develop and operate wind farms in Australia. Across Australia, land-use planning for wind farms and any other development is regulated by State legislation. Expanding the scope of the CER's responsibilities risks duplicating these compliance functions. Additionally there is a risk of unwarranted administrative burden for proponents and regulators that is inconsistent with the treatment of other sectors of the economy and/or forms of development.

c) the role and capacity of the National Health and Medical Research Council in providing guidance to state and territory authorities;

The National Health and Medical Research Council (NHMRC) is recognised by Pacific Hydro as Australia's leading, independent, expert body with respect to health and medical research, developing health advice and providing advice on ethical behaviour in health care and research for the Australian community, health professionals and governments. Pacific Hydro regularly relies on the findings of the NHMRC along with State based peak health organisations such as the Victorian Department of Health and Chief Health Officer position

The NHMRC has reviewed multiple studies into the impacts of wind farms on human health. The findings of these studies are consistent – there is no bona-fide, scientific or medical evidence that wind farms lead to adverse health impacts. These findings correlate with the findings of numerous independent reviews from peak medical and scientific bodies including the Australian Medical Research Council, the US National Research Council, Health Canada and the UK Health Protection Agency.

The most recent statement by the NHMRC was released in February 2015[26] and was based on a 'rigorous independent assessment of the existing scientific evidence on wind farms and human health'. The primary finding of this assessment is:

> There is no direct evidence that exposure to wind farm noise affects physical or mental health. While exposure to environmental noise is associated with health effects, these effects occur at much higher levels of noise than are likely to be perceived by people living in close proximity to wind farms in Australia. The parallel evidence assessed suggests that there are unlikely to be any significant effects on physical or mental health at distances greater than 1,500m from wind farms

The NHMRC has also called for further research into the potential health impacts within 1500m of a wind turbine. Pacific Hydro will continue to support any further research into wind turbines and health that the NHMRC or other peak health organisations in Australia deem appropriate, provided any further research is subject to the same merit tests as all other forms of medical research commissioned or supported by the NHMRC, and that the medical research is not subject to political influences and at the expense of other, serious, under-researched health problems.

Globally, infrasound has been studied extensively and there is no evidence to suggest that infrasound has any effect on health. Professor Simon Chapman, Professor in Public Health at the University of Sydney, has compiled a list of reports and research findings in relation to the alleged health impacts of wind turbines (or 'wind turbine syndrome'). There have now been 25 <u>published</u> reviews (including the aforementioned 2015 NHMRC review and statement into wind farms and human health) since 2003[27], all of which have reached a similar conclusion: that there is no consistent or reliable evidence that wind turbines are causing direct health effects. Professor Simon Chapman's compiled list is included at Appendix B for the Select Committee's consideration.

The most recent and comprehensive research internationally was undertaken by the national health organisation of Canada, Health Canada. The findings of Health Canada's extensive study into the effect(s) of wind farms on human health were released in 2014.[28] The study employed measurements of physical health which assessed stress levels and measures of sleep quality. A total of 1238 households participated in the study and approximately 4000 hours of wind turbine noise measurements were collected. The study found no evidence linking wind turbines to deleterious human health impacts. In addition, the study did not

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26 National Health and Medical Research Council (2015), NHMRC Statement and Information Paper: Evidence on Wind Farms and Human Health, available at: http://www.nhmrc.gov.au/guidelines-publications/eh57

27 Professor Simon Chapman, School of Public Health, Sydney University, and Teresa Simonetti, Sydney University Medical School (2015), Summary of main conclusions reached in 24 reviews of the research literature on wind farms and health, available at: http://ses.library.usyd.edu.au//bitstream/2123/10559/5/WindHealthReviews_2.pdf

28 Health Canada, Wind Turbine Noise and Health Study, 2014, available at: http://www.hc.sc.gc.ca/ewh-semt/noise-bruit/turbine-eoliennes/summary-resume-eng.php

identify any link between the noise from wind turbines and stress, or quality of sleep (either self-reported or measured). The Health Canada study did find an association between wind turbine noise and individual reports of annoyance.

Pacific Hydro recently commissioned an independent acoustic report, undertaken by Steven Cooper of The Acoustic Group, at the Cape Bridgewater Wind Farm in south west Victoria. The report *'The Results of an acoustic testing program – Cape Bridgewater Wind Farm*[29]*'* did not show a correlation between audible noise or vibration levels, and the observations, documented as sensations, of residents. Although the report itself suggests a trend between infrasound frequencies and resident observations, in Pacific Hydro's view, it does not demonstrate any evidence of a causal link between the existence of infrasound frequencies and the observations of residents.

To clarify some aspects of this report, Pacific Hydro and the Acoustic Group developed a joint statement to assist in public understanding of the results. This joint statement is attached as Appendix C.

These examples of findings identified above provide further support to the studies from other Government and Health Authorities in Australia and internationally. For further information we refer the Select Committee to the Clean Energy Council's Wind Farms and Health Fact Sheet released in 2014[30].

29 The Results of an acoustic testing program – Cape Bridgewater Wind Farm, The Acoustic Group (2015), available at: http://www.pacifichydro.com.au/english/our-communities/communities/cape-bridgewater-acoustic-study-report/?language=en

30 Clean Energy Council (2014), Wind Energy – The Facts, Wind Farms and Health, available at http://www.cleanenergycouncil.org.au/dam/cec/technologies/wind/fact-sheets/Wind-farms-and-health-fact-sheet-Jan-2015/Wind%20farms%20and%20health%20fact%20sheet%20-%20Jan%202015.pdf

d) the implementation of planning processes in relation to wind farms, including the level of information available to prospective wind farm hosts;

Federal and state planning legislation is effective in guiding the siting, development and operations of wind farms in Australia. Any new wind farm development must comply with stringent planning requirements determined by each state government, in addition to any relevant federal legislation (e.g. EPBC Act). To achieve this, wind farm proponents must work closely with project stakeholders and regulatory authorities to ensure that impacts on the environment, cultural heritage (Indigenous and European), landholders, the broader community and the landscape are assessed and that suitable and effective management and mitigation processes are employed.

It is recognised that planning decisions frequently involve the balancing of objectives that could be regarded as competing with one another. It is also accepted that different people with different interests will often place different weight on planning objectives. Pacific Hydro understands that in striving to achieve goals with global implications, local and regional impacts remain fundamentally important. The planning and consultation that precedes Pacific Hydro’s design of a wind farm and continues during the construction and operational phases reflects a commitment to sound environmental management and benefitting communities in which its projects reside. Pacific Hydro’s track record reflects this commitment.

e) the adequacy of monitoring and compliance governance of wind farms;

The monitoring and compliance governance of wind farms in Australia is designed to ensure that wind farms meet technical compliance regulations imposed by consents and legislation.

Approval of a wind farm requires that a wind farm developer prepare in-depth technical measurements, analysis and modelling which must be approved by the relevant regulator(s). Following the granting of an approval, the wind farm operator must ensure compliance with the various conditions of the approval, which includes the ongoing provision of technical measurements and analysis to regulators, who undertake compliance analysis.

f) the application and integrity of national wind farm guidelines;

Pacific Hydro recognises the important role of individual jurisdictions (predominantly State and Local government) in guiding the appropriate development of wind energy facilities in their respective regions. Pacific Hydro was consulted on the draft National Wind Farm Guidelines and has supported the Environment Protection and Heritage Council's (EPHC) decision to cease further development of the National Wind Farm Guideline (the Guidelines).

In order to obtain an approval for a wind farm development, proponents must ensure provision of a broad set of technical analysis, modelling and management procedures, which are assessed by jurisdictional regulators.

State and Local governments play a crucial role in assessing the validity of a wind farm development proposal against competing land use, economic, environmental, community and social development issues. Consultation on the draft Guidelines resulted in recognition that these jurisdictions in Australia are best placed for setting planning approval processes for wind farms within their respective planning frameworks (as they do for all other forms of infrastructure development) and with an understanding of the specific environmental, economic and social setting.

Whilst a potentially useful reference tool, national guidelines risk duplication of and inconsistency with planning processes and guidelines which the State and Local jurisdictions have already developed and deployed. Consultation on the draft Guidelines highlighted the potential for inconsistencies, inefficiencies and additional regulatory/ compliance burden where the national Guidelines would sit in parallel with jurisdictional planning frameworks and processes. There is no evidence to suggest that the functionality of existing jurisdictional assessment and compliance processes for wind farms are not meeting their intended objectives.

To avoid additional administrative burden, and given the existing rigorous jurisdictional planning regimes, the EPHC's decision to abandon further development of national wind farm guidelines is supported. Indeed, any consideration of nationalising land-use planning approvals process and associated guidelines for wind farms, in isolation and contrary to all other major infrastructure development, is not warranted.

g) the effect that wind towers have on fauna and aerial operations around turbines, including firefighting and crop management;

Pacific Hydro acknowledges that wind farms, like any form of human development, can have an impact on flora and fauna. Indeed, all forms of utility scale electricity generation have some impact on flora and fauna. As such, it is crucial that any new infrastructure or major development proposal is preceded by an assessment of the potential flora and fauna impacts. Where assessments reveal potentially significant detrimental impacts for designated wildlife sites, protected areas or populations of conservative significance, the subject project is likely to be considered inappropriate for that location. In all cases, ecological assessments should inform and influence project design, such that impacts to flora and fauna are predominantly avoided and where they cannot be completely avoided, potential impacts are minimised and mitigated against.

Wind turbines can have impacts on fauna, although frequently the actual impacts to bird life from operational wind farms are exaggerated by organised opposition groups. It is particularly relevant to consider the bigger picture, the various alternatives for the provision of electricity generation and their respective environmental impacts. Sovacool's 2009 paper[31] concluded that fossil-fuel power stations are significantly greater threats - by orders of magnitude – when compared to wind turbines:

> For wind turbines, the risk appears to be greatest to birds striking towers or turbine blades and for bats suffering barotrauma.
>
> For fossil-fuelled power stations, the most significant fatalities come from climate change, which is altering weather patterns and destroying habitats that birds depend on. For nuclear power plants, the risk is almost equally spread across hazardous pollution at uranium mine sites and collisions with draft cooling structures. Yet, taken together, fossil-fuelled facilities are about 17 times more dangerous to birds on a per GWh basis than wind and nuclear power stations. In absolute terms, wind turbines may have killed about 7000 birds in 2006 but fossil-fuelled stations killed 14.5 million and nuclear power plants 327,000.
>
> and
>
> ……the lesson that the most visible impacts from a given technology are not always the most egregious. Wind turbines seem to present a significant threat to birds because all of their negative externalities are concentrated in one place, while those from conventional and nuclear fuel cycles are spread across space and time. Avian mortality and wind energy has consequently received far more attention and research than the avian deaths associated with coal, oil, natural gas, and nuclear power systems, even though this study suggests that wind energy may be the least harmful to birds. The first-order estimates of avian mortality per GWh offered here imply that fossil fuels may be more dangerous to avian wildlife (and nuclear power plants slightly more dangerous) than wind farms, and they remind us that what can sometimes be considered the most obvious consequence of a particular energy system may not always be the most meaningful or important.

Similar conclusions have been reached in other recent studies.

Newman and Zillioux's 2009[32] study compared the effects and risks to vertebrate wildlife from six electricity generation types in the USA's New York / New England region, namely coal, oil, natural gas, hydro, nuclear, and wind. The results are summarised in the table below.

31 Sovacool, Benjamin K. (2009), Contextualizing avian mortality: A preliminary appraisal of bird and bat fatalities from wind, fossil-fuel, and nuclear electricity, Energy Policy 37 (2009) 2241–2248

32 Newman, J and Zillioux, E (2009) Comparison of reported effects and risks to vertebrate wildlife from six electricity generation types in the New York / New England Region, New York State Energy Research and

Development Authority (NYSERDA), Albany

Table 1: The potential highest levels of relative wildlife risks for each life cycle stage of each electricity generation source

Source	Relative Wildlife Risk Level for Potential Harm					
	Resource Extraction	Fuel Transportation	Construction of Facility	Power Generation	Transmission and Delivery	Decommissioning of Facility
Coal	Highest Potential	Lower Potential	Lower Potential	Highest Potential	Moderate Potential	Lower Potential
Oil	Higher Potential	Highest Potential	Lower Potential	Higher Potential	Moderate Potential	Lower Potential
Natural Gas	Higher Potential	Moderate Potential	Lowest Potential	Moderate Potential	Moderate Potential	Lowest Potential
Nuclear	Highest Potential	Lowest Potential	Lowest Potential	Moderate Potential	Moderate Potential	Lowest Potential
Hydro	None	None	Highest Potential	Moderate Potential	Moderate Potential	Higher Potential
Wind	None	None	Lowest Potential	Moderate Potential	Moderate Potential	Lowest Potential

Similarly, the National Audubon Society in the United States, UK Royal Society for Protection to Birds[33], the Sierra Club[34], and pre-eminent environmentalist David Suzuki[35] are amongst the overwhelming majority of green organisations who have supported the expansion of wind energy and re-emphasised that climate change and habitat loss remain by far the biggest threat to wildlife and that wind energy has an important role in mitigating this threat.

In April 2012, the UK Royal Society for Protection to Birds announced its plans to build a single wind turbine at its UK Headquarters, The Lodge. This action was taken by the RSPB as an important symbolic step to emphasize the impact of habitat loss and climate change, stating:.

> *We believe that renewable energy is an essential tool in the fight against climate change, which poses the single biggest threat to the long-term survival of birds and wildlife.*
>
> *In addition to campaigning to reduce greenhouse gas emissions, we are committed to reducing our own carbon footprint by generating our energy needs from renewable sources wherever possible.*
>
> *We know that with the right design and location wind turbines have little or no impact on wildlife. We hope that by siting a wind turbine at our UK headquarters, we will demonstrate to others that with a thorough environmental assessment and the right planning and design, renewable energy and a healthy, thriving environment can go hand in hand.*[36]

The Sierra Club also reported that less than 0.01% of annual bird deaths in the USA that are attributed to human intervention in the environment (not including habitat loss and climate change related impacts) resulted from wind farms.

33 Huyton, H (2013) *Let's not martyr the white-throated needletail to the anti-wind cause*, UK Royal Society for Protection to Birds, The Guardian 28 June 2013, http://www.theguardian.com/environment/blog/2013/jun/28/white-throated-needletail-wind-turbines

34 Sierra Club Canada (2011)The Real Truth About Wind Energy :A Literature Review on Wind Turbines in Ontario

35 http://www.davidsuzuki.org/blogs/science-matters/2011/07/when-it-comes-to-health-wind-power-blowsaway-the-alternative/

36 http://www.rspb.org.uk/reserves/guide/t/thelodge/windturbine/index.aspx

Aerial operations around turbines

Pacific Hydro's practices are consistent with the NASAG guidelines (National Airports Safeguarding Framework, Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers). The NASAG guideline details how wind farms can be planned to reduce impact on aviation.

For all projects we undertake an Aviation Risk Assessment to determine inherent risk, liaise with CASA, Airservices Australia, RAAF and local aerodrome operators in relation to data provision and recommended notifications. The Risk Assessments considers aerial agriculture activity and enables the identification of any other appropriate aviation safety mitigations. Wind turbines are considered by the aviation sector to be just another obstacle, like high voltage powerlines or telecommunications masts, that must be managed in planning and conducting low level aerial operations. It is the responsibility of the pilot to anticipate, assess and make operational judgments as to how close they fly to an obstacle.

Firefighting

During the 2011 Federal Senate Inquiry, at the Melbourne Hearing on 29 March 2011, Mr Geoffrey Conway, Deputy Chief Officer, Emergency Management in the Victorian Country Fire Authority made the following statement with regard to fire risk and aviation:

> Pilots operating aerial fire-fighting equipment are acutely aware of hazards of their occupation. Whether it be wind turbines and rotors, whether it be high-voltage transmission lines, whether it be trees or any other issue in the landscape…The current guidelines…allow for about a 300 metre spacing between installations for fire-fighting aircraft, particularly rotary winged fire-fighting aircraft. That is fine and we do not have any concerns in relation to that. We are quite confident that the pilots and the people on the ground managing the aerial fire-fighting capacity have that awareness and are able to manage it[37].

This position was reiterated by Victoria's Emergency Management Commissioner on 25 February 2015[38] in response to claims that reducing the 'buffer' zone from wind turbines to houses from 2km to 1km would make fighting fires near to homes more difficult:

> We make sure that our pilots and our air attack supervisors that fly to supervise our fire-bombers are aware of wind farms and they build that into their plan and we haven't had any example where it's restricted our fire operations.
>
> I think the key thing is how and which we use aircraft operation in and around the turbines.
>
> We have operated around turbines, we'll continue to do so and the buffer zones we don't believe will impact negatively on any fire operations.

Further, as noted in the transcript of a radio interview (11 December 2012) with Annabelle Homer on ABC North and West SA by the South Australian CFS Aviation Manager, Mr David Pearce:

> …of all the wind farms in SA there has been only three turbine fires, and one on Starfish Hill which collapsed. Pearce says any obstacle in the airspace is a problem for aircraft. He says wind turbines are treated purely as another object in the airspace, the same way power-lines and television towers are treated. Pearce says they manage the risks as they come across [them]. Pearce says aircraft don't actually put fires out, it is rather the fire-fighters on the [ground]. Homer says a CFS volunteer who called stated water bombers controlled the fire near Minlaton on Friday. He says fires on severe weather days often can't be combated with aircraft anyway due to low

37 Hansard of evidence provided by Mr Geoffrey Bruce Conway, Deputy Chief Officer, Emergency Management, Country Fire Authority Victoria. P. 50http://www.aph.gov.au/Parliamentary_Business/Committees/Senate_Committees?url=@Hansard/S13806.pdf

38 ABC News Online (2015), Wind farm buffer zone changes won't impede firefighting says Victoria's Emergency Management Commissioner, available at: http://www.abc.net.au/news/2015-02-25/reducing-wind-farm-buffer-zones-wont-impact/6260396

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> visibility, noting both large planes like 747s and small planes like Cessnocks are affected. Pearce notes that turbine access roads have provided access to areas which otherwise would have been blocked to fire appliances. Pearce says they aren't aware of any research that says wind turbines affect the spread of fire.[39]

It is noted that the Victorian CFA's submission to this inquiry includes a number of pictures demonstrating the ability of aerial fire-fighting to be undertaken in between and around turbines. Similarly, the NSW RFS's submission to this Inquiry states, with respect to bushfire suppression, that:

> Wind farms are an infrastructure development that must be considered in the preparation of Incident Action Plans for the suppression of bushfires in their vicinity. These considerations are routine and wind farms are not expected to present elevated risks to operations compared to other electrical infrastructure.
>
> Aerial fire fighting operations will treat the turbine towers similar to other tall obstacles. Pilots and Air Operations Managers will assess these risks as part of routine procedures. Risks due to wake turbulence and the moving blades should also be considered. Wind turbines are not expected to pose unacceptable risks.

Crop management

To date, the issue of crop spraying has not been identified as a constraint in relation to any Pacific Hydro projects and that it has not been raised as a matter of concern or complaint at any of our operational sites. If crop spraying constraints were to exist, these would be expected predominantly upon the property that hosts the wind farm, where the landowner has made an informed decision to host wind turbines.

Aviation Risk Assessment consider potential impacts of any localised crop spraying activities during the design phase of each of our projects. This includes discussions with landholders, consideration of land use and consultation with the Aerial Agricultural Association of Australia (AAAA). This approach is consistent with the existing wind industry technical guidelines and aviation safety guidelines for wind farms which provide direction on:

- The notification process for tall structures (wind turbines and wind monitoring masts)
- The need for risk assessment to identify whether the wind turbines or wind monitoring masts will
- be considered to be hazards
- Actions required if a wind turbine(s) or wind monitoring mast is considered to be a hazard –
- including the possibility that a wind turbine or monitoring mast should not be built; and
- Marking recommendations for wind monitoring masts
- The existing aviation safety guidelines also strongly encourage consultation with aviation
- stakeholders in the early stages of planning for wind farm developments, through:
- Early identification of any nearby licensed aerodromes
- Immediate consultation with any nearby aerodrome owners
- Preliminary assessment by an aviation consultant of potential issues
- Confirmation of the extent of the obstacle limitation surfaces (OLS) for any nearby aerodromes
- Registration of all wind monitoring masts on the RAAF Aeronautical Information Service (AIS)
- database
- Consultation with local agricultural pilots and nearby unlicensed airstrip owners; and

39 ABC Northwest – ABC North and West SA, Port Pirie' Late Afternoons: 10 December 2012 05:14PM. Interview transcript in media summary on 11 December, 2012.

- Consultation with Civil Aviation Safety Authority (CASA) and Airservices Australia.

By providing detailed turbine and mast location information to the RAAF, CASA, Airservices Australia, AAAA and local aerodrome operators this enables aeronautical charts to be updated and service providers to develop appropriate flight plans.

Pilots operating small aircraft of this nature must already be aware of hazards in their environment and wind farms are imminently more visible than other potential hazards such as power lines. To this end we note the comments of Geoffrey Conway of the Victorian Country Fire Authority at the 2011 Federal Senate Inquiry in relation to aerial fire-fighting equipment (provided above).

h) the energy and emission input and output equations from whole-of-life operation of wind turbines; and

Considerable investment in renewable electricity generation infrastructure has been committed in Australia, in part to reduce electricity generated greenhouse gas emissions. This pattern has been reflected globally.

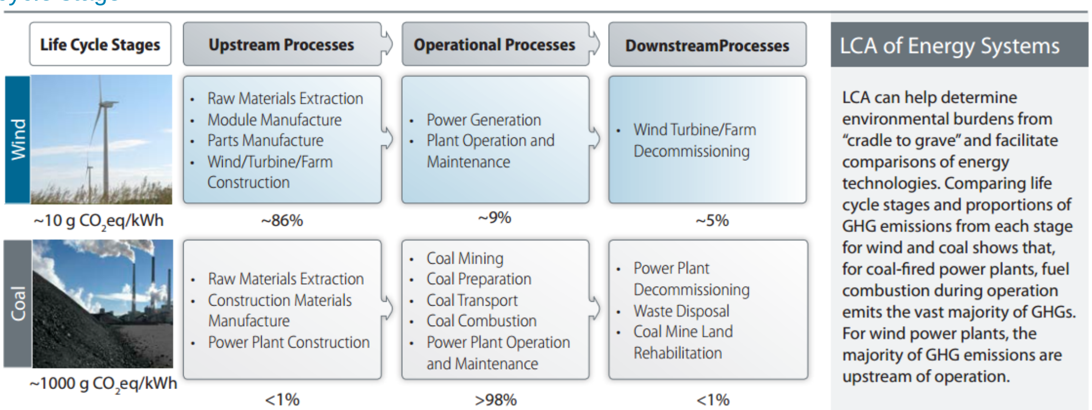
Life-cycle analysis of the energy and emission input and output equations relevant to renewable electricity generation infrastructure therefore provides an appropriate mechanism to compare conventional electricity generation plant against renewable generation systems, assisting in the decision making process for investment in new infrastructure and the determination of greenhouse gas emissions attributable to the electricity sector.

In 2012, the US based National Renewable Energy Laboratory (NREL) conducted a ‘harmonization’ project on both renewable and conventional generation modes with the intent of providing more exact estimates of associated GHG emissions[40].

The harmonization project adopted a systematic approach to review LCA literature and identify and reduce variability in the assessment of life cycle GHG emissions. More than 2,100 published LCA studies were reviewed, including approximately 240 published LCA studies of wind systems (land-based and offshore).

As illustrated in Figure 10 below, the harmonisation study estimated that the median value for greenhouse gas emission output for wind turbines across all life cycle stages is equivalent to ~10 g CO2 eq/kWh. By comparison, the estimated median value for electricity generated by coal was found to be ~1000 g CO2 eq/kWh.

Figure 8: Comparison of life cycle processes and greenhouse gas emissions for wind and coal power by life cycle stage



Source: National Renewable Energy Laboratory, 2013[41]

Energy Payback Time

The Energy Payback Time for wind turbines is quite small. While the payback time varies depending on the nameplate MW of the particular turbine, studies suggest it is at most 2-3 years and a minimum of 7 months for turbines ranging between 2MW-5MW. This is in comparison to non-renewable energy sources which continue further and further into emissions deficit each and every day that they operate.

40 Dolan, S.; Heath, G. (2012). “Life Cycle Greenhouse GasEmissions of Utility-Scale Wind Power: Systematic Review and Harmonization.” Journal of Industrial Ecology (16:S1); pp. S136-S154, available online at: http://onlinelibrary.wiley.com/doi/10.1111/j.1530-9290.2012.00464.x/pdf

41 National Renewable Energy Laboratory, 2013, Wind Power Results – Life Cycle Assessment Harmonization, available at: http://www.nrel.gov/docs/fy13osti/57131.pdf

Table 3: Payback time (in months) for wind turbines identified in life-cycle assessment studies

Study	Payback time (in months)	MW rating
Guezuraga et al (2012)[42]	27.6	2
Martinez et al (2009)[43]	7	2
Tremac and Meunier (2009)[44]	20.4	4.5
Vestas (2011)[45]	8	3
Weinzettal et al (2009)[46]	13	5

As stated in an article from the International Journal of Life Cycle Assessment:

> In any case, although there are components with a significant environmental impact within the turbine, it has also been verified that these impacts are much smaller than those generated by conventional power plants in operation, with reductions in the impact ranging from 89% to 99%, depending on the category. In addition, the energy payback time (time regarding the energy required to produce and implement a turbine) is less than 1 year, much smaller than the useful lifetime of the system, which is at least 20 years.[47]

As outlined in response to earlier Terms of Reference (i.e. Term of Reference a)) wind energy - as the cheapest large scale renewable - provides the most cost-effective means of lowering greenhouse gas emissions from Australia's electricity sector.

42 Guezuraga B, Zauner R, Polz W (2012) 'Life cycle assessment of 2 different 2MW class wind turbines.' Renew Energy 37(1):37-44

43 Martinez E et al (2009) 'Life cycle assessment of a 2MW rated power wind turbine: CML method.' Int J Life Cycle Assess, 14(1): 52-63

44 Tremeac B, Meunier F (2009), 'Life cycle analysis of 4.5MW and 250W wind turbines. Renew Sustain Energy Rev 13(8): 2104-2110

45 Vestas (2011) 'Life cycle assessment of electricity production from a Vesta's V112 turbine wind plant, final report' http://www.vestas.com/en/about-vestas/sustainability/sustainable-products/life-cycle-assessment/available-life-cycle-assesments-1.aspx

46 Weinzettal J et al (2009), 'Lifecycle assessment of a floating offshore wind turbine.' Renew Energy 34(3): 742-747

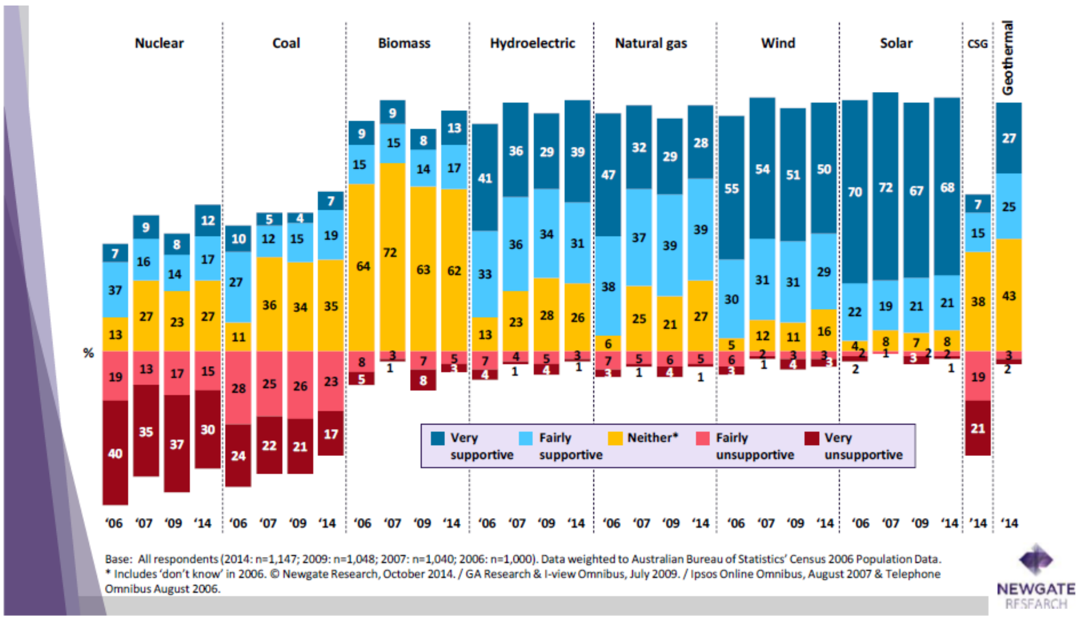
47 Martinez E et al (2009) 'Life cycle assessment of a 2MW rated power wind turbine: CML method.' Int J Life Cycle Assess, 14(1): 52-63

i) any related matter.

Community attitudes

Polling consistently shows that the communities in which wind turbines operate - and the Australian population in general – continue to support the generation of electricity by wind turbines in Australia. A survey of 1075 respondents conducted by Essential Research found that 76% of those surveyed support the building of wind farms in Australia to produce renewable energy[48].

Figure 9: Energy Source Preferences in Australia, 2014



Source: Newgate Research, 2014

Investment attraction

Australia's energy investment trends are influenced by global and local market factors. Across the world, there is a clear move away from fossil fuel generation technologies to cleaner forms across all technology options. Australia has high value renewable energy resources across all known options from wave, ocean, biomass, solar, wind, and geothermal. While these technologies are at varying levels of deployment and demonstration in Australia, many are already operating at scale in other countries.

In 2013, $214 billion went into clean energy investment49, continuing to drive renewable energy capacity across the world. With solar costs falling 30-40%, significant levels of solar generation were added in many nations.

In Australia the cost of wind generation has fallen by 10% and the cost of solar PV by 29% since 2011, while the cost of energy from new fossil-fuelled plants is high and rising50 because:

- New coal is made expensive by high financing costs. Australia's four largest banks are unlikely to finance new coal without a substantial risk premium due to the reputational damage of emissions-intensive investments – if they are to finance coal at all.

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48 Essential Research, 2013, Wind Farms – In general, do you support or oppose building wind farms in Australia to produce renewable energy?, available at: http://essentialvision.com.au/wind-farms

49 Renewable Energy Policy Network for the 21st Century (REN), Renewables 2014 Global Status Report, 2014, available at: http://www.ren21.net/portals/0/documents/resources/gsr/2014/gsr2014_full%20report_low%20res.pdf

50 Celsias. (2014). Unsubsidised renewables now cheaper than subsidised fossil fuels – Australia.

- New gas-fired generation is expensive as the expansion of Australia's liquefied natural gas (LNG) export market forces local prices upwards.

The commonly held view that fossil fuels are cheap and renewables are expensive is out of date. To develop energy policy from that perspective will be detrimental to Australia's long term interests.

There is a significant risk that fossil fuel assets will be written down in value as investors and markets transition away from emissions intensive infrastructure. This risk is highlighted in an Oxford University report and has been the subject of statements by the World Bank[51]. The long term reliability of energy supplies will be improved by significant investment in low emissions technologies and consideration should be given to mechanisms for retiring high emissions infrastructure before it becomes stranded.

A smooth but rapid transition to cleaner energy systems is in the national interest. Increasing the proportion of renewable energy within Australia will not only reduce emissions; it attracts investment, will provide lower prices to consumers and reduces health and environmental costs.

Downward pressure on wholesale electricity prices means households pay less

The benefits of the RET are multiple and broad while the electricity price impacts are low, stable and limited. Analysis by various bodies continues to show the fallacy in the assertion that LRET is "a major cost driver" or "significant burden" on consumers. The overall effect for consumers is net positive given the RET's effect on the wholesale market[52]. In relation to retail bill impacts, it is clear from regular analysis by the Australian Energy Markets Commission that the RET has a limited impact on retail bills.

It is accepted that the stationary energy market is undergoing significant change and transition. This is expected to continue for some time to come. Fundamental shifts in consumer demand, increased penetration of small scale generation, significant increases in the cost of gas and a reduced investment appetite for coal fired generation have seen a paradigm shift in market dynamics.

In such an uncertain future it is a prudent risk management strategy to maintain a level of diversification and flexibility in our energy system. Often overlooked in the discussion on future energy prices and the RET is the energy price hedge benefits that come from maintaining a reasonable portion of energy supply from technologies that have zero fuel costs.

In this context the value of the RET can't be assessed by purely looking at short term costs and benefits but should also be viewed as a risk mitigation policy that will provide lasting benefits. The RET provides these long term benefits by locking in an amount of fixed price energy production while maintaining an industry capacity to deliver further such energy supply should it be required.

To dismiss or diminish these benefits of RET would be akin to assessing the benefits of home insurance based solely on the previous 12 months. Would you consider the insurance premiums paid over the past 12 months as an economically inefficient use of funds because no claim was made or would you see it as a reasonable price to pay to ensure future risks were managed?

Clearly, managing risks in such a manner is not only common practice but best practice. Consumers and business engage in these risk mitigation activities every day so it is not unreasonable to expect our governments to do the same.

Supply security and affordability

The development of the National Energy Market (NEM) has increased energy supply security through many years of investment and improvement to the network and increasingly sophisticated energy market management systems.

51 Swann, T, Denniss, R. (2014). The Conversation. Fossil fuel campaigners win support from unexpected places. 5 February, 2014.

52 ROAM (2014). Report to the Clean Energy Council - RET Policy Analysis

Wind energy forecasting has improved significantly in recent years.. AEMO has been developing and integrating systems and services to manage wind generation in secure, predictable and balanced ways. Plant has moved, largely, to semi-scheduled dispatch settings that enable AEMO to manage the integration of wind generation, accurately predicting wind supply to 97% (or above) for each period. South Australia shows that wind generation can be well integrated into the energy market without impacting reliability and security of supply. Wind now supplies over 25% of energy in South Australia annually.

Over the next decade and beyond wind generation will play a key role in ensuring energy (price) security to Australian consumers is maintained. In the context of rising gas prices, and ensuring that gas is used in the most efficient way for the market, enabling renewable energy supply to offset the need for gas powered generation is a clear benefit to security of supply.

The RET will provide a vital safeguard (hedge) against the rising cost of gas fired generation.

Realising the benefits

Australia must transform its energy system in the coming decades to meet national emissions reduction targets and to ensure the Australian economy remains competitive in a low carbon future. Achieving this requires an energy plan that allows continued growth and prosperity while delivering deep cuts in greenhouse gas emissions.

To achieve this, a coordinated set of policies and measures that drive investment and action towards a lower emissions profile is required. Chief in the policy response is a price on carbon and continued industry development and transformation support through a specific target to deploy renewable energy.

The expanded renewable energy target (LRET) is a key policy measure and will complement broader actions. In establishing the Renewable Energy Target (RET) in 2001 and through subsequent reviews in 2003 and 2009, successive governments have continued to encourage significant investment in the stationary energy sector by domestic and international participants alike. This has resulted in over $18 billion invested in new innovative technologies, the creation of some 24,000 jobs and the reduction of 22.5 Mt in carbon emissions.

By any measure the RET has been an outstanding success of which successive governments, business and the community should be proud.

Onshore, utility-scale wind farms are highly economic and reliable. Development, deployment and operation of wind energy facilities is very closely regulated and scrutinised through local and state development and planning requirements.

Renewable energy projects including wind are vital to job creation, establishment of new industries and, in the case of renewable energy generation, supply of zero emission electricity.

Wind farms create jobs and bring investment into regional and rural areas, increase sustainable farm income and sustainability (regardless of seasonal fluctuations and/or drought conditions), provide clean power to the local grid and reduce emissions.

In the case of Pacific Hydro, we have a long standing commitment to maximising local content in all our wind farm developments and have achieved, on average approximately 40% local content. This is primarily made up of civil and electrical engineering components and locally made towers, which have featured in every Australian wind farm the company has developed.

Energy and Health

The health impacts of fossil fuels are well documented. Coal pollution consists of a range of noxious chemicals (including arsenic, lead, nitrogen and mercury) and small particulates. A 2009 United States report titled *Coal's Assault on Human Health* by the Physicians for Social Responsibility (PSR) stated that coal pollutants contribute to four of the five leading causes in death in the USA: heart disease, cancer, stroke and chronic respiratory diseases53 It would be negligent for any Senate inquiry to consider the health impacts of wind energy in the face of scientific evidence and peak health organisations which find no evidence, whilst concurrently ignoring the known health impacts of coal fired power stations in a nation that is so reliant on coal for its electricity.

In 2015 a report co-released by the Latrobe Valley's Voices of the Valley and Environmental Justice Australia, prepared by air pollution expert and biostatistician Professor Donald Campbell found that eleven additional deaths were likely to have been caused by the Hazelwood coal mine fire which occurred in 201454. The recently elected Victorian Labor government has committed to reopen the inquiry into the Hazelwood coal mine fire to further understand the directly associated health impacts.

Doctors for the Environment Australia (DEA) arose as a branch of the International Society of Doctors for the Environment (ISDE), based in Switzerland, founded in 1990 and with member organisations in 38 countries, mainly Europe and the Americas. DEA's 2009 Energy Policy Statement[55] includes:

> - Fossil fuels have additional health impacts by causing significant morbidity and mortality from cardio-respiratory diseases and cancer. In addition they are adding to pollution from mercury throughout the world which is contaminating fish stocks. Fossil fuel industry is water intensive in a water poor continent. Depletion of our hydrocarbon reserves will place a burden on future generations who will also need them for agriculture, plastics and pharmaceuticals.
> - Coal is the most costly form of energy when the environmental, direct and indirect health impacts are accounted for. DEA believes that it is an important health measure that no new coal power is initiated in Australia and we suggest that this will become possible by the urgent institution of the measures recommended in this policy.

Further, the DEA's 2014 Wind Farms and Health position statement[56] includes the following:

> - Negative effects arising from an energy source must be viewed in the context of wider significant social and environmental consequences. In the case of Wind Turbines, health benefits accrue from the avoidance of air pollution and greenhouse gas emissions, which have both immediate, long term and cumulative health effects.
> - There has been a persisting failure for policy makers to account for the broader social and health effects that are integral to energy generation, despite these being increasingly well recognised and documented.

53 Physicians for Social Responsibility (2009), Coal's Assault on Human Health, available at: http://www.psr.org/assets/pdfs/psr-coal-fullreport.pdf

54 Professor Donald Campbell (2014), Hazelwood Coalmine Fire Health Effects Report, available at: http://hazelwoodinquiry.vic.gov.au/wp-content/uploads/2014/08/Expert-report-of-Dr-Campbell.pdf

55 Doctors for the Environment Australia (2009), An energy policy for Australia: Doctors for the Environment Australia, http://dea.org.au/images/general/Energy_Policy_Final_2009.pdf

56 Doctors for the Environment Australia (2014), Position Statement: Health Effects of Wind Turbines, available at: http://dea.org.au/images/general/DEA_Position_Statement_-_Health_Effects_of_Wind_Turbines_-_December_2014.pdf

Wind Farms, Audibility and Health

The World Health Organisation adopts a guideline value of 40 dB(A) for protecting against general sleep disturbance effects. Across Australia, the States typically adopt a 40 dB(A) noise limit for wind farms or the background noise +5dB(A), whichever is the greater. Provision is also made for a limit of 35 dB(A) (or the background noise +5dB(A), whichever is the greater) in specific circumstances on the basis of their respective State legislated planning and zoning controls. These are amongst the strictest noise criteria in the world for wind farms.).

There are strong ramifications for not meeting State guidelines through existing state planning regulations which can include financial penalties and shutdowns. In each State, the responsible planning authority (i.e. State Government or local Council) and in some cases the Environment Protection Authority (EPA) has enforcement powers.

Concern regarding alleged health impacts from wind farms is claimed by some to relate to low frequency noise and/or infrasound that is below the audible range. 'Wind turbine syndrome' is the term often used by those alleging these impacts, coined in the USA by Dr Nina Pierpont who claims to have carried out research which demonstrates that certain people living in close proximity to industrial wind turbines are adversely affected by low-frequency vibrations emanating from the turbine. In South Australia, Dr Pierpont's allegations are frequently cited by Dr Sarah Laurie who often acts for the Waubra Foundation, a prominent Australian anti-wind group.

However, low frequency noise and infrasound is all around us every day and is not a phenomenon unique to wind farms. Numerous natural and man-made sources of low frequency noise and infrasound exist in urban and rural environments. Motor vehicles generate low frequency noise and infrasound and we surround ourselves with them. Research from 2010 by Adelaide-based acoustics consultancy Sonus has shown that infrasound levels at a beach and in the Adelaide CBD are typically higher than those within 200-300 metres of a wind turbine.[57] This is consistent with earlier European research.

The NSW 2009 Rural Wind Farms Inquiry considered the alleged existence of wind farm syndrome and was one of the first of many Australian upper house inquiries to do so. The Inquiry Committee's closing comments on "Wind Turbine Syndrome" included the following:

> The Committee is concerned that the significance of 'Wind Turbine Syndrome' is being unnecessarily exaggerated because Dr Pierpont is a medial [sic] doctor and has published a book on the issue, rather than any scientific merit of such a syndrome. As a result, a degree of fear is being instilled in communities that may host wind turbines. The Committee is concerned that, based on evidence received, this unwarranted fear may be causing greater health impacts than the presence of any actual 'Wind Turbine Syndrome'

The 2012 report[58] from the Senate Standing Committee on Environment and Community review of proposed legislation for "excessive noise from wind farms" noted in relation to health that:

> - [3.11] The number of health-related complaints about wind farms is small in proportion to the number of people living near these facilities. The numbers also vary greatly from one facility to the next, for reasons not apparently related to the number of residents in the area.
> - [3.23] There is limited, and contested, published evidence that wind farm noise may be associated with annoyance and sleep disturbance in some individuals, but the causes are not clear; this is also considered further below. State governments and planning authorities currently have in place guidelines that are intended to address audible noise pollution, including from wind farms.

57 Sonus (2010), Infrasound Measurements from Wind Farms and Other Sources, available at: http://www.pacifichydro.com.au/files/2011/10/Sonus-Report.pdf

58 Senate Environment and Communications Legislation Committee. 2012. Committee Report, Renewable Energy (Electricity) Amendment (Excessive Noise from Wind Farms) Bill 2012.

> - [3.44] The committee concludes that, while it is possible that the human body may detect infrasound in several ways, there is no evidence to suggest that inaudible infrasound (either from wind turbines or other sources) is creating health problems. In contrast, there is an established literature confirming the existence of psychogenic, or nocebo, effects in general, and at least one study suggesting they may be responsible for symptoms in some wind turbine cases.
> - [3.45] The committee wishes to emphasise that it does not doubt that the symptoms are real. It also does not doubt that some people may be affected by audible noise. It is concerned, as Dr Tait from Doctors for the Environment Australia expressed, that the discussion about a purported wind turbine syndrome is hampering progress on the issue:
>
> ‘Part of the problem, I think, of going around and promoting a wind turbine syndrome and going into communities and getting people scared about wind turbines is that it has muddied the water and it is distracting us from actually dealing with those small groups of people who have got a legitimate problem and do need us to be having some sort of debate about how we as a society work to help them with the issues that they are experiencing.’

The Victorian Department of Health’s 2013 *Wind farms, sound and health* [59] document makes the following statement:

> **There is no evidence that sound which is at inaudible levels can have a physiological effect on the human body. This is the case for sound at any frequency, including infrasound.**’

The Australian Medical Association (AMA) released a Position Statement on Wind Farms and Health in 2014[60] which includes the following statement:

> The available Australian and international evidence does not support the view that the infrasound or low frequency sound generated by wind farms, as they are currently regulated in Australia causes adverse health effects on populations residing in their vicinity. The infrasound and low frequency sound generated by modern wind farms in Australia is well below the level where known health effects occur and there is no accepted physiological mechanism where sub-audible infrasound could cause health effects.

Further, Pacific Hydro draws to the Committee’s attention the recent findings of the Resources and Development Court of South Australia with respect to the Stony Gap Wind Farm[61], which the Goyder Council in South Australia refused to grant planning permission for, a decision which was overturned by the court in late 2014. The Court considered evidence put before it by opponents to the proposal in relation to the alleged impacts of inaudible noise emissions. It found the opponents’ acoustician’s:

> approach to the task includes privileging the subjective experiences of those residents who have experienced problems, and their perceptions as to the cause of these experiences, over other contradictory data.

---

59 Department of Health, Victoria (2013), Wind farms, sound and health, available at http://www.health.vic.gov.au/environment/windfarms.htm

60 Australian Medical Association (2014), Position Statement: Wind Farms and Health, available at: https://ama.com.au/sites/default/files/documents/wind_farms_and_health_2014.pdf

61 Environment, Resources and Development Court of South Australia (2014), TRU Energy Renewable Developments Pty Ltd v Regional Council of Goyder & Ors, Judgement of Her Honour Judge Cole, Commissioner Mosel and Commissioner Brookman, 4 November 2014, available at: http://docs.wind-watch.org/Stony-Gap-Judgment-2014-SAERDC-48.pdf

Further and with respect to arguments put forward by Dr Sarah Laurie to the Court regarding the impacts of infrasound (sound that is below the accepted level of human hearing) on human health, the court found:

> Dr Laurie's evidence does not contain evidence (whether from her own research, or that of others) of a causal link between contemporary operating wind turbines and the kind of health problems reported by the deponents, which is consistent with any accepted scientific or legal method of proof.'

In deciding to overturn Goyder Council's decision to refuse the granting of the permit, the Court found that:

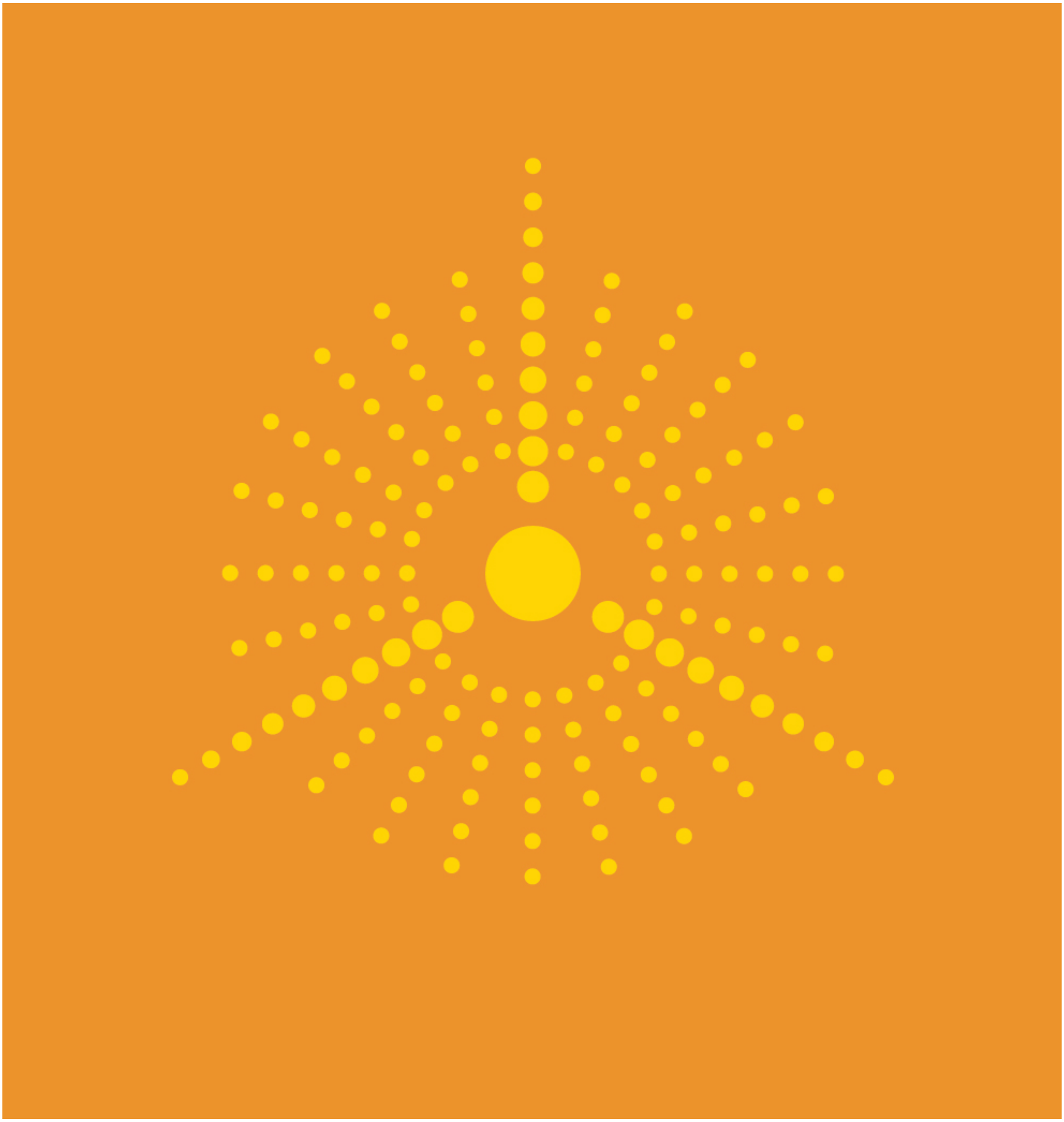
> There is no basis for the refusal of development plan consent to the proposed development on the grounds of health effects.'

Appendix A – Recent Federal Inquiry and Review Reports

Australian Government
Climate Change Authority

RENEWABLE ENERGY TARGET REVIEW REPORT

DECEMBER
2014



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Australian Government
Climate Change Authority

22 December 2014

The Hon. Greg Hunt, MP
Minister for the Environment
Parliament House
CANBERRA ACT 2600

Dear Minister

In accordance with section 162 of the *Renewable Energy (Electricity) Act 2000* (Cth), the Climate Change Authority submits to you its report of the Renewable Energy Target review.

As also required by the Act, the report will be published on the Authority's website (www.climatechangeauthority.gov.au).

Yours sincerely

Bernie Fraser
Chair

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ACKNOWLEDGEMENTS

The Authority would like to thank the people and organisations who contributed time and expertise to this review and in the process enhanced the quality of the review.

Various government departments and public agencies have also assisted the work of the Authority, including the Department of the Environment, Clean Energy Regulator, Australian Energy Market Operator, Australian Energy Market Commission, Clean Energy Finance Corporation and Department of Industry.

Over the course of the review, the Authority has received submissions from individuals, environment organisations, electricity generators and retailers, business and electricity sector peak bodies, and electricity sector investors.

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SUMMARY

This is the Climate Change Authority's second review of the Renewable Energy Target (RET). The RET targets reductions in greenhouse gas emissions from the electricity sector and thereby contributes significantly to reducing Australia's overall emissions.

In its 2012 review of the RET, the Authority found that the RET was stimulating considerable investment in renewable energy and argued that a stable and predictable policy was essential to sustain this investment. It concluded that no major changes were warranted to the overall RET design, but suggested some minor operational changes.

The uncertain future of the Authority until recently has limited the time available to conduct this review. Largely for that reason, the Authority has focused on what, it its view, are the most important issues. The Authority has also drawn on both its 2012 Authority review, and on the review conducted this year by a panel headed by Mr Dick Warburton AO LVO.

THE RET AND AUSTRALIA'S EMISSIONS REDUCTION GOALS

In 2010, when the Large-scale Renewable Energy Target (LRET) was set at 41,000 GWh, it was estimated that this contribution, with contributions from the Small-scale Renewable Energy Scheme (SRES) and other pre-existing renewables (notably hydro), would together represent at least 20 per cent of Australia's (then) projected total electricity demand in 2020. Given that electricity accounts for approximately one-third of Australia's emissions of greenhouse gases, renewable sources were seen as making a significant contribution to Australia's broader emissions reduction goals.

Reducing emissions in the electricity sector plays a pivotal role in climate change policies around the world. Unchecked climate change is widely seen as posing serious risks for the Australian community and its economy. Together with the broader international community, Australia has agreed to a goal of limiting global warming to no more than 2 degrees Celsius above pre-industrial levels to avoid the worst impacts of climate change. This requires concerted action by all countries—including Australia—to reduce their greenhouse gas emissions. The RET, as currently legislated, is a significant part of Australia's policy response to that challenge.

The RET arrangements were envisaged to deliver 'at least 20 per cent' of Australia's electricity from renewable sources by 2020 and are projected to reduce Australia's emissions by 58 million tonnes of carbon dioxide equivalent (Mt CO_2-e) over 2015–20, and by much larger amounts in later periods.

The RET arrangements are not perfect but, in the Authority's view, they are effective in reducing emissions (at reasonable cost) in the centrally important electricity sector. Given the absence of effective alternative measures bearing upon this sector, the Authority does not favour any significant scaling back of the 2020 LRET target of 41,000 GWh.

POSSIBLE EXTENSION OF END YEAR FOR THE LARGE-SCALE RENEWABLE ENERGY TARGET

In its 2012 review, the Authority considered the feasibility of achieving the 2020 LRET target. It concluded that the task was challenging but could be met, provided there was ongoing confidence on the part of renewables investors and assuming that the carbon price remained in place. Since then, confidence in the industry has waned and now investment has tapered off, on the back of the erosion of bipartisan support, continuing uncertainty about possible changes and the repeal of the carbon price.

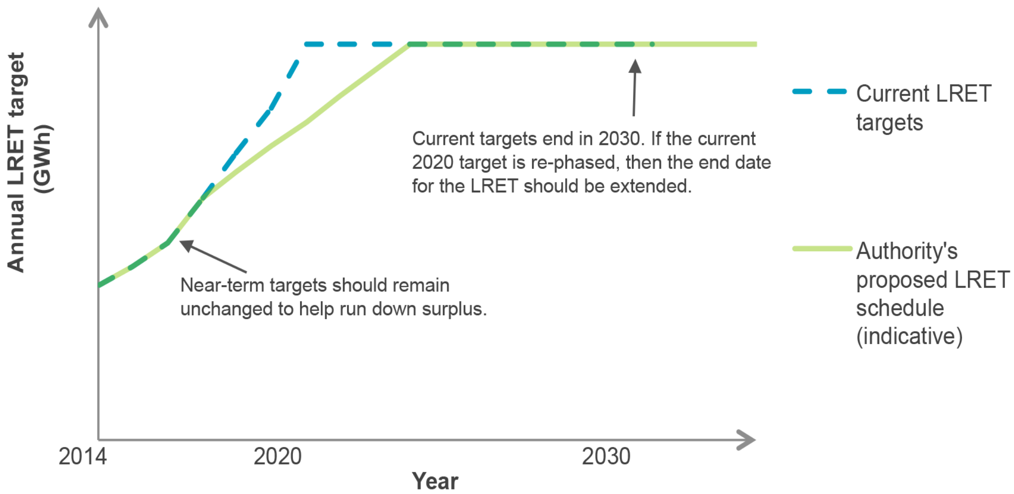
Confidence within the industry that bipartisan support for the LRET can be restored quickly in a convincing manner is essential to have a strong chance of achieving the 2020 goal of 41,000 GWh. At this time this is looking rather problematic.

Another change which has occurred since the 2012 review is that the projected demand for electricity in the National Electricity Market in 2020 has declined by about 16 per cent. This would imply a somewhat greater adjustment on the part of incumbent generators than was previously envisaged.

Having regard to these various changes—and to upholding the credibility of the present LRET target—the Authority recommends that the present target be preserved but the current 2020 timeframe for achieving it be extended by, say, up to three years (Figure 1). As discussed in the report, two consequential changes would flow from the adoption of this recommendation:

- the annual LRET targets should be re-phased after 2017
- to assist delayed projects to recoup their costs, the end date for the LRET would need to be extended by at least the same number of years as the 2020 target was deferred.

FIGURE 1: PROPOSED RE-PHASE FOR LRET TARGETS



Source: Climate Change Authority

EXEMPTIONS

Exemptions from RET costs are provided to some business activities based on their overall emissions intensity, regardless of whether those emissions are related to electricity use. Providing assistance with electricity costs to businesses that are not particularly electricity intensive leads to anomalies and places greater costs onto non-exempt electricity users. If broadening of assistance is considered, it should be based on need, the best measure of which in this context is electricity intensity.

THE ROLE OF THE RET AFTER 2020

The challenges of climate change are ongoing and Australia will need to pursue policies capable of reducing its emissions well into future.

The government proposes to set Australia's post-2020 emissions reduction targets in the first half of 2015.

The Authority noted in its 2012 review that the RET was not a 'first best' approach to reducing emissions in the electricity sector. A more comprehensive approach that encouraged or discouraged different types of generation on the basis of their emissions intensity would be better in this sector in the long term. In the absence of such an approach, however, the Authority believes that increases in, and extensions of, the existing RET targets should remain an option in the period beyond 2020, as should expanding arrangements to cover a wider set of technologies.

ROOFTOP SOLAR UNDER THE SMALL-SCALE RENEWABLE ENERGY SCHEME

The small-scale solar photovoltaic (PV) industry has been very successful in installing rooftop solar systems for Australian households, community groups and small businesses. Assistance provided under the SRES has encouraged this growth but, as costs have fallen, the case for maintaining current levels of support has become less compelling. Some evidence also suggests that subsidising small-scale PV at these levels is a relatively expensive way of reducing emissions from the electricity sector.

That said, the cost impacts on electricity consumers are modest and the gradual phase-out of the scheme is to commence shortly. Any more rapid phase-out should be designed to avoid disruptive cycles in the industry.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS	NUMBER	PAGE
Substantial reductions in electricity sector emissions over the coming decades—including through greater deployment of renewables—must be a key focus for Australia in playing its part in reducing global emissions and the risks of dangerous climate change.	C 1	19
The Renewable Energy Target arrangements are currently the primary policy instruments for electricity sector decarbonisation, and no more cost-effective and scalable measures are in prospect at this time. Their overall impacts on electricity consumers are quite modest, and are mitigated through the provision of targeted assistance.	C 2	23
If any further exemptions from electricity costs under the RET are to be granted, this should be on the basis of electricity intensity, rather than emissions intensity.	C 3	39
Subsidising household PV under the SRES is a relatively expensive way to reduce emissions in the electricity sector. The Authority, however, has not recommended any changes, largely because the SRES assistance will shortly begin to phase out, and the overall costs are relatively modest.	C 4	48
No changes should be made to the Renewable Energy Target framework to promote diversity of renewable technologies at this time.	C 5	50
In the interest of maintaining investor confidence in the industry, the frequency of statutory reviews of the RET should be changed from every two years to every four years. For the same reason, if bipartisan agreement were to be reached on any revisions to the current 2020 LRET target, those revised arrangements should be outside the scope of future reviews.	C 6	50

RECOMMENDATIONS	NUMBER	PAGE
Given the sharp decline in investor confidence, the resulting slowdown in investment, and the further reduction in projected electricity demand, the government should: • defer the 2020 target for the LRET by, say, up to three years and • extend the scheme as a whole by at least the same amount of time, with a view to providing sufficient time for projects to recover their costs. Given the large overhang of certificates, there is no case to reduce the annual targets until after 2017.	R.1	37
Over the longer term increased recourse to renewables in electricity generation is essential to Australia's efforts to reduce its total greenhouse gas emissions. In the absence of effective alternatives, RET arrangements will have to carry much of this burden, so consideration should be given—at the appropriate time—to the nature and timeframe of possible RET arrangements in the post 2020 period. In particular, the government should consider increasing and extending targets, and expanding arrangements to cover a wider set of technologies.	R.2	39

CHAPTER 1. ABOUT THIS REVIEW

This chapter outlines the scope and context of the Climate Change Authority's 2014 Renewable Energy Target (RET) review. It provides information about the Authority and its approach to the review.

1.1. THE CLIMATE CHANGE AUTHORITY

The Climate Change Authority ('Authority') is an independent statutory agency, established to provide expert advice on Australian climate change policy, including through a scheduled series of reviews of climate programs and legislation.

The Authority currently comprises a Chair (Mr Bernie Fraser) and four members with expertise including in climate science, economics, and public policy. Its work is guided by a set of principles under the *Climate Change Authority Act 2011* (Cth), which requires the Authority to have regard to the following matters:

- economic efficiency
- environmental effectiveness
- equity
- the public interest
- the impact on households, business, workers and communities
- the development of an effective global response to climate change
- Australia's foreign policy and trade objectives
- any additional principles the Authority considers relevant.

1.2. APPROACH AND CONTEXT

The Authority's requirements for reviewing the RET are set out in the *Renewable Energy (Electricity) Act 2000* (Cth) (the REE Act) and *Climate Change Authority Act 2011* (Cth) (see Appendix B). Any recommendations must be consistent with the objects of the REE Act (s. 3) which are to:

- encourage the additional generation of electricity from renewable sources
- reduce emissions of greenhouse gases in the electricity sector
- ensure that renewable energy sources are ecologically sustainable.

The Authority reviewed the RET in 2012. In that review the Authority emphasised the role of the RET in reducing emissions and the importance of a stable and predictable policy environment to its success. It concluded that no major changes were warranted to the overall scheme, but suggested some minor operational changes.

The Authority conducted its 2012 review against the policy backdrop existing at that time. Since then, significant changes have occurred. In particular, the carbon pricing mechanism has been repealed and the outlook for electricity demand is more subdued than it was in 2012.

The government initiated a new review of the RET in 2014 by a panel headed by Mr Dick Warburton AO LVO, and supported by a secretariat located within the Department of the Prime Minister and Cabinet. The report of the Expert Panel (hereafter, the 'Warburton review' report) was released in August 2014. The review concluded that the cost of the RET outweighed its benefits and that significant change was required. The review recommended that:

- the Large-scale Renewable Energy Target (LRET) be either closed to new entrants or modified so that targets to 2020 are set one year in advance and increase by half of projected additional electricity demand in that year.
- the Small-scale Renewable Energy Scheme (SRES) be either terminated immediately or phased out more rapidly (by 2020 rather than 2030).

A full list of the Authority's 2012 recommendations and those of the 2014 Warburton review are at Appendix C. Consistent with its 2012 report and in line with its legislative requirements, the Authority's 2014 RET review pays particular attention to:

- the objective of reducing emissions (both now and in the longer term)
- the research demonstrating the crucial role that decarbonisation of the electricity sector will play as Australia and the world move to a low-emissions economy.

The Authority concluded in its 2012 review that two-yearly reviews of the RET risked undermining policy stability and investment in the sector and recommended that they occur only every four years (CCA 2012, p. 39); this recommendation has not been implemented and the Authority's statutory obligation to conduct this review remains in place.

1.3. SCOPE OF REVIEW AND REPORT STRUCTURE

This review covers a small number of issues which the Authority believes are of most significance at this time. The lingering uncertainty about the future of the Authority has also necessitated the fairly narrow focus of the review. As appropriate, the Authority has drawn on previous consultation and analysis from both the 2012 Authority review and this year's Warburton review.

The important issues considered by the Authority include:

- The role of the electricity and renewables sectors in contributing to the goal of keeping global average warming to below 2 degrees (chapter 2).
- The case for rescheduling the LRET target; the appropriateness of current assistance to emissions-intensive, trade-exposed activities; and the role of the RET after 2020 (chapter 3).
- Whether any changes should be made to the level of assistance provided to small-scale solar photovoltaic (PV) generation under the SRES (chapter 4).
- Whether any changes to the RET design to promote access by more diverse renewable technologies are warranted; and the appropriate frequency of statutory reviews of the RET (chapter 5).

The limited scope of this review has meant that some questions, such as the treatment of larger, commercial-scale PV, could not be addressed on this occasion. For the same reason the Authority did not commission additional economic modelling of the electricity sector for this review, but has drawn on several previous exercises including modelling commissioned for the Authority's earlier review and the Warburton review.

1.4. CONSULTATION

The Authority has reviewed the public submissions made to the Warburton review, and met with and secured input from interested stakeholders (see Appendix A for a list of submissions received). The Authority would like to thank the people and organisations who contributed time and expertise to the review.

CHAPTER 2. THE RENEWABLE ENERGY TARGET AND AUSTRALIA'S EMISSIONS REDUCTION TASK

The RET works by creating a market for additional renewable electricity that supports investment in new renewable generation capacity.

This chapter outlines the operation and impacts of the RET and places them in the broader context of Australia's emissions reduction goals.

It examines Australian and international research on the transition to a low-emissions economy. This suggests major decarbonisation of electricity systems by 2050 is required to reduce the risks of dangerous climate change. Two consistent findings of this research are that significantly more needs to be done both before and beyond 2020 to reduce electricity sector emissions, and that renewable energy is likely to play a major role in this task.

This chapter also considers the extent to which the RET is the 'right' policy instrument for reducing electricity sector emissions. It finds that the RET can make significant emissions reductions at reasonable cost, with modest impacts on electricity consumers.

2.1. INTRODUCTION

The RET arrangements are designed to deliver the equivalent of at least 20 per cent of Australia's electricity from renewable sources by 2020 (see Box 1). The term 'equivalent' is used because the scheme includes displacement technologies, such as solar water heaters, which reduce electricity demand rather than generate electricity. The primary legislation for the RET, the REE Act, sets out the formal objects of the Act which are to:

- encourage the additional generation of electricity from renewable sources
- reduce emissions of greenhouse gases in the electricity sector
- ensure that renewable energy sources are ecologically sustainable.

The RET's objectives should be seen in the context of Australia's broader goal of contributing to global efforts to reduce the risks posed by climate change.

2.2. THE RENEWABLE ENERGY TARGET—ITS OPERATION AND IMPACTS

2.2.1. HOW THE RET WORKS

The RET works by creating a market for additional renewable electricity that supports investment in new renewable generation capacity. It places a legal obligation on entities that purchase wholesale electricity (mainly electricity retailers) to surrender a certain number of certificates to the Clean Energy Regulator (CER) each year. These certificates are generated by accredited renewable power stations and eligible small-scale renewable technologies. Each certificate represents one megawatt hour (MWh) of additional renewable energy for compliance purposes; the certificates are tradeable and can be 'banked' for use in later compliance years. If a liable entity does not surrender the number of certificates required, a 'shortfall charge' of $65/MWh applies to the outstanding amount. Costs incurred by purchasing certificates are tax-deductible, while the payment of the shortfall charge is not. Assistance with the costs of the RET is provided to eligible emissions-intensive, trade-exposed businesses. Generators producing and consuming their own electricity ('self-generators') are exempt.

Since 2011, the RET has operated as two schemes—the Large-scale Renewable Energy Target (LRET) and the Small-scale Renewable Energy Scheme (SRES).

The LRET supports large-scale renewable energy projects, such as wind and large-scale solar generators, by helping to bridge the cost between renewable and fossil-fuel generation. It sets annual targets for the amount of large-scale renewable energy; these targets rise to 41,000 GWh in 2020 and stay constant at that level until the scheme ends in 2030 (see Figure 9 in chapter 3). These annual targets are allocated among liable parties in proportion to their purchases of wholesale electricity.

The SRES helps households, small businesses and community groups with the upfront cost of installing small-scale renewable systems, such as rooftop solar photovoltaic (PV) systems and solar hot water heaters. The SRES has no fixed annual targets; rather, liable entities are obliged to purchase all of the certificates generated from the installation of eligible small-scale systems. Unlike the LRET, where certificates are generated in arrears, owners of eligible small-scale technologies receive certificates upfront for the amount of renewable electricity the system is 'deemed' to create over a given period. This approach reduces the administrative burden on households and the CER. The scheme will phase out gradually (from 2017 or 2022 depending on the technology), with the number of years of deeming reducing by one each year until the scheme ends in 2030. Small-scale technology certificates (STCs) can be sold through the Clearing House for $40; this provides a price cap for the scheme, the level of which can be altered by the Minister.

The Authority's 2012 RET review provides further detail about the operation of the two schemes.

BOX 1: 'AT LEAST 20 PER CENT' AND THE 41,000 GWH TARGET

The RET aims to ensure that 'the equivalent of at least 20 per cent of Australia's electricity generation comes from renewable resources by 2020' (Explanatory Memorandum, REE Amendment Bill 2009 (Cth)). To meet this target, the legislation specifies a fixed amount of large-scale electricity generation each year, providing clear signals about the amount of large-scale generation capacity required to meet the targets. The legislated 2020 LRET target is 41,000 GWh. The amount of renewable energy in Australia in 2020 was never going to be exactly 20 per cent. It will be higher or lower depending on several factors, including overall demand for electricity. The SRES is uncapped.

In its 2012 RET review, the Authority considered the merits of fixed versus floating targets and preferred a fixed target, based on the argument that setting gigawatt hour targets to achieve a particular share of demand would require continuous revision, leading to significant uncertainty about the amount of investment required to meet the target.

Estimates of the share of electricity that will be supplied by renewable generation in 2020 vary depending on both the method used (for example, what counts as renewable energy) and the projections of future electricity supply and renewable energy generation.

The RET (and Mandatory Renewable Energy Target (MRET) before it) was designed to encourage additional renewable electricity generation, so generation from pre-existing renewable plant needs to be considered when estimating the total share of renewables in a given year. This means there are three distinct components that affect the share of renewable energy:

- electricity demand
- eligible generation under the RET (both large-scale and small-scale)
- 'below baseline' generation from renewable generators that existed before the MRET ('pre-existing' renewable generators). Pre-existing renewable generators are allocated baselines based on their average historical output and are eligible to receive certificates for output above these baselines. The amount of generation below their baselines needs to be added to generation from the RET to get the total amount of renewable generation.

When the initial 20 per cent by 2020 target was translated to a fixed gigawatt hour amount in 2007, Australia-wide electricity supply was projected to be about 300,000 GWh in 2020 and below-baseline generation was expected to be about 15,000 GWh per year (CCA 2012, p. 43). With a RET of 45,000 GWh per year by 2020, this translated into a total renewable energy contribution of 60,000 GWh per year, equivalent to 20 per cent of (then) forecast demand in 2020. When the RET was split, the LRET target was revised to 41,000 GWh in 2020 (and through to 2030) and the SRES was left uncapped, but notionally allocated at least 4,000 GWh.

Over time, projections have changed, increasing the projected share of renewable energy in 2020. In 2012, the Authority projected the share of renewables in 2020 would be about 26 per cent. The updated forecasts included in the Warburton review project a 2020 renewables share of 26 per cent (if displacement from solar hot water is excluded) or 28 per cent (if it is included, as per the Authority's analysis, which was based on previous approaches). Table 1 compares the modelling outputs and resulting share of renewables from the two reviews.

TABLE 1: PROJECTED SHARE OF RENEWABLES IN 2020, DIFFERENT RET REVIEWS

	LRET TARGET (GWH)	BELOW BASE-LINE GEN. (GWH)	SOLAR PV (GWH)	SHW (GWH DISPLACED)	TOTAL RENEWABLES (GWH)	TOTAL GENERATION (GWH)	SHARE OF RENEWABLES IN 2020 (%)
CCA 2012 RET Review (p. 43)	41,000	14,300	7,900	3,000	66,200	258,500	26
2014 Warburton review (pp. 126-130)	41,000	16,150	9,920	3,500 (not in Warburton method)	70,570	255,300	28

Source: Climate Change Authority based on CCA 2012 and Warburton review 2014

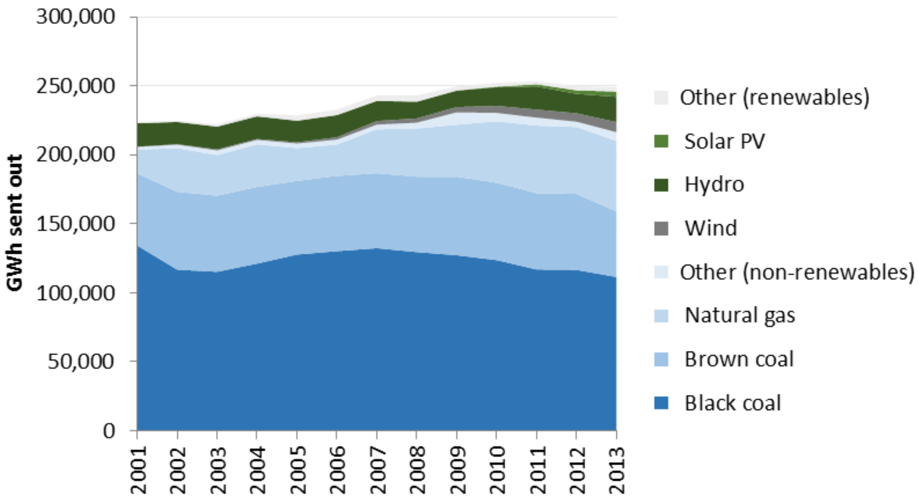
2.2.2. RENEWABLES CAPACITY AND GENERATION SO FAR

The recent Warburton review found that the RET has been successful in promoting additional generation from renewable sources. Over 2001–2014, more than 400 renewable power stations with a total capacity of more than 5,000 MW were installed under the RET—equivalent to about 10 per cent of Australia's current grid-connected capacity (Climate Change Authority calculation based on Warburton review 2014 and Energy Supply Association of Australia (ESAA) 2014). About three-quarters of this is wind power; the rest includes biomass, hydro, landfill gas and solar (Warburton review 2014, p. 8). Figures 2 to 4 show the increase in renewable generation over 2001–2013. The amount of renewable energy generation almost doubled over the period, from about 17,800 GWh in 2001–02 to about 32,500 GWh in 2012–13, with the share of renewables rising from eight to 13 per cent over the same period.

So far, about 2.2 million small-scale renewable systems have been installed under the RET (Clean Energy Regulator 2014a). About 1.3 million of these are small-scale solar PV systems, which have been installed by more than 10 per cent of Australian households (ACIL Allen 2013a, p. viii).

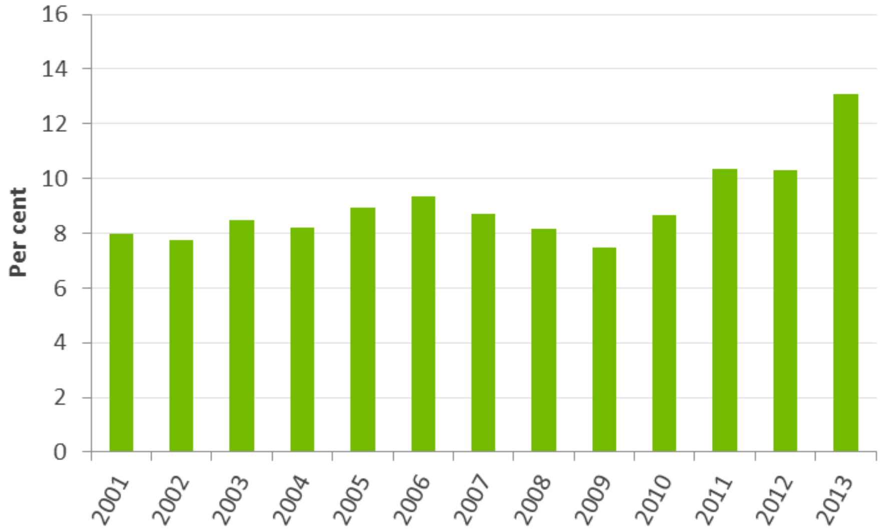
To date, the emissions reductions from the RET have been relatively small, because annual targets have been relatively low. Modelling by SKM for the Clean Energy Council estimated that Australia's emissions over 2001–2012 were 22.5 Mt CO_2-e lower with the RET in place (SKM 2012, p. 1). This is equivalent to about 10 per cent of Australia's current annual electricity sector emissions (CCA 2014, p. 159).

FIGURE 2: GENERATION BY FUEL SOURCE, AUSTRALIA, 2001–2013



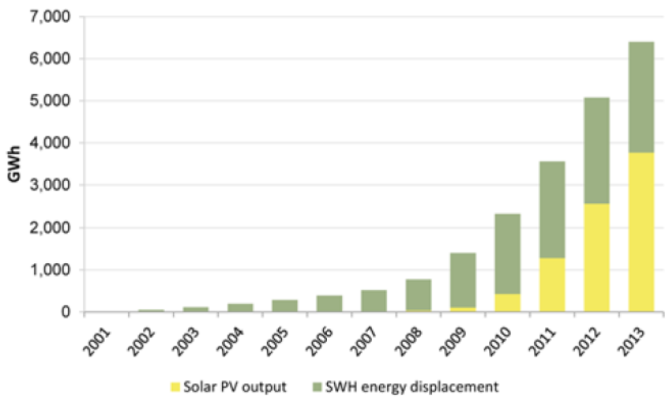
Note: Other (renewables) includes bagasse (wood), biogas and geothermal. Other (non-renewables) includes oil products and multi-fuel-fired power plants. Year refers to financial year ending June. Solar PV includes rooftop solar; generation includes off-grid.
Source: BREE 2014

FIGURE 3: SHARE OF RENEWABLES IN AUSTRALIAN ELECTRICITY GENERATION, 2001–2013



Source: Climate Change Authority based on BREE 2014

FIGURE 4: GENERATION AND DISPLACEMENT FROM SOLAR PV AND HOT WATER, 2001–2013



Note: 'SWH'= solar water heater.
Source: Warburton review 2014

2.2.3. PROJECTED IMPACTS OF THE RET AND THEIR DISTRIBUTION

The rest of this section looks at RET's likely future performance, resource costs and the distribution of those costs. As mentioned, the Authority has not conducted any new modelling for this review, but has drawn on a number of published studies on the impacts of the RET, including the modelling by ACIL Allen commissioned for the Warburton review and by SKM MMA for the Authority's 2012 review. Box 2 in chapter 3 compares these and other recent studies.

The RET is projected to deliver substantial volumes of emissions reductions in the future: modelling for the Warburton review (2014, p. 41) estimates that (relative to a scenario in which the RET was repealed) the current RET would reduce emissions by:

- 58 Mt CO_2-e over 2015-2020—about the same as annual emissions from all of Australia's passenger cars and light commercial vehicles (CCA 2014a)
- 299 Mt over 2015–2030—about half of Australia's current total annual emissions (CCA 2014b).

These projected emissions reductions result from increasing the amount of renewables in the generation mix, which has an economic cost. The cost of the RET is commonly measured by its incremental resource cost to the electricity sector; that is, the difference between the net present value (NPV) of the resources allocated to the electricity sector with or without the RET in place. The incremental resource costs include the costs of building and running a renewable plant, minus the avoided fuel costs of displaced fossil fuel plant, other avoided running costs, and any avoided capital costs. The RET generally raises the capital cost of generation, which is partly offset by lower ongoing costs. ACIL Allen estimated the additional resource cost of the current RET to 2030 at $10,430 million in NPV terms relative to a situation of no RET (in 2014 dollars, ACIL Allen 2014, p. 116).

Dividing the incremental resource cost of the RET by its emissions reductions gives the average cost per tonne, a measure of the policy's cost effectiveness. The Warburton review provides estimates of the average cost of emissions reductions from the RET, the LRET and solar PV under the SRES, calculated in two different ways (Table 2). It estimates the cost of the LRET from 2014–2030 to be $32 per tonne (when future emissions reductions are not discounted), or $62 per tonne (when the emissions reductions are discounted at the same rate as future resource costs). Subsidising rooftop PV is more expensive per tonne of emissions reductions, at $95 per tonne without discounting. The method of estimating the cost per tonne of emissions reductions under the RET is discussed further in section 4.3.

TABLE 2: ESTIMATES OF THE COST OF EMISSIONS REDUCTIONS OF THE RET FROM ACIL ALLEN MODELLING

	COST PER TONNE ($/TCO$_2$-E)					
	2014–2030			2014–2040		
	RET	LRET	ROOFTOP PV	RET	LRET	ROOFTOP PV
Undiscounted emissions reductions	35	32	95	25	22	79
Discounted emissions reductions	68	62	175	62	56	185

Note: 'undiscounted emissions reductions' means that future emissions reductions are not discounted relative to those today. 'Discounted emissions reductions' means that emissions reductions in the future are discounted at the same rate as future resource costs (a 7 per cent real discount rate). The Authority considers the estimate with undiscounted emissions is the more appropriate measure. See text for further details.
Source: Warburton review 2014

The Authority considers the estimate with undiscounted emissions is the more appropriate measure. Unlike holdings of money, over the timeframes and volumes of emissions reductions considered here, a tonne of emissions reductions in the future is as valuable as a tonne now, as it has the same consequences for climate change outcomes. In its 2012 review, the Authority did not discount future emissions reductions, and estimated the average cost of the RET to be $40 per tonne (in 2012 dollars).

Looking beyond the resource cost of the RET, the scheme has distributional impacts on households and businesses. These impacts arise from changes in the wholesale and retail prices of electricity which affect electricity consumers' purchasing power and the profits of existing generators. These price changes are different from the 'costs of the RET to the economy'—they involve transfers from some households or businesses to others.

Retail electricity prices are made up of the costs of generating, transmitting, distributing and selling the electricity to end users. The overall impact of the RET on retail prices is the net impact of two main effects that work in different directions:

- The RET tends to lower wholesale electricity prices—because the RET increases the available supply of electricity from sources with lower operating costs than fossil fuel generation.
- The RET tends to raise the retail component of electricity prices—retailers have to purchase certificates to acquit their RET liabilities, the costs of which are passed on to customers.

Existing generators are affected in two ways. Increased generation displaces fossil-fuelled plant output. Also, lower wholesale prices mean they make less money for the electricity they sell.

The impact on households and other retail customers depends on the relative size of the wholesale and retail price effects. For a particular level of renewable capacity, the larger the wholesale price effect, the smaller the overall cost impact on consumers; the magnitude of these impacts is discussed in section 2.5.

2.3. AUSTRALIA'S EMISSIONS REDUCTION TASK

Climate change poses serious risks for the Australian community and its economy. Together with the broader international community, Australia has agreed to a goal of limiting average global warming to no more than 2 degrees Celsius above pre-industrial levels to avoid the worst impacts of climate change. This requires large and ongoing reductions in greenhouse gas emissions by all countries, including Australia.

Australia's emissions were about 600 Mt CO_2-e in 2012, 2.5 per cent above 2000 levels (CCA 2014, p. 86). With the currently legislated RET in place, but without other strong policies, the most recent official estimates projected that emissions would grow to 685 Mt in 2020, 17 per cent above 2000 levels (Treasury and Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCSRTE) 2013). The next set of official projections is expected to be lower, reflecting the effects of structural changes in the Australian economy, behavioural change and the impacts of past policies, including energy efficiency (see, for example, Frontier Economics 2014). Even if the growth in emissions slows, however, absolute emissions are likely to grow in the absence of additional strong policies.

Australia has an international undertaking to reduce its emissions by 5–25 per cent by 2020, relative to 2000 levels, and is considering its goals for reductions beyond 2020. The government has indicated it will make decisions on post-2020 targets in the first half of 2015.

In its Targets and Progress review, the Authority considered Australia's current (and prospective) emissions reduction goals. It recommended a long-term emissions budget for Australia that is consistent with the 2 degrees goal, and corresponding short-term and medium-term targets of:

- a minimum 15 per cent reduction compared with 2000 levels by 2020 (which increased to 19 per cent when taking account of surplus emissions units carried over from the first commitment period of the Kyoto Protocol)
- between 40 and 60 per cent reductions compared with 2000 levels by 2030 (CCA 2014, p. 10).

Based on the available evidence, the Authority concluded that Australia's minimum 5 per cent 2020 target is inadequate, because it does not keep pace with the action taken by many other countries and is inconsistent with the 2 degrees goal (CCA 2014, pp. 121–2).

Since that review climate scientists have reaffirmed their conclusions about the risks ahead, and some of the world's largest emitters have announced commitments for post-2020 action:

- The United States has pledged to reduce its net greenhouse gas emissions by 26 to 28 per cent—compared with 2005 levels—by 2025 (White House 2014).
- China has pledged to peak CO_2 emissions by 2030 and to increase its non-fossil fuel share of energy to around 20 per cent by that year.
- The European Union has pledged to cut greenhouse gases by at least 40 per cent from 1990 levels by 2030 (Barroso 2014).

2.4. THE ROLE OF THE ELECTRICITY SECTOR

The electricity sector features prominently in Australian and international research on reducing greenhouse gas emissions, with a consistent finding that limiting warming to no more than 2 degrees would require virtual decarbonisation of global electricity systems by 2050 (Sachs et al., 2014, p. 32; IPCC 2014b p. 64, IEA 2014a p. 125).

The electricity sector is important for three reasons:

- It accounts for a significant share of current emissions—one-third of Australia's total emissions and 28 per cent of total global emissions (CCA 2014, p. 246, Audoly et al. 2014, p. 1).
- Deep cuts in electricity sector emissions are technically feasible with currently known technologies, and more cost-effective than deep cuts in some other sectors.
- Low- and zero-emission electricity generation can be a precursor to feasible, least-cost decarbonisation pathways for the sectors that use energy.

The survey of decarbonisation pathways by the Intergovernmental Panel on Climate Change (IPCC 2014b) found that in least-cost pathways consistent with less than 2 degrees of warming, the electricity sector is decarbonised more rapidly, whereas deep reductions in emissions in some other sectors accrue after 2050 (IPCC 2014b pp. 6-86). In these scenarios, renewables are projected to replace fossil fuels as the dominant source of electricity generation by 2050. In the International Energy Agency's (IEA's) 2 degree scenario, for example, renewables are projected to surpass 70 per cent of global generation capacity by 2050, with fossil fuels declining to just over 20 per cent and nuclear maintaining its current share of seven per cent (IEA 2014a, p. 125). The importance of decarbonising global electricity supplies for reducing energy emissions is reflected in the IEA's (2014b) advice to policy-makers in the lead up to the climate change negotiations in Lima this month: electricity sector decarbonisation is one of five priority actions on the IEA's list for reducing energy sector emissions.

Substantial decarbonisation of electricity supply facilitates decarbonisation for energy-consuming sectors, as electricity can displace the direct use of fossil fuels for energy (IEA 2014a, pp. 127-128; Sachs et al. 2014, pp. 12-13). Recent modelling for Australia conducted as part of a multi-country United Nations project (Pathways to Deep Decarbonisation in 2050) provides examples:

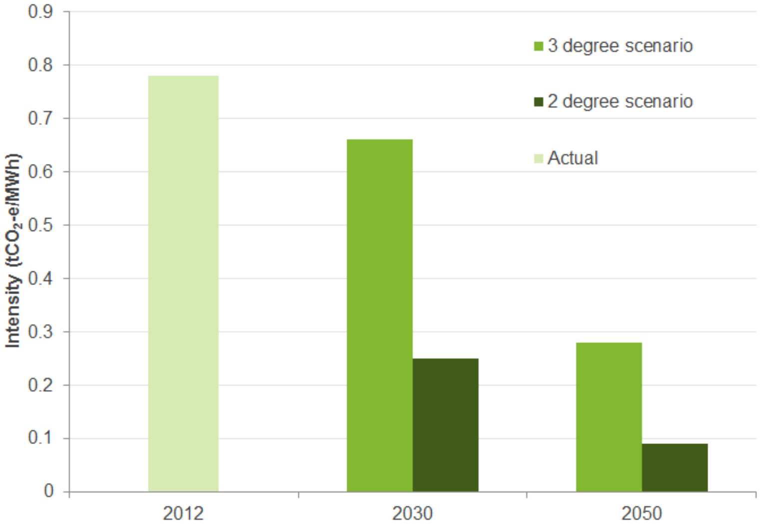
- In industry, emissions could fall 60 per cent on 2012 levels by 2050, driven substantially by decarbonisation of the electricity supply and electrification of industrial processes (ClimateWorks Australia et al. 2014a, p. 25).
- Emissions from Australian buildings could be virtually eliminated by 2050 through a combination of energy efficiency and switching from gas to electricity for all heating, hot water and cooking (ClimateWorks Australia et al. 2014b, p. 120).
- Emissions from road transport, which currently accounts for the vast majority of transport emissions, could be reduced by about 70 per cent by 2050 (ClimateWorks Australia et al. 2014b p.69, CCA 2014b p.17). Much of this is due to a substantial shift towards electric and hybrid light vehicles. Emissions from cars and light commercial vehicles are projected to fall by around 85 per cent between 2012-2050, while kilometres travelled grow by about 75 per cent over the same period (ClimateWorks Australia 2014b p. 67, p.69).

Australia's current trends lag well behind these projections. In 2012, the emissions intensity of Australia's electricity supply was higher than China's and 87 per cent above the OECD average (IEA 2014c, pp. II.61-3). Even with the currently legislated RET (but without other strong policies):

- the emissions intensity of Australia's electricity supply is projected to decline only slightly, from 0.78 tonnes of carbon dioxide equivalent per megawatt hour (tCO_2-e/MWh) in 2012 to 0.69 tCO_2-e/MWh in 2030 (CCA 2014, p. 250)
- absolute emissions from electricity generation are projected to grow.

For Australia to get onto a cost-effective pathway consistent with global action to limit warming to no more than 2 degrees, the emissions intensity of its electricity would need to fall rapidly. Modelling conducted for the Authority's Targets and Progress review projected about a 70 per cent reduction on 2012 emissions intensity levels by 2030, and about a 90 per cent reduction by 2050. This trend is projected to hold even in the case of weaker global action—a scenario consistent with limiting warming to 3 degrees found emissions intensity would fall 15 per cent below 2012 levels by 2030 and about 65 per cent by 2050 (Figure 5).

FIGURE 5: CHANGES IN EMISSIONS INTENSITY OF AUSTRALIA'S ELECTRICITY SUPPLY TO 2050 2 AND 3 DEGREE SCENARIOS

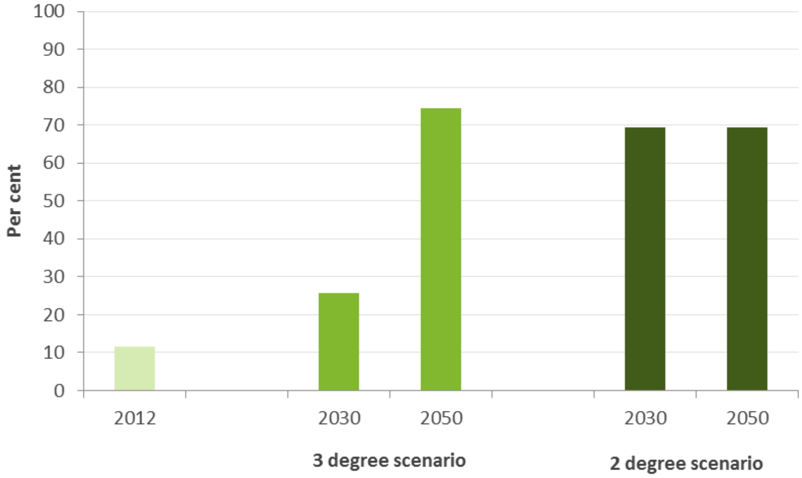


Note: The 2 degree scenario is the 'high' scenario and the 3 degree scenario the 'central policy' scenario from modelling for the Authority's Targets and Progress review. Both scenarios assume a fixed carbon price to July 2014, with the 2 and 3 degree scenarios reaching \$65/t CO_2-e and \$27/t CO_2-e in 2020, respectively. Prices are in real 2012 Australian dollars.
Source: Climate Change Authority 2014 based on Treasury and DIICCSRTE 2013 and ACIL Allen 2013b

This modelling—and the projected decline in emissions intensity—reflects a strong shift from fossil fuel to renewable generation, with the share of total renewable generation increasing from 12 per cent in 2012 to about 70 per cent in 2030 in the 2 degree scenario, and to about 25 per cent in the 3 degree scenario (Figure 6).

The Pathways to Deep Decarbonisation modelling discussed above reinforces these findings. It suggests that even if other zero- or low-emissions technologies are deployed—such as nuclear and carbon capture and storage (CCS)—renewables would still dominate the generation mix (ClimateWorks Australia et al. 2014b). The project investigated three pathways for electricity generation consistent with the Authority's recommended long-term emissions budget for Australia, namely: a 100 per cent renewable grid scenario; a scenario in which CCS is included in the possible technology mix; and a scenario in which CCS and nuclear are included (ClimateWorks Australia et al. 2014a p.22, 2014b pp. 42-5). Even in the nuclear and CCS scenarios, renewables are projected to account for more than 70 per cent of total generation in 2050.

FIGURE 6: AUSTRALIA'S CURRENT AND PROJECTED SHARE OF RENEWABLES IN ELECTRICITY GENERATION TO 2050, VARIOUS SCENARIOS



Note: Generation is calculated in GWh sent out. 'Renewables' includes hydro, wind, geothermal, biomass, solar thermal and solar PV (including rooftop solar). Generation displaced by solar water heating is not included in the share of renewables. Non-renewable generation includes coal, gas, cogeneration, liquid fuel, black coal with carbon capture and storage (CCS) and gas with CCS. CCS technology plays a larger role under a 2 degree scenario from 2030 resulting in a lower share of renewables in 2050 than in the 3 degree scenario.
Source: Climate Change Authority based on ACIL Allen 2013b

The modelling discussed above projects a major and expanding role for large-scale renewables through to 2050. On the other hand, some changes underway in the electricity sector—including rapid reductions in small-scale battery costs—could result in a more decentralised electricity sector in the future. This raises the question of whether near-term investment in large-scale renewables may be stranded if the grid was to become much more decentralised over the coming decades.

While it is impossible to know how the sector will evolve, modelling for the CSIRO's Future Grid Forum (Graham et al. 2013, pp.53, 68, 84) provides some insights. Even across scenarios resulting in extremely different levels of centralised electricity generation in 2050, investment in large-scale renewables to 2020 is reasonably similar. This suggests near-term investment in large-scale renewables could be robust to a range of possible futures.

In summary, the available studies consistently find:

- Significantly more will need to be done to reduce emissions beyond 2020 to keep Australia on a path towards limiting global warming to no more than 2 or even 3 degrees.
- Renewables are likely to play a major role in decarbonising future electricity supplies.

CONCLUSION

C 1. Substantial reductions in electricity sector emissions over the coming decades—including through greater deployment of renewables—must be a key focus for Australia in playing its part in reducing global emissions and the risks of dangerous climate change.

2.5. IS THE RET AN APPROPRIATE POLICY INSTRUMENT?

In its 2012 review, the Authority concluded that while the RET was not a perfect policy, the benefits of any changes should be assessed in light of their implications for ongoing investment in renewables. Since then, many stakeholders have suggested the RET should be reduced or abolished, arguing that:

- lower cost emissions reductions exist elsewhere
- the Emissions Reduction Fund (ERF) should be the main policy in the economy and the electricity supply sector
- the distribution of costs (including their incidence on existing fossil fuel generators) is undesirable.

The Authority's responses are listed below and elaborated in the subsequent sections:

- some cheaper emissions reductions are available elsewhere, but policy needs to consider the size and cost of the overall emissions reduction task
- within the electricity supply sector, it is doubtful that the prospective alternative policies would deliver comparable reductions
- the size and incidence of the RET's impacts do not warrant reductions in the targets.

This section expands upon each point in turn.

2.5.1. SOME CHEAPER REDUCTIONS ARE AVAILABLE, BUT POLICY NEEDS TO CONSIDER THE SIZE AND COST OF THE OVERALL TASK

As discussed in section 2.4, decarbonising the electricity supply sector is a critical part of Australia's transition to a low-emissions economy; this requires policies capable of making substantial reductions in electricity sector emissions.

Some lower-cost emissions reduction opportunities do exist in Australia outside the electricity supply sector, and the Authority expects that some of these will be picked up by the ERF (CCA 2014c) or other current policies.

The existence of such opportunities, however, is not sufficient to conclude that the RET is too expensive. Policy-makers need to consider the overall size of Australia's emissions reduction task and the costs for achieving not just some but all of the reductions required to meet Australia's targets. This includes considering the cost of the most expensive of those units (the 'marginal cost' or the cost 'at the margin').

The government's latest estimate of Australia's emissions reduction task is 421 Mt between 2015 and 2020 (Department of the Environment 2014). This is based on results of modelling by the Australian Treasury for the Authority's Targets and Progress review (Treasury and DIICCSRTE 2013), which suggests that to achieve even Australia's minimum 2020 commitment of a 5 per cent emissions reduction target domestically would cost up to $65 per tonne (in 2012 dollars) at the margin with the carbon pricing mechanism in place. That modelling assumed that the current RET remained in place. If the RET target were to be weakened or abolished, more emissions reductions would be required elsewhere and the marginal cost of delivering those additional reductions would be expected to be at least as high.

Sustained weak electricity demand means that the emissions reduction task to 2020 is likely to be smaller than previously estimated. Frontier Economics (2014, p. 7), for example, estimates that downward revisions to electricity demand forecasts will lower Australia's emissions reduction task by 142–196 Mt over 2014–2020. This would reduce the marginal cost of achieving the minus 5 per cent target. That said, there is no guarantee that it would reduce the cost to a level less than the average cost per tonne of a lower RET.

At an average cost of $35 per tonne to 2030 (Table 2), the Authority believes the RET is making a reasonably cost-effective contribution to emissions reductions in a strategically important sector—both out to 2020 and beyond, when steeper reductions will be required.

2.5.2. WITHIN THE ELECTRICITY SUPPLY SECTOR, PROSPECTIVE ALTERNATIVES ARE UNLIKELY TO DELIVER COMPARABLE REDUCTIONS

Policies to reduce emissions from electricity can operate in one or more of the following five ways:

- using existing lower emissions plant more intensively ('fuel-switching')
- improving the efficiency of existing fossil-fuel power stations so that they produce fewer emissions per unit of electricity
- retiring higher emissions plant
- building new zero- or low-emissions generation (large- or small-scale)
- reducing the demand for electricity by improving household and business energy efficiency.

Improving energy efficiency can often provide substantial low cost (or even financially beneficial) ways of reducing Australia's emissions (see for example CCA 2014a, p. 160). This can reduce overall electricity demand, but will not reduce the emissions intensity of the electricity supply.

The government is implementing the ERF as the centrepiece of its climate policy to reduce emissions across the economy. As discussed in the Authority's Carbon Farming Initiative review (CCA 2014c), the crediting part of ERF (as currently designed) is not well suited to encouraging new zero- or low-emissions plant because the contract period is short relative to the life of the large infrastructure investment. It could encourage efficiency improvement at existing plants, but is less suited to encouraging fuel-switching, as reductions are assessed at the facility level, rather than across the generation fleet as a whole.

The government is also designing a 'safeguard mechanism' to complement the ERF crediting mechanism. This remains under development (and is planned to commence from 1 July 2016), and the ERF White Paper notes that the application of the safeguard mechanism to the electricity sector would be a matter for industry consultation, given the interactions with other policies such as the RET. Given these uncertainties, there is no basis at this time to assume the ERF will be effective in delivering comparable volumes of emissions reductions to the RET at lower prices.

Renewable deployment policies like the RET reduce emissions through encouraging new zero-emissions plant. While performance depends on the specifics of the design, schemes like the LRET are considered to be a relatively cost-effective way of reducing electricity sector emissions. The Productivity Commission's 2011 review of more than 1,000 emissions reduction policies in nine countries concluded that, while emissions trading schemes delivered the lowest cost emissions reductions (by using all five of the options above), schemes to encourage the deployment of large-scale renewable energy were the next most cost-effective set of policies in the electricity supply sector. Within those policies, renewable energy targets such as Australia's were found to be more cost effective than schemes that set the price for, rather than the quantity of, renewables (Productivity Commission 2011, pp. xiv, 80–1).

In the Authority's view, the RET is the only currently prospective policy instrument in the electricity supply sector that can be relied upon to deliver sizeable volumes of emissions reductions.

2.5.3. THE SIZE AND INCIDENCE OF THE RET'S IMPACTS DO NOT WARRANT REDUCTIONS IN THE TARGETS

Another objection to the RET raised by some stakeholders (see section 3.2) is that, even if its overall costs are reasonable, the burden on particular groups (in particular on existing fossil fuel generators) is too high.

As outlined in section 2.2.3, consumers and electricity generators share the costs of the RET and the impact of the RET on consumer prices is the net impact of two main effects that work in different directions.

ACIL's modelling for the Warburton review indicated that the RET would have almost no impact on consumer prices over the period 2015–2030:

- the wholesale and retail price impacts of the RET are projected to offset each other in NPV terms to 2030
- over the period to 2040, the RET is projected to make households better off.

The impacts of reducing the current RET are discussed further in section 3.2.

In the near term, the RET is projected to increase retail electricity prices by a small amount, with a typical household projected to pay about $250 more in total over the period 2015–2020 (in present value terms). This is considered a modest impact and is mitigated through the provision of targeted assistance (see AEMC 2014, p. 198 for current electricity concessions). Beyond 2020, the RET is projected to reduce retail prices by a small amount, which is why the net impact over the period to 2030 is projected to be neutral.

Other modelling exercises point to similarly modest impacts on household bills. Modelling by SKM MMA for the Authority's 2012 RET review suggested that, on average, the RET would increase household electricity bills by $15 per year over 2012–13 to 2030–31 (in 2012 dollars, CCA 2012, p. 150). Looking across other recent modelling exercises on the impacts of the RET (see Box 2), some project that the RET slightly lowers retail prices and some that it slightly raises them, but the projected changes in household bills are modest in either direction.

The RET's impact on electricity bills for commercial and non-exempt industrial users are also considered to be modest. ACIL Allen's modelling for the Warburton review indicated that the RET would increase electricity prices for commercial and industrial customers to 2020, but lower them in the period out to 2040 (Warburton review 2014, p.37). Modelling by SKM MMA projected that the RET would increase average electricity bills for small and medium enterprises by $17 per year over the period 2012–13 to 2030–31 (in 2012 dollars; CCA 2012, p. 151). When these costs are expressed as a share of electricity bills, they tend to be higher than for households because businesses generally have lower electricity tariffs (CCA 2012, p. 151).

The impacts of RET costs on very large energy users are difficult to assess because they generally have private bilateral contracts with their electricity retailer; the most emissions-intensive users receive partial assistance for the impacts of the RET on their electricity costs (see section 3.3).

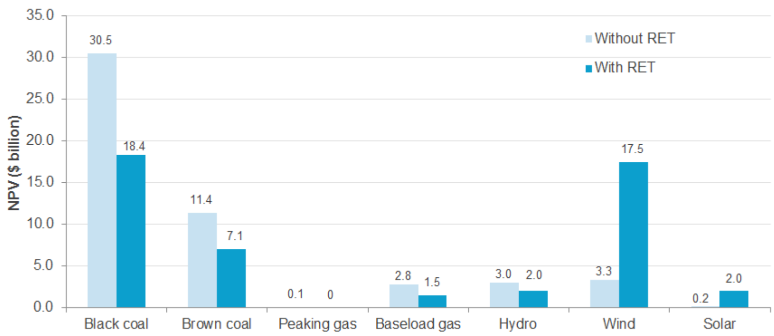
The RET lowers revenue and profits for thermal generators, relative to a situation of no RET. Figure 7 compares profitability by generator type between these two scenarios. It shows that the net present value of profits to black and brown coal-fired generators are about 40 and 38 per cent lower with the RET. Conversely, profits for wind generators are higher with the RET in place. Electricity generators' profits are also affected by the current over-supply of generation capacity, which is causing low wholesale prices. A substantial adjustment task lies ahead for the electricity sector, as older plant eventually exit the market, regardless of the level of the RET (section 3.1.2).

Given their relatively high emissions intensity, it is difficult to imagine any effective policy to reduce greenhouse gases which had no impact on coal-fired generators. If the revenue impacts on incumbents were a primary concern for government, it could consider providing direct assistance, rather than weakening the policy causing the impacts. Two considerations argue against that course.

First, the current owners of many large coal- and gas-fired power stations acquired the assets in full knowledge of the 41,000 GWh 2020 target—as many of these plants were purchased after plans to expand the RET were announced. The government published a paper on expanding and extending the RET in July 2008 (COAG Working Group on Climate Change and Water 2008). Plans to introduce state-based renewable schemes, which would have had a comparable effect (and which the Commonwealth arrangements subsumed) were announced even earlier. Figure 8 lists thermal power stations with a capacity of 500 MW or more that were acquired or commissioned by private businesses from 2009 onwards. These assets represent 55 per cent of the total capacity of the largest power stations and 10 out of the 24 largest power stations by number.

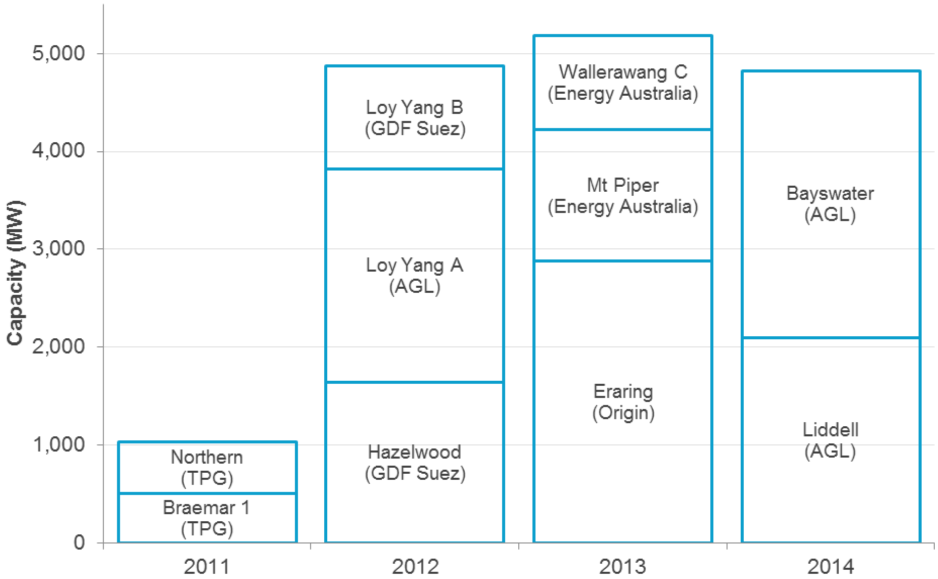
Second, the government has already given a total of $2 billion in carbon price compensation to the 10 most emissions-intensive coal-fired generators by way of assistance with the impacts of a carbon price (Climate Change Authority calculation based on Clean Energy Regulator 2014b). The most emissions-intensive of these received about half a billion dollars each. The carbon price has since been repealed but generators are not obliged to repay this assistance.

FIGURE 7: PROFIT BY GENERATOR TYPE WITH AND WITHOUT THE RET, 2015–2040



Note: The without RET scenario assumes the RET ceases operation from 1 January 2015 and any mechanism used to compensate investments made under the RET, if one were introduced, does not affect wholesale or retail price outcomes (ACIL Allen 2014, p. ii). The with RET scenario assumes the current RET remains in place. ACIL Allen calculated profit measure as modelled pool revenues (energy and LGCs), less fixed operating and maintenance costs and variable generating costs.
Source: Warburton review 2014, based on ACIL Allen 2014

FIGURE 8: LARGE FOSSIL FUEL POWER STATIONS ACQUIRED OR COMMISSIONED, 2009–2014



Note: For the purposes of this analysis, large power stations are those over 500 MW capacity. Name of commissioning or purchasing entity in brackets. Analysis covers the period 2009–2014; purchases and commissions only occurred from 2011 onwards. TPG purchased Alinta in 2011. Excludes plant purchased or commissioned by state-owned generators.
Source: Climate Change Authority based on ACIL Allen 2014 and public announcements listed in References

The Authority concludes that, in the absence of other policies, the RET remains the central policy instrument for reducing electricity sector emissions. The overall impacts on electricity consumers are modest and, where appropriate, best mitigated through the provision of targeted assistance to vulnerable households and electricity-intensive businesses. It is difficult to be persuaded that existing fossil-fuelled generators are being unfairly burdened by the RET's impacts, given the timing of many purchase decisions and the payment of compensation for a carbon price that has since been withdrawn.

CONCLUSION

C 2. The Renewable Energy Target arrangements are currently the primary policy instruments for electricity sector decarbonisation, and no more cost-effective and scalable measures are in prospect at this time. Their overall impacts on electricity consumers are quite modest, and are mitigated through the provision of targeted assistance.

CHAPTER 3. THE LARGE-SCALE RENEWABLE ENERGY TARGET

This chapter considers the role of the Large-scale Renewable Energy Target (LRET) in the current policy context, including the level of the LRET and exemptions for emissions-intensive, trade-exposed (EITE) industries.

First, it examines whether the current 2020 LRET target remains feasible, and the best course of action if this is not the case. It concludes that there is no case to reduce the target, but there is a case for deferring the current 2020 LRET target, for example by up to three years, to provide additional time to ensure it can be met.

Second, it considers the eligibility criteria for determining partial exemptions for trade-exposed businesses, concluding that present anomalies should not be extended in the event that assistance is expanded in the future.

Finally, it explores the role of the LRET post-2020 and recommends the government consider, in the absence of more comprehensive policies, an expanded role for the LRET after 2020 capable of delivering substantial decarbonisation in the electricity sector.

3.1. FEASIBILITY OF THE CURRENT LARGE-SCALE RENEWABLE ENERGY TARGET

Given the repeal of the carbon price, and doubts about the capacity of the Emissions Reduction Fund and safeguard mechanism to drive necessary emissions reductions in the electricity sector, the LRET will likely be called upon to play a greater role in the decarbonisation of Australia's electricity sector out to 2020 and beyond.

In its 2012 RET review, the Authority considered the feasibility of the 2020 target and concluded that the target was challenging but achievable provided that a price on carbon remained. Since that time several developments have occurred which have undermined investor confidence in this sector and raised doubts about the feasibility of achieving the LRET in 2020. In particular, the erosion of bipartisan support for the target and the prospect of major changes has seen investment in large-scale renewable projects in 2014 fall to levels not seen since 2002 (Bloomberg New Energy Finance 2014, p. 1).

In light of these developments, the Authority has considered:

- whether the current 2020 target is still ‘technically feasible’ (that is, can the required new capacity be built)
- whether it is still 'financially feasible' (that is, will it be financed)
- how might the current LRET target be modified if there are reasonable doubts about its achievability.

3.1.1. TECHNICAL FEASIBILITY

The first question around the feasibility of any 2020 target is whether it is physically possible to meet. Recent estimates put the amount of new large-scale renewable capacity required to meet the full 41,000 GWh target by 2020 at just below 9,000 MW (Warburton review 2014, p. 29). Meeting this target would require sustaining higher build rates than Australia has achieved to date. Assuming relatively small amounts of construction in 2015, it would require an average annual build rate of about 1,800 MW over 2016–2020, almost three times the highest annual rate to date of 655 MW (Climate Change Authority calculation from Clean Energy Council 2014, p. 6).

One aspect of the feasibility of achieving the target is whether inputs such as steel, components and construction equipment can be obtained. In recent work commissioned by the Clean Energy Council, ROAM Consulting investigated the technical feasibility of meeting the 2020 target by conducting interviews with industry experts (ROAM Consulting 2014, pp. 8–10). ROAM found there are no physical constraints to meeting the target, with sufficient raw materials, components, labour and construction equipment available either domestically or (for some materials) overseas. Overall, and despite the higher build rates required, ROAM concluded that it would be technically possible to build the capacity required to meet the current 2020 target.

A second part of technical feasibility is whether there are enough potential projects sufficiently far advanced that they could be constructed if current investor uncertainties were resolved. Table 3 provides an estimate of the pipeline of new renewable projects by project status. The pipeline consists of about 16,100 MW of wind farm projects and 1,700 MW of large-scale solar projects. About 7,700 MW of the total already has planning approval.

While it is difficult to be certain given the compressed timeframes to 2020, there would appear to be an adequate project pipeline and availability of inputs for the current 2020 target to still be considered technically feasible.

TABLE 3: LARGE-SCALE RENEWABLES PROJECT PIPELINE

PROJECT STATUS	CAPACITY (MW)
Undergoing approvals	10,050
Approvals finished, but other issues require resolution before financial close	1,600
Ready to build in 2015–16 pending financial close	5,650
Committed	500
Total	**17,800**

Notes: Clean Energy Regulator (CER) information compiled from the Bureau of Resource and Energy Economics' Electricity Generation Major Projects Database and Australian Energy Market Operator's (AEMO's) operation planning database, complemented with interviews conducted with project proponents. The CER has not independently substantiated all information provided in these interviews. Information provided represents status at May 2014.
Source: Information provided by the CER to the Climate Change Authority

3.1.2. FINANCIAL FEASIBILITY

For the LRET to remain financially feasible:

- the combination of the wholesale electricity and Large-scale Generation Certificate (LGC) prices must cover the costs of renewable generation
- the LGC price must not exceed the penalty price under the scheme (the 'shortfall charge')
- finance would need to be available to fund the necessary new large-scale renewable energy projects.

At present, both wholesale electricity market and LGC prices are low, discouraging investment in new renewable capacity.

LGCs cover the gap between the costs of renewable and fossil fuel generation. Other things being equal, lower wholesale electricity market prices mean renewable generators need to earn more revenue from LGCs. If, for example, a wind project required about $90/MWh to be commercially viable, with a wholesale electricity price of about $35/MWh, it would need an LGC price of about $55. If the price of LGCs exceeds the shortfall charge, liable parties will probably choose to meet their liabilities by paying the charge, rather than purchasing renewable generation, with costs passed through to electricity consumers.

Current low LGC prices are heavily influenced by uncertainty about the future of the LRET. Even if Parliament reaches a conclusion soon, it could take some time for investor confidence to return, increasing the cost and reducing the likelihood of investors financing the new renewables required to meet any 2020 target.

The rest of this section discusses the financial feasibility of the target in more detail. It covers views and analysis on meeting the existing 2020 target, the causes and implications of low wholesale and LGC prices, and the potential availability of finance for new generation.

THE CURRENT 2020 TARGET AND THE SHORTFALL CHARGE

In submissions to the Warburton review,[1] participants expressed conflicting views about whether the existing target can be met without triggering the shortfall charge.

If a liable entity does not surrender the number of certificates required under the LRET or the SRES, a shortfall charge applies to the outstanding amount. The shortfall charge for both the LRET and SRES is a nominal price of $65/MWh. Costs incurred by purchasing certificates are tax-deductible, while the payment of the shortfall charge is not. Liable parties could therefore purchase certificates at a higher price (a tax effective price of about $93/MWh, assuming a company tax rate of 30 per cent), before they were financially worse off than paying the shortfall charge (assuming the company is in a tax-paying position). If the LGC price exceeds the shortfall charge, then liable entities will probably choose to pay the shortfall charge, so the amount of renewable energy for that year would be below the target level. Because the shortfall charge is not indexed, its value falls over time in real terms. By 2020, the tax-effective shortfall charge is estimated to be worth $79/MWh in today's dollars (ROAM Consulting 2014, p. 19).[2]

Infigen submitted that there are sufficient large-scale renewable projects in the pipeline to reach the required capacity, provided regulatory certainty is restored. The Clean Energy Council agreed, citing its commissioned modelling from ROAM. Box 2 provides an overview of the different modelling exercises conducted on the RET.

Some participants, including the Australian Industry Group (AiG) and Origin Energy, noted that the 2020 target is becoming increasingly difficult to achieve, with AiG citing the uncertain political environment as a key factor.

Other participants, including AGL, the Australian Energy Market Commission (AEMC), Energy Australia and the Energy Supply Association of Australia (ESAA), stated that the target can no longer be achieved without triggering the shortfall charge. Energy Australia argued that the rapid build rate and suppressed wholesale prices would render new projects uneconomic. The AEMC cited modelling by Frontier Economics that indicated the target would not be met due to low wholesale prices, low demand growth and repeal of the carbon price (Frontier Economics 2014, pp. 28–9). AGL stated that:

> *At current LGC and wholesale electricity market prices, new investments in renewable energy projects cannot be justified economically. Given the market based policy mechanism of the RET and the energy-only market design of the National Electricity Market (NEM) in particular, it is inconceivable that the investment in renewable projects required to meet the LRET will be forthcoming, particularly against the backdrop of the manifest uncertainty in relation to broader energy policy. (AGL, Warburton review submission, p. 1)*

Modelling commissioned for the Warburton review projected that the 2020 target could be met without the LGC price exceeding the shortfall charge (ACIL Allen 2014, p. 14). This and other commissioned modelling provides information about whether the current target would be met under a situation in which projects are built relatively steadily to meet the current targets. This means that it is less informative about a situation in which the regulatory uncertainty to date, or further lengthy delays in reaching a political agreement on the RET reduce investment in renewables over the next year or so.

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[1] Quotations are taken from participants' submissions to both the Warburton and Climate Change Authority reviews as indicated. For a list of submissions to the Authority review see Appendix A.

[2] In this chapter, all currency amounts are in real 2014 Australian dollars unless otherwise specified.

LARGE-SCALE GENERATION CERTIFICATE PRICES

To ensure any LRET target is met through renewable generation, rather than retailers paying penalties, LGC prices should not exceed the shortfall charge, but they should be sufficient, in combination with expected wholesale prices, to cover the costs of new renewable generation. At present, LGC prices are low for two main reasons:

- a surplus of certificates created by small-scale solar PV (these were created before the RET was split into the LRET and SRES)
- expectations of future cuts to the 2020 target.

Accounting for 2013 surrenders, there are currently about 26 million surplus LGCs (ACIL Allen 2014, p. 14), suppressing prices and making it more difficult for projects to reach financial close. The Investor Group on Climate Change (IGCC) commented on the effect of this LGC oversupply in its submission to the Warburton review:

> *We understand that energy suppliers have sufficient accumulated [LGCs] such that they would not need to enter the market to purchase additional [LGCs] for some time. For example, AGL indicated in 2013 that they had sufficient supply of [LGCs] for 5 years of obligations under the scheme. If as a result of weakening the RET, there is still a surplus of [LGCs] in the market for some years, further new build of assets may be delayed as a result of depressed LGC prices. (IGCC, Warburton review submission, p. 7)*

More important, however, is that current low LGC prices principally reflect the view of likely cuts to the current 2020 target. In a recent paper, Nelson et al. noted:

> *Firms expect the target to be altered, and so LGC prices have softened and investment has hence been delayed. Now such little time is left to meet the target that policy makers will almost certainly as a minimum vary the target to avoid manifest policy failure or abandon the existing policy altogether, producing a second wave of dynamic inconsistency. (Nelson et al. 2014, p. 2)*

The CER estimates that the volume-weighted average market price for an LGC will be about $30 in 2015 (CER 2014), with this forward price reflecting anticipated cuts to the LRET (PricewaterhouseCoopers Australia (PwC) 2014, p. 8). This, in combination with current low wholesale prices, is significantly below required returns for new wind projects of at least $80/MWh (Bloomberg New Energy Finance 2013, p. 1).

BOX 2: COMPARING COMMISSIONED MODELLING OF THE RET

Almost a dozen modelling exercises have been conducted on the RET in recent years. While there are differences in approach and input assumptions, they are more notable for their overall similarity than their differences. For previous RET reviews, Warburton (2014) and the Authority (2012) commissioned modelling from ACIL Allen and SKM MMA, respectively. Other exercises include:

- Deloitte Access Economics (commissioned by the Australian Chamber of Commerce and Industry, the Business Council of Australia and the Minerals Council of Australia, 2014)
- Frontier Economics (commissioned by AEMC, 2014)
- Jacobs (commissioned by the Climate Institute, World Wildlife Fund and the Australian Conservation Foundation, 2014)
- Oakley Greenwood (commissioned by ESAA, 2014)
- ROAM Consulting (commissioned by the Clean Energy Council, 2014)
- Schneider (2014).

Some of these modelling exercises indicate that the current 2020 target can be met without exceeding the shortfall charge; others indicate that the shortfall charge is triggered before the target is met. In general, the different modelling exercises indicate that, other things being equal, lower electricity demand, higher renewable technology costs and lower gas prices reduce the likelihood of the target being met. Frontier Economics' modelling, incorporating all of these assumptions, is the only one of these exercises finding that not even a 'real' 20 per cent target (that is, a target based on 20 per cent of current estimated demand in 2020) could be met.

All exercises show that reducing the LRET improves revenue for fossil fuel generators and that overall impacts on retail electricity prices are modest. Some project retail prices would be slightly lower, and some slightly higher with the abolition of LRET:

- ACIL Allen modelling projects that if the RET is repealed, households would be no better or worse off in the period to 2030 (ACIL Allen 2014, p. 32).
- Deloitte estimates that repeal of the RET would reduce the household bills on average by around $49 per year (Deloitte 2014, p. 19). This represents three per cent of a typical household bill of around $1,400.
- Jacobs estimates that repeal of the RET would increase electricity prices by between 2.1 and 8.3 per cent over the period to 2030 (Jacobs 2014, p. 27).

Some participants have questioned the technology cost and carbon pricing assumptions of the ACIL Allen modelling conducted for the Warburton review. The assumptions, sources and results from ACIL Allen's modelling are generally similar to those from the Authority's 2012 commissioned modelling:

- Electricity demand—both are based on the Australian Energy Market Operator's (AEMO's) medium growth forecasts for demand in the National Electricity Market (NEM). Since 2012 the projected demand for electricity in the National Electricity Market in 2020 has declined by about 16 per cent (Climate Change Authority calculation from AEMO 2012 and 2014a).
- Technology costs—both are based on the Australian Energy Technology Assessment published by the Bureau of Resource and Energy Economics.
- Gas prices—both forecast the gas price to reach around $9 per gigajoule by 2020.

One area of difference is the 'below baseline' generation for 'pre-existing' generators (largely hydro generators). As described in Box 1, the magnitude of output below baseline levels from pre-existing generators is important when determining how much additional renewable energy is required to meet a 'real' 20 per cent target (if that were a policy goal). In general, higher output from pre-existing generators means that a smaller amount of additional renewable generation is required to meet a given overall share of renewables. In 2012, the Authority estimated 2020 generation from these sources of about 14,300 GWh, whereas in 2014 ACIL Allen estimated output from pre-existing generators of about 16,000 GWh. Actual long-run output will depend on rainfall levels, which can affect the output of hydro generators.

WHOLESALE ELECTRICITY PRICES

Low current and expected future wholesale prices, caused largely by excess capacity in the electricity market, are also making it harder to invest in large-scale renewable energy projects, given current low LGC prices.

While the RET is certainly adding capacity, it is neither the sole nor primary cause of oversupply. Other drivers include weakening demand for electricity and barriers and disincentives to exit for incumbent, ageing generators. Reasons why even very old plant might not be exiting now include:

- The bulk of capital costs are sunk, and operating costs of most plants are quite low—so as long as revenues exceed operating costs, plants are likely to keep running.
- 'First-mover disadvantage'—generators that exit earlier make remaining generators (including their competitors) better off because reductions in supply increase wholesale market prices, other things being equal.
- Uncovered site remediation costs—these are potentially very high for some generators and holdings of bonds intended to cover these costs may be inadequate, exposing firms to large liabilities should the site be closed (Nelson et al. 2014, pp. 15–16).
- Uncertainty about the future policy environment—where investors perceive a possibility that generators could be paid to retire, they may continue to operate plant for longer than otherwise planned on the prospect they could be paid to close down.

Potential options to address the oversupply of generating capacity include:

- Let the market resolve the imbalance—allow the persistently low wholesale price to force generators from the market, particularly as large maintenance expenditure decisions fall due. There is some evidence this is starting to happen—in the NEM about 1,300 MW of mothballed generation has recently been or is soon to be permanently retired. About 1,150 MW remains mothballed and more mothballing is planned for the future (Climate Change Authority based on AEMO 2013; AEMO 2014b).
- Industry-supported plant closure—an ongoing revenue stream is provided by the electricity supply industry (which, in turn, would presumably be funded by electricity consumers) to fund the permanent closure of excess generation capacity.
- Taxpayer funding of plant closure.
- Direct regulation—for example, power stations could be required to close once they reach a certain age (Nelson et al. 2014, pp. 19–22).

Selecting the right response is a very important issue for electricity consumers and the electricity supply industry. The retirement of some existing fossil fuel capacity would certainly make it easier to invest in new renewables or any other type of low-emissions plant. Ultimately, these new investments are essential if Australia is to transition to a low-emissions economy.

Detailed consideration of the appropriateness of government intervention to deal with excess supply is beyond the scope of this review. The Authority observes, however, that there would be significant equity and precedent issues associated with options that require other parties paying to meet the remediation obligations that properly belong to generators. The Authority also notes that closing a small number of coal-fired power stations would have a limited impact on Australia's emissions in the short term, to the extent that the lost output was replaced by increased output from other coal-fired power stations.

The Authority's concerns about equity issues are shared across state and federal governments. In December 2014, the Council of Australian Governments (COAG) Energy Council stated (p.1) that it does not support assistance to generators to exit the market and 'opposes the transferral of the costs of retiring assets onto consumers or taxpayers'. The Council will consider whether there are any material barriers to orderly exit and task AEMO with further work on pathways to ensure the exit of generators does not create risks for electricity system security.

AVAILABILITY AND COST OF FINANCE FOR NEW RENEWABLE GENERATION

A critical issue in determining the overall feasibility of meeting the LRET is whether prospective new projects will be able to secure the necessary finance.

To date, investment in new renewable generation to meet the RET has often, but not always, been based on power purchase agreements (PPAs). PPAs are long-term agreements between a renewable energy generator and an electricity retailer with obligations to surrender LGCs. The retailer typically agrees to purchase all electricity generated, with pricing for the LGCs and electricity covering the cost of the renewable investment. A PPA assists the renewable energy project in obtaining finance for construction, because potential investors know that it has a guaranteed price for its output. Retailers can benefit by contracting access to the LGCs required to meet their LRET liability, shielding themselves from unexpected increases in future LGC spot market prices.

For a renewable energy project, the alternative to signing a PPA is to be a 'merchant' generator. Merchant generators can rely on spot prices for both electricity and LGCs—or can hedge against future uncertainties through short-term forward contracts. The lack of a guaranteed price for their output increases the risk relative to a generator with a PPA, which is reflected in higher risk premiums for finance.

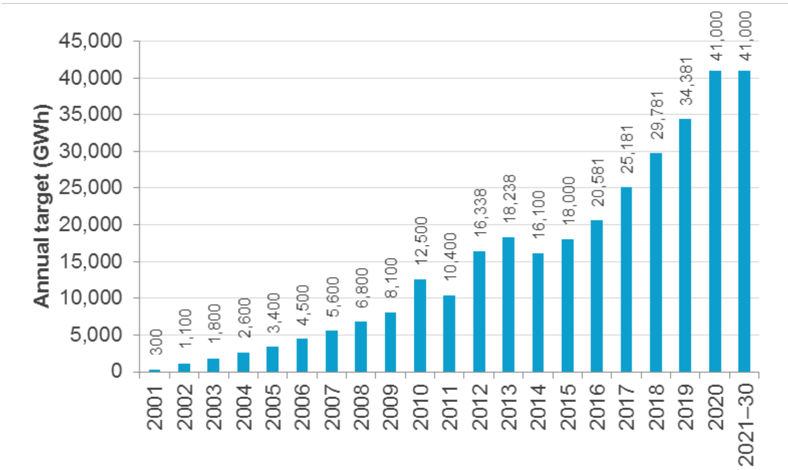
As part of this review, the Authority held bilateral meetings with a number of banks and equity investors to better understand the conditions under which investment in new large-scale renewable energy projects would be commercially feasible. Taking these discussions into account, as well as evidence presented in submissions, the Authority concludes that:

- **Bipartisan support is critical**. Agreement between the two major political parties on the level and timing of the LRET would restore confidence to make investments in new capacity. Many stakeholders have highlighted the need for this commitment to unequivocal, even in the face of continued lobbying for the target to be cut. Given the extent of uncertainty and disruption caused by the recent period of policy uncertainty, investor confidence may take some time to return.
- **Surplus LGCs are suppressing prices and making it more difficult to invest**. This suggests that if changes are made to the level or timing of the annual targets, then the targets to 2017 should not be altered, to assist with running down the surplus.
- **Sufficient generation to meet the target is unlikely to be financed without arrangements such as PPAs that provide certainty about future revenue streams**. Given the suppressed wholesale price and uncertain outlook for electricity demand, PPAs (or mechanisms that provide similar certainty) are important for investors (PwC 2014). While investments can be made on a merchant basis, the increased risk raises the costs of finance, which will likely make some potential projects uneconomic.

- **The current scheme end date of 2030 will likely curtail the volume of projects that are financially feasible**. The IGCC noted that investors typically need 12, and preferably 15 years, of LGC revenue for a project to be commercially viable. Given the time required for investors to regain confidence, project developments may only begin in earnest from 2016 or 2017; even if developments started again in 2015 new projects would not be operational until 2017 at the earliest. The short remaining period for LGC creation would mean recovering costs from fewer certificates, potentially causing the required LGC price to rise above the shortfall charge. An extension of the scheme's horizon would reduce the certificate prices required to raise the same project revenues.
- **Frequent reviews of the LRET create uncertainty which discourages investment in the sector**. Investors suggested that legislated reviews should be removed altogether, or undertaken less frequently (see chapter 5).

In the near term, the Authority's view is that there is no difficulty in meeting annual targets under the LRET, because of the large overhang of LGCs and the gentle increase in the annual target levels. From 2017 to 2020, however, the annual targets increase steeply from 25,181 GWh to 41,000 GWh (Figure 9). This sharp increase, in combination with the current market conditions and political uncertainty, could make meeting the target too challenging a task, even if an early bipartisan agreement on the LRET were reached. Options for dealing with this situation are discussed in the following sections.

FIGURE 9: ANNUAL LRET TARGETS 2001–2030



Notes: Targets from 2001–2010 are for the RET as a whole. Annual targets exclude allowance for waste coal mine gas generation. Since 2011 the RET has operated as the SRES and LRET; as part of the split the targets were re-phased to reduce the number of excess certificates. This included increasing the 2012 and 2013 targets, and slightly reducing the targets from 2016–18 to balance the adjustment.
Source: Warburton review 2014

3.2. CASE FOR ADJUSTING THE LARGE-SCALE RENEWABLE ENERGY TARGET

3.2.1. LEVEL OF THE 2020 TARGET

In 2012, the Authority considered arguments for changing the level of the LRET. At the time, the Authority considered that, on balance, the level of the target should not be changed. This judgement was largely based on providing stability, predictability and investor confidence for the LRET and climate policy more broadly.

Since then, the risk of the LRET not being met has increased significantly. If liable parties meet their RET obligations by paying penalties rather than surrendering certificates, this increases consumer electricity prices for no environmental benefit. This is a situation to be avoided. Not only would it impose costs on consumers, but it could undermine public confidence in climate policies and erode support for mitigation measures.

In submissions to this review and the Warburton review, some participants, including incumbent generators and emissions-intensive businesses, argued that the target should be reduced to a 'real' 20 per cent target (that is, one based on 20 per cent of either current estimated or actual electricity demand in 2020) or be abolished completely. Four main reasons were advanced—the LRET does not represent low-cost emissions reductions, the difficulty of meeting the current target, the oversupply of capacity in the market and the LRET's large impact on trade-exposed industries. Stanwell, for example, submitted:

> *Stanwell supports efficient, industry wide approaches to emissions abatement at least cost to the Australian economy. The current RET does not meet this criteria. (Stanwell, submission to the Climate Change Authority, p. 1)*

Other participants, largely renewable energy proponents and non-government organisations, argued that substantial investment and planning had occurred based on the current target, and that its level should be maintained. WWF Australia noted:

> *The RET has … mobilised national and international investment and built a strong domestic renewable energy industry which will be important to Australia's future economic prosperity. The renewable energy target has mobilised around $20 billion in investment to date and will generate nearly $15 billion more by 2020 under the current target. Reducing the RET would threaten these investments and harm Australia's reputation as a reliable investment destination. (WWF Australia, submission to the Climate Change Authority, p. 2)*

The modelling conducted for the Warburton review indicates that reducing the target to a 'real' 20 per cent target (25,500 GWh in the ACIL Allen modelling) would:

- Reduce the amount of new large-scale renewable capacity built between 2014–2020 from about 8,200 MW to 3,200 MW (a reduction of about 60 per cent).
- Reduce the LGC price in 2014 by about $14, which is 26 per cent lower than with the current RET. LGC prices would be consistently more than 10 per cent lower to 2030.
- Improve coal-fired generators' aggregate profits to 2030 by about $9.3 billion in NPV terms ($6.6 billion for black coal; $2.7 billion for brown coal).
- Reduce investment in the renewables sector from about $14 billion to around $6 billion over the period to 2030.
- Lower household bills slightly to 2020, then increase them slightly to 2030, resulting in a cumulative increase of $118 over 2015–2030 in NPV terms.
- Increase cumulative emissions by 39 Mt CO_2-e over the period 2015–20 and 190 Mt CO_2-e over the period 2015–30 (ACIL Allen 2014, pp. 40–50; Warburton review 2014, pp. 51–2).

Many participants acknowledged the need to make provisions for existing projects in the event the target is cut. The Business Council of Australia (BCA) noted:

> *Recognising that investments have now been made under the scheme, the scheme cannot be scrapped without stranding assets and creating issues of sovereign risk. Therefore, any amendments to the RET should seek to not adversely affect investments that have already been made and should be mindful of their impact on investments currently being planned or already subject to approval. (BCA, Warburton review submission, p. 15)*

The design and implementation of appropriate transitional assistance for existing projects would not be straightforward. Providing standardised assistance by fixing an LGC price would likely lead to windfall gains or losses for individual projects. Project-specific measures would avoid this problem, but implementation would be more complex. For example, criteria would need to be established for assessing what were reasonable expectations of the LGC price on commencement of a project and who bore the risk for a reduction in the price under each contract. In addition, providing transitional assistance to existing projects raises the costs of any weakening of the LRET targets. These costs are likely to be borne ultimately by electricity consumers or taxpayers.

Any sizeable reduction in the target would also retard the decarbonisation of Australia's electricity sector. As outlined in section 2.4, the electricity sector will play an important role in Australia's transition to a low-emitting economy. Cuts to the RET now would require more rapid emissions reductions in the sector later, and more reductions to be made up from elsewhere to meet Australia's 2020 target. At this time, there is no evidence that emissions reductions of the scale required from the electricity supply sector could be obtained more cheaply through the ERF.

The importance of the RET in reducing Australia's emissions was noted by some stakeholders, including AiG:

> *If the RET were removed or significantly scaled back, there would be a much larger gap between likely emissions and Australia's commitment to reduce greenhouse gas emissions to at least five per cent below 2000 levels by 2020. The cost and difficulty of bridging this gap through other policies could be significant, particularly if low-cost international abatement options are excluded. (AiG, Warburton review submission, p. 4)*

It should be noted that the RET was always intended to deliver 'at least 20 per cent' renewables and had the goal of subsuming the existing and planned state-based targets that existed when it was developed (Explanatory Memorandum, REE Amendment Bill 2009 (Cth)).

In the Authority's view, the changed circumstances since its last review do not warrant a reduction in the target. In particular, there is no compelling justification for reducing the target to a level representing 20 per cent of an updated electricity demand forecast for 2020. There is no reason to think that 20 per cent is the 'right' amount of renewable energy. As noted above, a significant reduction in the target would not decrease consumer prices and would not provide a satisfactory solution to the current oversupply problem. It would, however, defer investment in renewable generation, leading to higher electricity sector emissions, making it harder for Australia to achieve the deeper emissions reductions required beyond 2020. While modelling indicates that maintaining the current target level reduces fossil fuel generators' profits, it is likely that any effective mitigation policy will have this kind of effect. The next section considers the Authority's preferred option for adjusting the LRET.

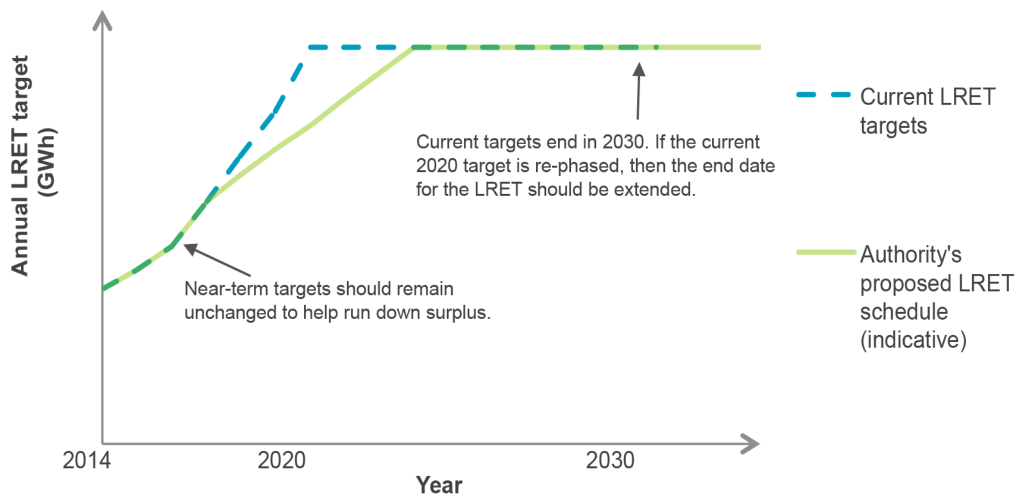
3.2.2. RESCHEDULING THE LRET TARGETS

The current target of 41,000 GWh of renewable energy in 2020 is looking increasingly challenging to achieve. Rather than cutting the 2020 target, the Authority suggests that consideration be given to extending the end year for achieving the target. This could help to restore confidence in the scheme, and provide the industry with some 'breathing space' to resume building the required capacity, following the disruptions of recent years. It would also provide some extra time for incumbent generators to adjust to further falls in projected electricity demand in 2020—for example, projected demand for electricity in the NEM in 2020 has declined by about 16 per cent since 2012.

Figure 10 shows a proposed reschedule, which:

- retains the current annual targets to 2017 to run down the present surplus of certificates
- extends the end date for operation of the LRET by at least the same number of years as the 41,000 GWh target is extended to ensure projects built later in the period have enough time to recoup the cost of their investments.

FIGURE 10: PROPOSED RE-PHASE FOR LRET TARGETS



Source: Climate Change Authority

Recent modelling of the LRET has not specifically analysed the effects of deferring the 41,000 GWh target. A few stakeholders have commented on the case for deferring the current 2020 LRET target. The Major Energy Users Association submitted that:

> *The proposition by some liable parties to extend the transition period (to 41,000 GWh LRET) beyond 2020 while ramping up the target in the years between 2020 and 2030 (e.g. the 30/30 proposition) suggests a reasoned compromise. It avoids the heavy short-term burden on industry and consumers, but provides ongoing signals for investment in renewable energy as demand grows and/or international agreements emerge. (Major Energy Users Association, Warburton review submission, p. 48)*

Schneider has modelled an LRET scenario where the targets are reshaped, with obligations reduced in the near term (to 2020) and added at the back end of the scheme (2020 to 2030), with overall obligations the same. This modelling suggests that deferring the target in this way would have a minimal impact on overall emissions (Schneider 2014, pp. 8–10).

3.2.3. THE AUTHORITY'S VIEW

On balance, the Authority considers it is better to extend the 2020 target and increase confidence it can be met, than to retain the target and miss it.

Given the doubts about achieving the LRET target by 2020 discussed earlier—reflecting policy uncertainty and low investor confidence—this approach would seem to be a pragmatic basis for moving forward.

A 'minimal change' approach would be to extend the targets by up to three years—and extend the end of the scheme by at least the same amount of time (Table 4). Any new LRET schedule should take account of the current LGC surplus, and leave targets to 2017 unchanged. The revised schedule should also take account of the time required for restoration of investor confidence and the physical construction of required capacity.

TABLE 4: ILLUSTRATIVE RE-PHASE OF THE 2020 LRET TARGET—TWO EXAMPLES

	LRET TARGETS (GWH)		
YEAR	CURRENT	2-YEAR EXTENSION	3-YEAR EXTENSION
2017	25,181	25,181	25,181
2018	29,781	28,345	27,818
2019	34,381	31,509	30,454
2020	41,000	34,672	33,091
2021	41,000	37,836	35,727
2022	41,000	41,000	38,364
2023	41,000	41,000	41,000
Ending	*2030*	*2032 (at the earliest)*	*2033 (at the earliest)*

Note: The table provides illustrative examples of extending the target by two or three years and extending the scheme by at least the same amount of time. Given the large overhang of certificates, there is no case to reduce the annual targets until after 2017.
Source: Climate Change Authority

RECOMMENDATION

R.1. Given the sharp decline in investor confidence, the resulting slowdown in investment, and the further reduction in projected electricity demand, the government should:

- defer the 2020 target for the LRET by, say, up to three years and
- extend the scheme as a whole by at least the same amount of time, with a view to providing sufficient time for projects to recover their costs.

Given the large overhang of certificates, there is no case to reduce the annual targets until after 2017.

3.3. EXEMPTIONS FOR EMISSIONS-INTENSIVE, TRADE-EXPOSED INDUSTRIES

This section considers whether the current basis for assisting particular businesses with RET costs remains appropriate.

Partial exemptions are provided for businesses undertaking emissions-intensive, trade-exposed (EITE) activities on the basis that RET costs reduce the competiveness of businesses competing in an international environment.

The current RET partial exemption framework determines eligibility and assistance rates based on an activity's overall emissions intensity, regardless of the extent to which those emissions are related to electricity use. Emissions intensity is determined using historical data and the exemption is only applicable to the portion of RET costs associated with expansion of the original 9,500 GWh MRET. Highly EITE activities are eligible to receive a 90 per cent exemption of their incremental RET costs, while moderately EITE activities are eligible for a 60 per cent exemption. In 2013, this translated to an exemption rate of about 75 per cent for highly EITE activities and about 50 per cent for moderately EITE activities (Warburton review 2014, p. 79).

There is some (understandable) confusion between 'exemption' and 'liability' under the RET. Most EITE businesses are not liable entities. Liable entities under the RET are those that acquire electricity from the wholesale market or electricity direct from a generator—in practice, primarily electricity retailers. When EITE businesses receive assistance with RET costs, overall RET liabilities remain unchanged, so RET costs are passed through to a smaller set of non-exempt customers.

Exemptions are provided through Partial Exemption Certificates issued by the CER to EITE businesses. The value of the exemption takes into account the assistance rate and a range of other inputs, including:

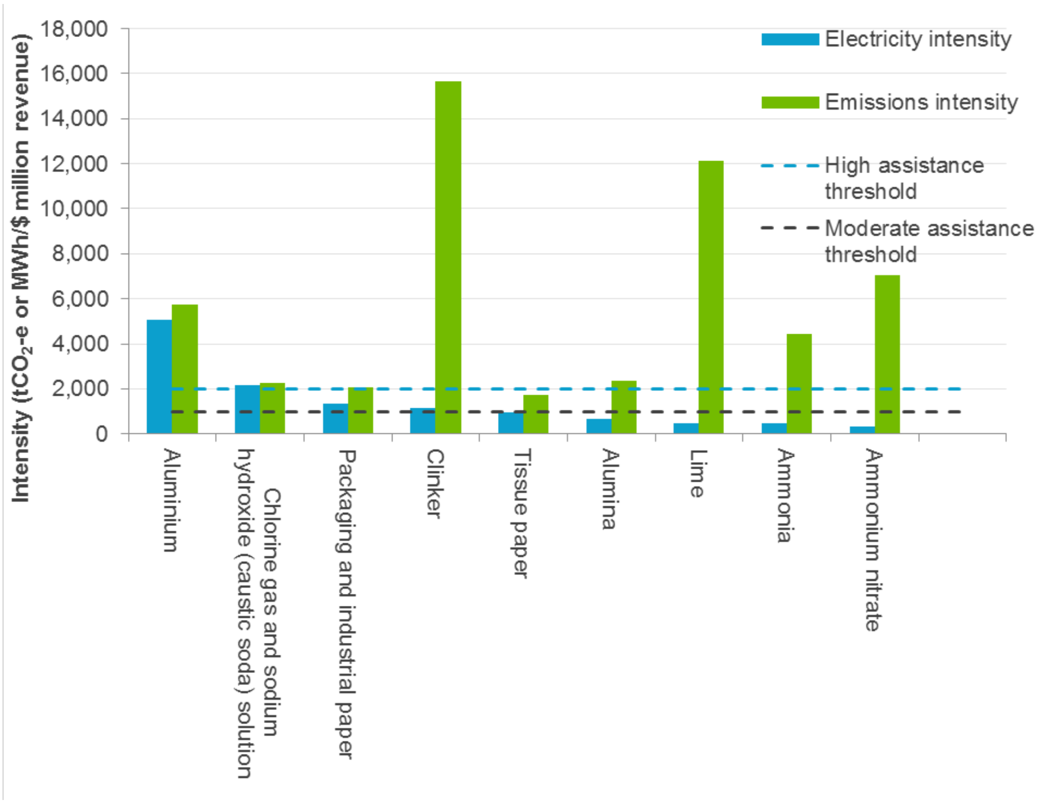
- electricity use per unit of output for the activity—each activity has a specified industry average electricity baseline, the value of which is predetermined from historical data and is set in regulations
- output—the quantity of relevant product is submitted to the CER by the EITE business every year
- proportion of electricity use from a given site that incurs a RET liability.

The Authority considered the assistance for EITE activities in its 2012 RET review, but did not form a conclusion. At the time, the carbon pricing mechanism included a similar assistance regime for the same activities, leading the Authority to recommend the Productivity Commission consider the issue as part of its broader review of carbon pricing assistance. With the repeal of the carbon price, the Authority has considered whether the eligibility criteria remain appropriate.

Providing assistance based on emissions intensity, rather than electricity intensity, leads to some anomalies. Figure 11 shows the emissions intensities and electricity intensities of selected activities and the thresholds for assistance. Based on the current eligibility thresholds, some activities, such as lime and ammonium nitrate, are highly emissions-intensive, but not particularly electricity-intensive. These activities receive a high level of exemption from RET costs, despite having lower electricity intensities than some moderately emissions-intensive activities, such as tissue paper manufacturing.

Providing assistance with electricity costs to businesses that are not particularly electricity intensive places a greater burden on non-exempt electricity users. In the Authority's view, any changes to assistance with RET costs should be based on need and the best measure of need in this context is electricity intensity. If broadening of assistance is considered, it should be based on electricity intensity.

FIGURE 11: EMISSIONS INTENSITY AND ELECTRICITY INTENSITY OF SELECTED ACTIVITIES ELIGIBLE FOR PARTIAL EXEMPTIONS FROM RET COSTS



Note: The emissions intensity for each activity includes scope 2 (electricity) emissions, with 1 MWh of electricity use converted to 1 tCO_2-e. All numbers in this figure have been provided as midpoints of ranges to protect commercial confidentiality. The eligibility threshold for highly EITE activities is 2,000 tCO_2-e/$ million revenue and for moderately EITE activities it is 1,000 tCO_2-e/$ million revenue. (There are also thresholds based on tCO_2-e/$ million value added; activities are eligible for assistance if they qualify under either metric.) Data was originally provided to the Department of Climate Change and Energy Efficiency for the purpose of establishing the eligibility of EITE activities under the Jobs and Competitiveness Program and Renewable Energy Target exemption scheme. Emissions data was provided for the financial years ending 2007 and 2008, and revenue data was provided for the financial year ending 2005 to the second half of 2008.
Source: Climate Change Authority based on data provided by the Department of the Environment

CONCLUSION

C 3. If any further exemptions from electricity costs under the RET are to be granted, this should be on the basis of electricity intensity, rather than emissions intensity.

3.4. THE RENEWABLE ENERGY TARGET AFTER 2020

Chapter 2 included comparisons of the projected emissions intensity of Australia's electricity supply in 2030 under low-emissions pathways with those under the current RET. This highlighted that more will need to be done beyond 2020 for Australia to follow a transition path consistent with global action to reduce the risks of dangerous climate change. This does not, of itself, necessarily mean that the RET should be maintained indefinitely, or increased or extended. Indeed, the Authority would like to see a more comprehensive approach to the electricity sector which would encourage all forms of zero- and low-emissions generation technologies, and discourage more emissions-intensive forms of generation, in a more cost-effective way than is attainable through the RET alone. That approach, however, seems some way off, and in the meanwhile further increases in and of RET targets post-2020 should be considered.

As part of any consideration of increased and extended RET targets, eligibility for certificate creation should also be reconsidered. The RET might be modified, for example, to become a low-emissions target through the inclusion of other zero- or low-emissions technologies. This could include waste coal-mine methane generation plants, plants burning industrial waste gases derived from fossil fuels, potentially coal or gas carbon capture and storage plant, and, if ever permitted by law, nuclear energy. Certificates created for non-zero-emissions plant could be discounted relative to zero-emissions plant.

Consistent with the conclusions drawn in its 2012 RET review, the Authority believes that issues of investor confidence and regulatory risk remain highly relevant to investors in renewables and should be taken into account when considering future policy options.

The Authority has recently been asked to conduct a special review under section 59 of the *Climate Change Authority Act 2011* over the next 18 months. This will cover future national emissions reduction targets, emissions trading and other plausible measures relevant to Australia pursuing its post-2020 emissions reductions targets. Stakeholder views on policy options for the electricity sector will be sought as part of this review.

RECOMMENDATION

R.2. Over the longer term increased recourse to renewables in electricity generation is essential to Australia's efforts to reduce its total greenhouse gas emissions. In the absence of effective alternatives, RET arrangements will have to carry much of this burden, so consideration should be given—at the appropriate time—to the nature and timeframe of possible RET arrangements in the post 2020 period. In particular, the government should consider increasing and extending targets, and expanding arrangements to cover a wider set of technologies.

CHAPTER 4. THE SMALL-SCALE RENEWABLE ENERGY SCHEME

The SRES provides support for small-scale renewable technologies, including small-scale solar PV. Owners of eligible small-scale technologies receive tradeable certificates upfront for the amount of renewable electricity the system is 'deemed' to create over a given period, which they generally assign to the installer in exchange for a lower system price. Installations of solar PV have exceeded expectations and so far, about 1.3 million solar PV systems have been installed under the RET, producing about 3,800 GWh of electricity in 2013.

This chapter focuses on solar PV and considers whether the level of assistance provided under the SRES should be adjusted, and, if so, how. It considers the impacts of the SRES and whether the benefits achieved represent value for money for Australia as a whole.

It concludes that subsidising PV under the SRES is a relatively expensive way of reducing emissions from the electricity sector, but does not see any strong case for urgent change, given that the overall costs are relatively modest and assistance will start phasing out from 2017. If any changes are introduced, they should be gradual to avoid creating disruption in the sector.

4.1. THE AUTHORITY'S 2012 CONCLUSIONS AND SUBSEQUENT DEVELOPMENTS

In its 2012 review (CCA 2012, p. 65), the Authority identified four potentially problematic issues with the design of the SRES, but did not recommend any fundamental changes. Those issues were:

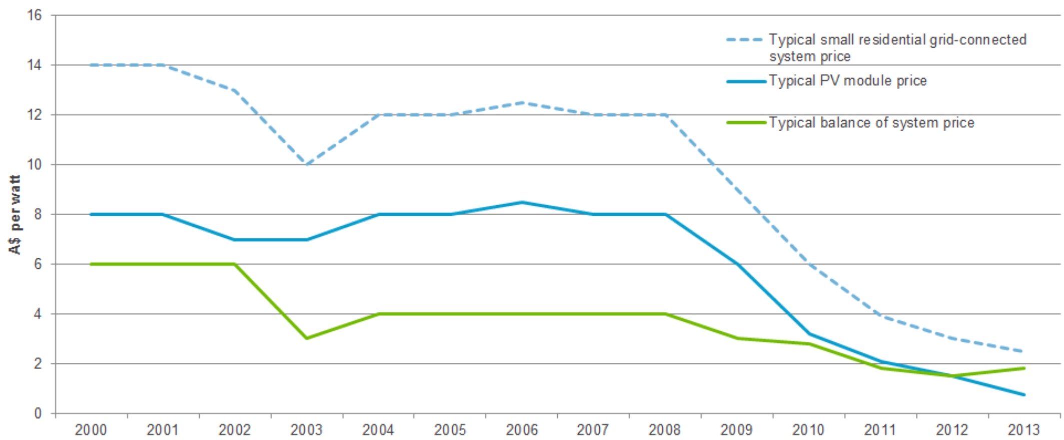
- the uncapped nature of the scheme means that the SRES can account for a relatively large share of total RET costs for consumers under certain circumstances
- unlike the LRET, the subsidy provided to small-scale systems does not automatically reduce with falling technology costs, meaning that government intervention is required to reduce assistance rates
- there was no legislated end date for the scheme (this has now changed)
- paying for 15 years of generation upfront ('deeming') was unlikely to be justifiable for larger solar PV systems below the eligibility threshold of 100 kilowatts (kW).

The Authority considered a number of options for addressing these issues, including recombining the SRES and LRET, and introducing certificate discounting that the Minister could initiate under pre-specified conditions. On balance, the Authority opted to propose modest adjustments to guard against possible booms and high costs, rather than any major and likely disruptive changes. Specifically, the Authority recommended lowering the eligibility threshold for solar PV and adding an end date to the scheme; the second of these was accepted and the scheme will now end in 2030.

At the time, the Authority noted that more disruptive options, such as recombining the LRET and SRES, might have been justified if the uptake of small-scale systems was expected to continue its strong growth. It found, however, that as the factors driving the boom—sharp falls in system costs, generous payments for exported electricity through state-based feed-in tariffs, and 'multiplier' credits for solar PV—were no longer present, and installations were expected to stabilise. This seems to be occurring—data from the Clean Energy Regulator (2014) shows that system installations in 2013 (the last year for which data are complete) were actually 44 per cent lower than their 2011 peak.

That said, with the exception of the legislated end date, the design issues and consequent risks that the Authority identified in 2012 remain today. Data from the Australian PV Institute indicate that since 2012, costs for PV modules and overall PV systems have continued to decline, albeit at slower rates (Figure 12). The average system size and the share of larger systems is rising (Figure 13); this increases the compliance costs of the SRES, other things being equal. Typical module prices fell from $1.50 per Watt in 2012 to $0.75 per Watt last year; installed prices for typical small residential systems dropped less rapidly, falling from $3 to about $2.50 per Watt. Very recently, there have been reports (see for example Edis 2014) that some suppliers have been offering prices as low as $1 per Watt for fully installed systems after SRES assistance, implying a total installed price of $1.60 per Watt.

FIGURE 12: TRENDS IN AUSTRALIAN PV SYSTEM COSTS, 2000–2013

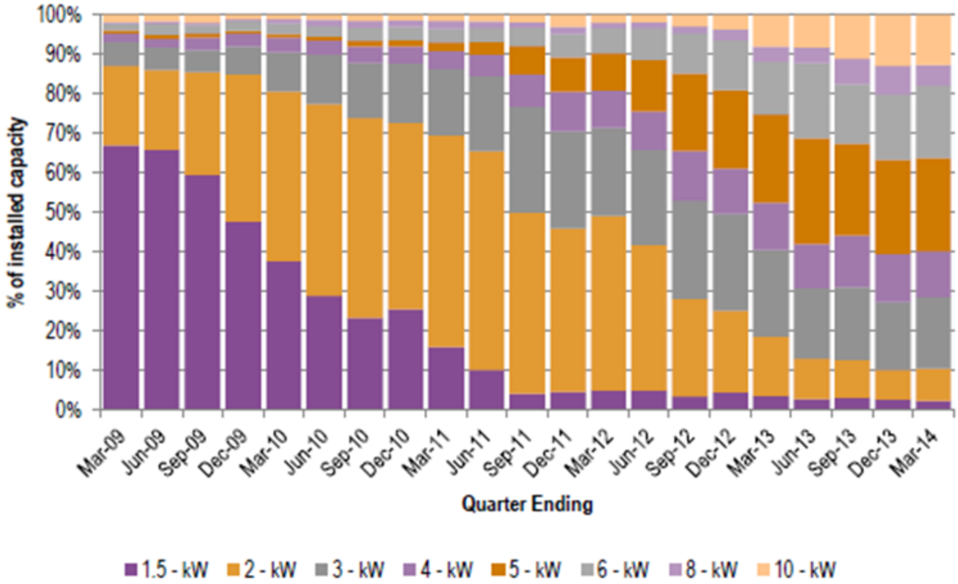


Note: Prices are prior to any assistance under the SRES and are in nominal dollars.
Source: Climate Change Authority based on Australian PV Institute 2013

Arguments for maintaining current levels of support have become less compelling with the decline in upfront costs.

Stakeholder views on the SRES are polarised. Liable entities, large energy users, peak electricity and some business peak bodies favoured scaling back or phasing out assistance on the grounds that solar is now a cost-effective economic investment for households and no longer requires a subsidy. Other stakeholders involved in the small-scale market argued that the SRES should be retained in its current form because of the public benefits it creates.

FIGURE 13: SHARE OF INSTALLED PV CAPACITY BY SYSTEM SIZE, 2009–2014



Note: 10 kW includes systems of 10–100 kW.
Source: ACIL Allen 2014

Submissions[3] from the Australian Industry Greenhouse Network, Business Council of Australia, and Energy Networks Association argued for abolition. Others supported an accelerated phase-out, suggesting a range of approaches including capping the scheme, reducing the length of deeming periods and applying a discount factor to certificates. AiG proposed regular and predictable adjustments using a formula that accounts for changes in the consumer cost of small-scale technologies and retail electricity prices.

Stakeholders advocating the SRES be retained highlighted the impacts on the industry should the scheme be abolished, and argued that it has beneficial impacts on electricity prices and has driven improvements in industry standards and innovation. The Australian PV Institute, REC Agents Association, Yingli Solar and SunWiz argued that the growth of distributed PV reduced reliance on higher cost generators during extreme temperature events, helping suppress wholesale power prices. The Clean Energy Council (CEC), REC Agents Association, Australian Solar Council and Australian PV Institute argued that rooftop solar will also deliver future benefits by deferring upgrades to the electricity network.

Many stakeholders in the industry pointed to the structure and wide geographical distribution of employment in small-scale renewables, and argued that abolishing the SRES would result in the loss of thousands of jobs. SunWiz argued that reducing or abolishing the SRES would increase upfront costs and payback periods for PV systems, and have a substantial impact upon their affordability and demand. The REC Agents Association pointed to the benefits of the SRES to the industry to date, arguing it has helped drive scale, resulting in lower costs through the industry supply chain and innovations in the marketing, delivery and installation of solar systems. The CEC argued that the SRES plays a vital role in ensuring high standards of quality assurance and safety within the industry because only PV systems designed and installed by accredited parties can access the SRES.

[3] References to submissions in this chapter are those made to the Authority if the organisation made a submission to the Authority (see Appendix A), otherwise references are to organisations' submissions to the Warburton review.

Whether the level of assistance provided under the SRES should be adjusted and, if so, how, are reasonable questions to be asking. Because assistance for PV systems is paid up-front, changing the level of assistance will have no effect on households who have already installed PV—there is no 'stranded' asset risk for such households. Rapid step changes, however, could significantly disrupt installation businesses.

In considering assistance under the SRES, the Authority has looked at:

- the impacts of the SRES
- whether the benefits achieved represent value for money for Australia as a whole
- the need for a smooth transition if assistance were to be reduced, to avoid the risk of serious disruption in the installation industry.

Two preliminary points should be noted. First, the discussion here should not be interpreted as relating to assistance for technologies other than solar PV. In this limited review, the Authority has confined its focus to solar PV because it makes up the overwhelming majority of certificate creation under SRES (over 90 per cent of certificates in 2013) (Climate Change Authority calculation from IES 2014, p. 10). Modelling commissioned for the Warburton review suggests that this dominance will continue, with solar PV projected to make up 75 per cent of cumulative certificates created over 2015–2030 (Climate Change Authority calculation from data underlying ACIL Allen 2014, p. 17).

Second, this analysis focuses on household PV rather than larger, commercial-scale PV; time and resources have prevented the Authority from considering commercial-scale PV in this review; Box 3 provides an overview of the issues.

4.2. IMPACTS OF THE SRES

Small-scale PV has private and wider social costs and benefits. In addition to the net private benefits for households, installation of small-scale PV has three sources of wider social impact:

- emissions reductions associated with displacement of electricity from the grid
- the 'network impacts' of PV installations on the broader systems that transmit and distribute electricity from generators to consumers
- growth of the small-scale PV industry.

4.2.1. HOUSEHOLD COSTS AND BENEFITS OF PV

As with measures to improve household energy efficiency, barriers to the uptake of PV can include price or other factors, some of which SRES addresses through an upfront subsidy. Installing household solar PV has net financial benefits for households—the reduction in ongoing electricity bills from self-generation is likely to more than offset the upfront cost of installing a PV system. Net financial benefits would probably accrue even without the SRES, but by providing an upfront payment[4] to households, the scheme lowers initial expenses and shortens the payback period. The upfront payment represents the amount of renewable energy the system is 'deemed' to create over a given time frame, and increases with system size and the 'quality of the solar resource' (that is, the sunniness of the broad location). This support will decrease from 2017 as the deeming period reduces by one year each year until the scheme ends in 2030.

[4] Technically, the SRES allows households who install solar PV to create tradeable certificates. In practice, the vast majority of households assign these certificates to the installer in exchange for a reduction in the installation price, hence the shorthand 'payment'.

BOX 3: TREATMENT OF COMMERCIAL-SCALE PV IN THE RET

In its 2012 review, the Authority noted the risk that future increases in installations of commercial-scale solar PV could increase the volume of STCs and therefore the costs of the uncapped SRES. The Authority recommended reducing the eligibility threshold for PV and that the government conduct further consultations to determine an appropriate threshold. Systems over the threshold would be incorporated in the LRET with five-year deeming. Earlier this year, the Warburton review made a similar recommendation, specifying an SRES eligibility limit of 10 kW (see Appendix C).

Installed capacity of systems over 10 kW grew by an estimated 150 per cent over 2012–13, albeit from a very low base. Much of this growth was encouraged by grants from the now-discontinued Clean Technology Investment Program (Green Energy Markets 2014, p. 32). The Warburton review (2014, p. 74) notes the presence of barriers to uptake that would reduce the likelihood of a significant future boom in commercial-scale PV, such as the fact that industrial businesses pay lower electricity tariffs than households, and often rent their premises.

That said, as the market for household solar PV becomes more saturated, PV suppliers will likely increase their efforts to target business customers, including through offering arrangements such as solar leasing that would lower some of these barriers. This entails some risk of a boom in these systems, which would cause a rapid increase in SRES costs.

Both the renewable energy industry and the CER have raised concerns at the high compliance costs associated with shifting larger systems into the LRET. The Clean Energy Council (2014) reports that installing and checking the more sophisticated meters required would increase installation costs by several thousand dollars. The CER would experience very large increases in applications for accreditation.

Moving larger systems into the LRET is but one approach to managing the risks to future SRES cost blowouts (and would require a solution to the high transaction costs problem to be viable). Other options are:

- retaining commercial-scale PV in the SRES but issuing certificates more frequently (either fewer years of upfront deeming or at intervals in arrears)
- retaining commercial-scale PV in the SRES with a more rapid phase-out of deeming.

The Authority believes further consideration of the consequences of these options is warranted, but it has not been possible in the course of this review.

The average upfront cost of installing a 3 kW solar system (a common system size) is estimated at about $7,670 in 2014 (Green Energy Markets 2014, p. 27). SRES payments cover about one-third of this cost; on average across states and territories, this lowers the simple payback period of a 3 kW system from 10 to about seven years (Warburton review 2014 p. 66). As the deeming period reduces in future, the absolute value of this upfront payment will fall by about $160 per year in nominal terms.[5]

In addition to net financial benefits, households also receive non-monetary benefits from installing PV. Many get satisfaction, for example, from reducing their reliance on energy retailers and feel that generating renewable energy at home is a 'practical' or direct way of contributing to Australia's emissions reduction task.

The funds for the SRES subsidy are ultimately provided by electricity consumers as a whole. Liable parties under the RET—generally electricity retailers—have to surrender certificates created by renewable energy from small-scale technologies: retailers pass the costs of purchasing these certificates onto their customers. In 2014, SRES costs were estimated to make up 1.6 per cent of an average household electricity bill (ACIL Allen 2014, p. 24); SRES costs would represent a larger share of commercial bills because commercial users generally have lower electricity tariffs.

4.2.2. SOCIAL COSTS AND BENEFITS OF PV

EMISSIONS REDUCTIONS

Generating electricity from solar PV displaces emissions-intensive grid electricity. So far, about 1.3 million solar PV systems have been installed under the RET, producing about 3,800 GWh of generation in 2013 (Warburton review 2014 pp. 8,10). This total embraces all of the solar PV subsidised by the SRES, including systems that households would have installed in the absence of SRES. The emissions reductions properly attributable to policy depend on the number of 'additional' installations the SRES has encouraged.

Assessing 'additionality' is difficult, given the judgments that have to be made about how many systems would be installed without SRES. Modelling by SKM MMA for the Authority's 2012 RET review, and by ACIL Allen for the Warburton review, provides two estimates of the additional systems that might be encouraged by the SRES in future:

- ACIL Allen projected that about 2,800 MW of solar PV would be installed over 2015–2020 without the SRES and 3,700 MW would be installed with the SRES in place; this suggests about one-quarter of projected installations to 2020 might be additional (Climate Change Authority calculation from data underlying Warburton review 2014, p. 69). ACIL also projects 'additional' emissions reductions of 15 Mt CO_2-e over the period to 2030 (ACIL Allen 2014, p. 116).
- SKM MMA projected about 3,400 MW of solar PV without the SRES and 3,500 with the SRES in place over 2012–13 to 2020–21, suggesting fewer than five per cent of installations would be additional (Climate Change Authority calculation from SKM MMA 2012).

It is possible that the proportion of 'additional' systems encouraged by the SRES is falling over time. The lower the pre-subsidy upfront costs, the shorter the payback period, so, other things being equal, falls in upfront costs are likely to raise the share of uptake that would occur regardless of the policy.

[5] Climate Change Authority calculation based on an STC price of $38, a 3 kW system and solar zone data from Renewable Energy (Electricity) Regulations 2001 (Cth), schedule 5. It is a simple average across solar zones that determine the volume of STCs deemed in one year to create an Australia-wide approximation.

IMPACTS ON THE ELECTRICITY NETWORK

Different electricity consumers place different demands on the networks that transmit and distribute electricity. Air conditioning, for example, can impose heavy demands at peak times, increasing network costs. Solar PV can reduce a consumer's demand on the network during peak times, but also uses the network to export generation surplus to the household's requirements. Current approaches to network pricing do not accurately reflect the costs and benefits created by different consumers. As a result, network pricing can tend to over- or under-encourage the installation and use of technologies such as PV and air conditioning.

The introduction of more cost-reflective network pricing is an important issue for the electricity sector. It is beyond the scope of this review, but is currently being addressed through other channels, such as Australian Energy Market Commission rule changes (AEMC 2014a).

Available estimates of the impact of PV on networks differ, but generally indicate that PV either imposes much smaller costs on other network customers than air conditioning does, or provides net benefits (NERA 2014, APVI 2013). A recent case study used modelled PV data to estimate that a household with a 2.5 kW north-facing PV system receives a reduction in their network charges that is approximately $120 per year greater than value of the reduction in network costs caused by the PV system. In contrast, a case study in respect of a large air conditioning unit found the additional network costs were approximately $680 per year more than the extra network charges paid by the household (NERA 2014 cited in AEMC 2014b, pp. 28–9).

IMPACTS ON THE INSTALLATION INDUSTRY

The final wider social impact of households' demand for PV is that businesses exist across Australia to satisfy it. Any changes to the level of assistance provided through the SRES would affect the owners and employees of these businesses and their suppliers. This is not directly relevant to the level of assistance provided under the SRES, but it does have implications for the manner in which any changes to the SRES are introduced. Sudden changes in government subsidies, for example, can have damaging effects on the owners and employees of businesses providing the subsidised good. The report of the Royal Commission into the Home Insulation Program details many examples of the impacts of such policy changes on the lives and wellbeing of business owners and staff, and was critical of how these issues were handled. It describes some of the impacts of that program's sudden termination in the following terms:

> *... many businesses found themselves with an immediate freezing of their cash flow. As a result, many businesses had ongoing commitments to suppliers with forward orders that could not be met. Businesses were left with commitments on property leases, vehicles, equipment, and held insulation stock which could not be moved and no longer had any appreciable value. Some businesses had a liability to financial institutions, sold or disposed of vehicles, stock and equipment at a loss, or had to sell their family home to meet their business debts. (Hanger 2014, p. 287)*

This highlights the need for any changes to assistance arrangements under the SRES to be introduced in ways which avoid creating potential 'boom-bust' situations.

4.3. SRES ASSISTANCE FOR SOLAR PV AND VALUE FOR MONEY

There is at least a strong suggestion that the SRES may subsidise a reasonably large volume of installations that would occur anyway. Even when viewed in terms of the probable additional installations, it appears that reducing emissions by installing small-scale solar PV is a relatively expensive way to reduce emissions in the electricity sector.

As discussed in section 2.2.3, the appropriate measure of the cost per tonne of emissions reductions is the incremental net present value of the resource cost divided by the incremental undiscounted emissions reductions delivered by the policy. Published estimates of the cost per tonne of emissions reductions from the SRES calculated in this way are very limited. ACIL Allen's modelling for the Warburton review generated projections of about $95 per tonne of CO_2-e over the period to 2030 for solar PV (in 2014 dollars; Warburton review 2014, p. 42). This modelling incorporates a levelised cost of energy (a measure of the cost of generating electricity from a technology that includes building and running costs) of about $190/MWh, which is about double the estimated levelised cost of wind (about $80–$100/MWh) (ACIL Allen 2014, p 115). Both estimates omit some avoided resource costs (see Box 4).

What is clear, however, is that the cost per tonne of emissions reductions from solar PV under the SRES is relatively expensive compared with:

- the LRET, which is projected to create about 20 times the volume of additional emissions reductions at an average of about one-third of the unit cost over the period to 2030 (ACIL Allen 2014, p. 116) and
- with what the modelling commissioned by the Authority (Treasury and DIICCSRTE 2013) suggests might be required to achieve the minus 5 per cent 2020 target domestically through efficient policy (about $65 per tonne in 2020, in 2012 dollars).

BOX 4: ESTIMATING THE COST-EFFECTIVENESS OF ASSISTING PV UNDER THE SRES

The appropriate measure of the cost per tonne of emissions reductions is the incremental net present value of the resource cost divided by the incremental undiscounted emissions reductions delivered by the policy. Ideally, the incremental NPV of the resource should incorporate:

- the incremental upfront costs of solar PV
- its avoided resource costs, which can come about through both
  - reduced generation from large-scale plant
  - any (positive or negative) impacts on the electricity network.

In practice, impacts on the electricity network are often excluded from these calculations for the RET, given they are difficult to estimate.

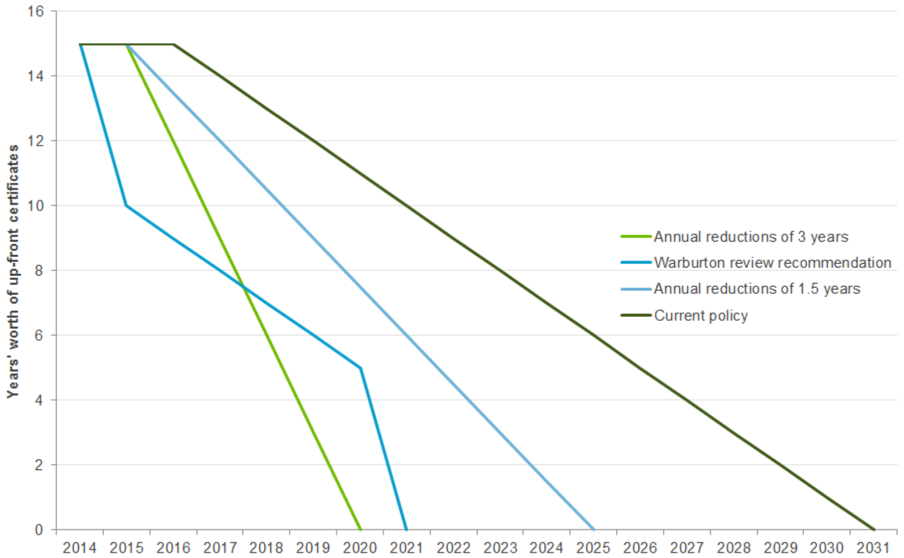
ACIL Allen's modelling estimates the cost per tonne of emissions reductions under the SRES at about $95 per tonne of CO_2-e over the period to 2030 when compared with a no RET scenario (ACIL Allen 2014, p. 116). The modelling estimates the cost per tonne of emissions reductions from the RET as a whole, then apportions it between the LRET and SRES by calculating the cost per tonne for the SRES and assigning the remaining resource costs and avoided emissions to the LRET (Kelp 2014). The cost per tonne for the SRES is calculated as the incremental upfront costs of PV divided by the emissions displaced by the incremental PV installations. When compared with the 'ideal' approach outlined above, this omits some avoided resource costs. That said, the larger the share of PV that would be installed anyway, the smaller these incremental second-order effects would be.

4.4. CONCLUSIONS ON ASSISTANCE FOR PV UNDER THE SRES

Overall, the Authority concludes that there is reasonable evidence that SRES support for small-scale PV is a relatively expensive way to reduce emissions from the electricity sector. At the same time, the cost impacts on electricity consumers generally are modest and the scheme is to start phasing out in 2017. This scheduled phase out could conceivably be accelerated while taking care to avoid serious disruption in the industry, by avoiding large 'steps' in the rate of deeming, which are likely to encourages rushes of installations before assistance rates change.

By way of illustration, a still smooth but slightly more rapid phase-out might involve reducing deeming by 1.5 or three years each year over 2015–2025 or 2015–2020, respectively. This would reduce compliance costs for electricity retailers, with possible modest flow-on savings to electricity users. Figure 14 illustrates these possibilities, and compares them with the current policy and the Warburton review's accelerated phase-out option (its other recommended option was immediate abolition).

FIGURE 14: OPTIONS FOR AN ACCELERATED PHASE-OUT OF PV ASSISTANCE



Source: Climate Change Authority based on Warburton review

CONCLUSION

C 4. Subsidising household PV under the SRES is a relatively expensive way to reduce emissions in the electricity sector. The Authority, however, has not recommended any changes, largely because the SRES assistance will shortly begin to phase out, and the overall costs are relatively modest.

CHAPTER 5. OTHER ISSUES FOR THE REVIEW

This chapter considers two issues—the diversity of access and uptake for renewable technologies under the RET, and the role and appropriate frequency for statutory reviews of the scheme. The first issue is a statutory requirement of the Authority's RET reviews.

On both issues, the Authority is inclined to reiterate the conclusions made in its 2012 reviews, namely that no change should be made to the RET to encourage particular technologies, and that statutory reviews should be conducted every four years rather than every two years.

5.1. DIVERSITY OF ACCESS AND UPTAKE

The Authority has a statutory obligation to review diversity of access of renewable technologies to the scheme.

In its 2012 RET review, the Authority considered various measures that could be used to promote diversity of access and uptake, including:

- **Multipliers**, which could be applied to certificates from particular technologies to increase their uptake.
- A **cap**, which could be used to limit the total amount of generation from a particular technology, increasing the share of the target available to other eligible technologies.
- **Banding**, which would set a quota for total generation from each eligible technology. By assigning particular targets to different technologies, banding allows each technology the space to evolve without potentially being 'crowded out' by other technologies that might be cheaper in the short term.

The design of the LRET—which is neutral between renewable technologies—encourages the deployment of the lowest cost technologies, thereby minimising the costs to consumers of meeting a given target.

In 2012, the Authority concluded that the adoption of any measure to promote diversity within the RET, such as expanding the use of multipliers, or introducing banding or caps, would increase the costs of the scheme to consumers, and to the community as a whole. The Authority's view remains that the present approach should continue and that the current level of diversity of access is appropriate at this time. As recommended in section 3.4, the question of access to the scheme would warrant further consideration in the event the LRET were to be increased and extended in the period beyond 2020.

CONCLUSION

C 5. No changes should be made to the Renewable Energy Target framework to promote diversity of renewable technologies at this time.

5.2. FUTURE STATUTORY REVIEWS

Currently, the REE Act requires the Authority to conduct reviews of the RET every two years. When the Authority considered the review schedule in 2012 it concluded that full reviews every four years would provide an appropriate balance between policy flexibility and investor certainty. This is a position shared with many stakeholders—in submissions to the Warburton review and the Authority, the vast majority of participants addressing this issue argued for less frequent reviews—or no statutory reviews at all.

Statutory reviews that are transparent, predictable and principles-based are a valuable part of the governance of any major policy. In the context of the RET, they allow the tracking of progress towards nominated targets and evaluation of performance based on the goals of the scheme. They also allow actual and potential problems to be identified—and possible solutions to be explored in a formal (if stretched) timeframe.

As recent experience has demonstrated, frequent reviews of the RET in an environment lacking bipartisan political support for the scheme can cause investment and employment in the renewables industry to stall and fall. The Authority looks forward to an early resolution of uncertainty surrounding the RET, and especially the 2020 LRET target. In that event, the level and timing of the re-negotiated 2020 LRET target could be deemed to be outside the scope of future RET reviews.

A likely major issue for consideration in the next statutory review (assuming this is in 2018) is the possible role of the RET in the period beyond 2020, including its place in the overall post-2020 policy framework. As noted earlier, in the absence of more comprehensive, cost-effective measures to reduce emissions in the electricity sector, consideration would need to be given to increasing and extending the RET targets post 2020, along with eligibility for certificate creation (see section 3.4).

The Authority remains of the view that its previous suggestion that statutory reviews of the RET occur every four years strikes a reasonable balance between the need for policy flexibility and the risks to investor confidence created by too frequent reviews.

CONCLUSION

C 6. In the interest of maintaining investor confidence in the industry, the frequency of statutory reviews of the RET should be changed from every two years to every four years. For the same reason, if bipartisan agreement were to be reached on any revisions to the current 2020 LRET target, those revised arrangements should be outside the scope of future reviews.

APPENDIX A PUBLIC CONSULTATION

The Authority is required to conduct public consultation for all of its reviews. Given the limited time available to conduct the review, the Authority did not release an issues paper or draft report. Nevertheless, throughout the review, the Authority consulted with a wide range of interested parties, including energy retailers, energy users, investors and the renewable energy industry. The Authority also drew on its previous work as well as the public submissions, analysis (including modelling) and report of the recent Warburton review.

Stakeholders were also invited to provide submissions to the Authority. Table 5 lists the individuals and organisations that provided submissions. These are available on the Authority's website at: www.climatechangeauthority.gov.au/submissions/submissions-received.

TABLE 5: SUBMISSIONS RECEIVED

AGL	Alstom
Australian Financial Markets Association	Australian Petroleum Production & Exploration Association
Australian Sugar Milling Council	Barbara J. Fraser
Clean Energy Council	CWP Renewables
Energy Networks Association	Energy Supply Association of Australia
Hydro Tasmania	Minerals Council of Australia
Origin Energy	Peter Cook
Recurrent Energy	Senvion Australia
Stanwell Corporation	Trustpower
WWF Australia	

APPENDIX B REQUIREMENTS FOR AUTHORITY RENEWABLE ENERGY TARGET REVIEWS

The *Climate Change Authority Act 2011* (Cth) (the CCA Act) and *Renewable Energy (Electricity) Act 2000* (Cth) (the REE Act) establish the legislative requirements for the Authority's RET review. Together, they cover requirements for timing, scope and conduct of the reviews. The relevant parts of both of these Acts are reproduced below:

- Section 12 of the CCA Act sets out general principles that the Authority must have regard to in conducting reviews.
- Section 162 of the REE Act sets out the Authority's specific requirements for reviewing the RET.

THE AUTHORITY'S PRINCIPLES (SECTION 12 OF THE CCA ACT)

In performing its functions, the Authority must have regard to the following principles:

(a) the principle that any measures to respond to climate change should:

- be economically efficient; and
- be environmentally effective; and
- be equitable; and
- be in the public interest; and
- take account of the impact on households, business, workers and communities; and
- support the development of an effective global response to climate change; and
- be consistent with Australia's foreign policy and trade objectives;

(b) such other principles (if any) as the Authority considers relevant.

PERIODIC REVIEWS OF OPERATION OF RENEWABLE ENERGY LEGISLATION (SECTION 162 OF THE REE ACT)

(1) The Climate Change Authority must conduct reviews of the following:

(a) the operation of this Act and the scheme constituted by this Act;

(b) the operation of the regulations;

(c) the operation of the *Renewable Energy (Electricity) (Large-scale Generation Shortfall Charge) Act 2000*;

(d) the operation of the *Renewable Energy (Electricity) (Small-scale Technology Shortfall Charge) Act 2010*;

(e) the diversity of renewable energy access to the scheme constituted by this Act, to be considered with reference to a cost benefit analysis of the environmental and economic impact of that access.

Public consultation

(2) In conducting a review, the Climate Change Authority must make provision for public consultation.

Report

(3) The Climate Change Authority must:

(a) give the Minister a report of the review; and

(b) as soon as practicable after giving the report to the Minister, publish the report on the Climate Change Authority's website.

(4) The Minister must cause copies of a report under subsection (3) to be tabled in each House of the Parliament within 15 sitting days of that House after the review is completed.

First review
(5) The first review under subsection (1) must be completed before the end of 31 December 2012.

Subsequent reviews
(6) Each subsequent review under subsection (1) must be completed within 2 years after the deadline for completion of the previous review.

(7) For the purposes of subsections (4), (5) and (6), a review is completed when the report of the review is given to the Minister under subsection (3).

Recommendations
(8) A report of a review under subsection (1) may set out recommendations to the Commonwealth Government.

(9) In formulating a recommendation that the Commonwealth Government should take particular action, the Climate Change Authority must analyse the costs and benefits of that action.

(10) Subsection (9) does not prevent the Climate Change Authority from taking other matters into account in formulating a recommendation.

(11) A recommendation must not be inconsistent with the objects of this Act.

(12) If a report of a review under subsection (1) sets out one or more recommendations to the Commonwealth Government, the report must set out the Climate Change Authority's reasons for those recommendations.

Government response to recommendations
(13) If a report of a review under subsection (1) sets out one or more recommendations to the Commonwealth Government:

(a) as soon as practicable after receiving the report, the Minister must cause to be prepared a statement setting out the Commonwealth Government's response to each of the recommendations; and

(b) within 6 months after receiving the report, the Minister must cause copies of the statement to be tabled in each House of the Parliament.

(14) The Commonwealth Government's response to the recommendations may have regard to the views of the following:

(a) the Climate Change Authority;

(b) the Regulator;

(c) such other persons as the Minister considers relevant.

APPENDIX C OUTCOMES OF PREVIOUS REVIEWS

This appendix lists the recommendations from previous RET reviews for easy reference (the Authority's 2012 review and the 2014 Warburton review).

THE AUTHORITY'S 2012 RENEWABLE ENERGY TARGET REVIEW

Recommendation 1
The frequency of scheduled reviews should be amended from every two years to every four years, so the next scheduled review would be in 2016.

Recommendation 2
The form of the Large-scale Renewable Energy Target should continue to be expressed in legislation in terms of a fixed gigawatt-hour (GWh) level.

Recommendation 3
The existing Large-scale Renewable Energy Target of 41,000 GWh and interim targets should be maintained in their current form.

Recommendation 4
The RET review in 2016 is an appropriate time to consider adjusting the targets beyond 2020 in light of the policy and economic conditions prevailing at that time.

Recommendation 5
The Small-scale Renewable Energy Scheme should remain separate to the Large-scale Renewable Energy Target.

Recommendation 6
The threshold for solar photovoltaic units in the Small-scale Renewable Energy Scheme should be reduced from 100kW to, say, 10kW. The CCA recommends the Government conduct further consultation with stakeholders to determine an appropriate threshold. Units over the small-scale threshold would be included in the Large-scale Renewable Energy Target with five year deeming.

Recommendation 7
The ministerial power to lower the price cap should be retained to provide an immediate cost-containment mechanism should installations of small-scale systems boom.

Recommendation 8
The Small-scale Renewable Energy Scheme should be phased out by reducing deeming so that renewable energy generation is not rewarded after 2030.

Recommendation 9
The Clearing House should be amended to a 'deficit sales facility' whereby new certificates would only be placed in the Clearing House when it is in deficit.

Recommendation 10
The requirement to submit a solar hot water heater and small generation unit return should be removed from the *Renewable Energy (Electricity) Act 2000*.

Recommendation 11
The requirement to provide the out-of-pocket expense data for a small generation unit installation should be removed from the Renewable Energy (Electricity) Regulations 2001.

Recommendation 12
There should be no change to primary point of liability or the size threshold for coverage of grids.

Recommendation 13
Large electricity consumers should be permitted to opt-in to assume direct liability for RET obligations. The Government should consult further with stakeholders to develop a detailed approach to opt-in that is efficient for both large electricity users and retailers. The CCA considers that the New South Wales Greenhouse Gas Reduction Scheme opt-in model would be an appropriate starting point for this detailed design work.

Recommendation 14
No changes be made to the process for calculating individual liability.

Recommendation 15
The relevant Renewable Power Percentage and Small-scale Technology Percentage should be required to be set prior to a compliance year, and preferably by 1 December of the preceding year.

Recommendation 16
The current arrangements for surrender of certificates (annual surrender for the Large-scale Renewable Energy Target; quarterly surrender for the Small-scale Renewable Energy Scheme) should be maintained.

Recommendation 17
The Clean Energy Regulator should be able to refund over-surrendered certificates to a liable entity that ceases to trade, or transfer over-surrendered certificates if a liable entity is acquired by another entity which takes on a RET liability.

Recommendation 18
The current settings for the shortfall charge should be maintained. However, the level of the shortfall charge should be reconsidered by the CCA as part of its 2016 review of targets beyond 2020, or earlier if circumstances warrant.

Recommendation 19
The level of the emissions-intensive, trade-exposed exemption under the RET should be considered by the Productivity Commission as part of its broader review of the Jobs and Competitiveness Program.

Recommendation 20
The Government should take into consideration the impact of the RET on the competitiveness of an emissions-intensive, trade-exposed industry in any request to the Productivity Commission's review of the level of industry assistance under the carbon pricing mechanism and the RET.

Recommendation 21
In cases where the RET costs are passed through to emissions-intensive, trade-exposed businesses, Partial Exemption Certificates should be tradeable, and thereby able to be used by any liable entity to reduce liable electricity acquisitions.

Recommendation 22
The Government should consider opportunities for efficiencies through the alignment of application processes and data requirements for emissions-intensive, trade-exposed industries under the Jobs and Competitiveness Program and the RET.

Recommendation 23
The self-generator exemption should continue in its current form.

Recommendation 24
Arrangements should be developed to allow for incidental electricity offtakes under the self-generators exemption which provide community benefits in remote locations.

Recommendation 25
No change is necessary to the list of eligible sources or the accreditation process for the Large-scale Renewable Energy Target.

Recommendation 26
Existing arrangements for waste coal mine gas should be maintained under the Large-scale Renewable Energy Target.

Recommendation 27
There should be no change to the *Renewable Energy (Electricity) Act 2000* to allow for new waste coal mine gas to be eligible.

Recommendation 28
The Government should explore whether the RET eligibility for native forest wood waste is likely to increase the rate of logging of native forests. If it is not, then wood waste eligibility should be reinstated, subject to appropriate accreditation processes designed to ensure that no additional logging occurs as a result.

Recommendation 29
Maintain the Clean Energy Council as the sole accreditation body for installers under the Small-scale Renewable Energy Scheme.

Recommendation 30
New small-scale technologies should be included on a case-by-case basis for inclusion in the Small-scale Renewable Energy Scheme.

Recommendation 31
No additional new small-scale technologies should be made eligible in the Small-scale Renewable Energy Scheme at this time.

Recommendation 32
Existing arrangements for displacement technologies should be maintained.

Recommendation 33
No change should be made to the *Renewable Energy (Electricity) Act 2000* to allow additional displacement technologies.

Recommendation 34
No change should be made to the RET framework to promote greater diversity.

WARBURTON 2014 RENEWABLE ENERGY TARGET REVIEW

Recommendation 1

The Renewable Energy Target (RET) should be amended in light of the changing circumstances in Australia's main electricity markets and the availability of lower cost emission abatement alternatives.

Recommendation 2

The Large-scale Renewable Energy Target (LRET) should be amended in one of the following two ways:

Option 1 – Closed to new entrants ('grandfathering')

In order to reduce the cost of the LRET and its impact on electricity markets, the Panel recommends that the LRET should be closed to new entrants.

a. The LRET is closed to new renewable energy power stations (subject to limited exceptions described below). The Clean Energy Regulator (CER) should set targets annually based on estimated output from accredited power stations.

b. In addition to those renewable energy power stations already accredited under the scheme, eligibility would be extended to:

i. Renewable energy power stations already under construction.

ii. Renewable energy power stations to be constructed where project proponents can demonstrate that there is full financial and contractual commitment to the project (e.g., final investment decision, engineering and procurement contract) within one month of the announcement of this approach.

c. The last year of the operation of the LRET is 2030.

or

Option 2 – Share of growth in electricity demand

In order to provide support for new renewable power stations and contribute to Australia's emissions reduction target while achieving less reduction than Option 1 in the cost of the LRET, the Panel recommends that the target be set to allocate a share of growth in electricity demand to renewables in the following manner:

a. The target is set annually by the CER, increasing each year to 2020 by an amount equivalent to 50 per cent of projected growth in national electricity demand, ensuring that new renewable energy power stations are only supported under the RET where electricity demand is increasing.

b. Where national electricity demand is projected to remain flat or fall, the target is held at the previous year's level.

c. From 2021 onwards, the target is fixed at the 2020 level until 2030, the last year of the operation of the LRET.

Based on current electricity demand forecasts, this approach would achieve a 20 per cent share of renewables in the electricity generation mix by 2020.

Recommendation 3

The Small-scale Renewable Energy Scheme (SRES) should be amended in one of the following two ways:

Option 1 – Abolition

In order to address the cost of the SRES (and its effect on electricity markets), the Panel recommends that it be closed immediately in the following manner:

a. The SRES should terminate upon announcement.

b. Those who contracted before the announcement for the installation of a small-scale system should receive the certificates they would have done.

or

Option 2 – Bring forward the phase-out of the SRES

In order to reduce the cost of the SRES while providing some support for new small-scale renewable energy systems, the Panel recommends that the phase-out of the SRES be brought forward in the following manner, to take effect immediately:

a. Bring forward the last year of operation of the SRES from 2030 to 2020.

b. Reduce the period for which certificates may be created for rooftop solar PV systems from 15 years to 10 years, and in each year from 2016 onwards further reduce the period for which certificates may be created, as set out below:

Rooftop solar PV: period certificates may be created

YEAR INSTALLED	PERIOD
Prior to announcement	15 years
From announcement	10 years
2016	9 years
2017	8 years
2018	7 years
2019	6 years
2020	5 years
2021	Scheme closed

c. Reduce system size eligibility threshold for rooftop solar PV systems from no more than100 kilowatts to no more than 10 kilowatts.

d. Reduce the period for which certificates may be created for solar and heat pump water heaters by one year each year, commencing in 2016, as set out below:

Solar and heat pump water heaters: period certificates may be created

YEAR INSTALLED	PERIOD
Prior to 2016	10 years
2016	9 years
2017	8 years
2018	7 years
2019	6 years
2020	5 years
2021	Scheme closed

Recommendation 4

The current partial exemption arrangements for emissions-intensive trade-exposed businesses should be maintained.

Recommendation 5

The self-generation exemption should be amended to extend the one kilometre radius restriction and to permit self-generators to supply incidental amounts of electricity (below a set threshold) to third parties without attracting a RET liability. The Government should consult with affected parties to determine an appropriate distance limit and threshold for incidental off-takes.

Recommendation 6

The Government's commitment to the reinstatement of native forest wood waste as a renewable energy source under the LRET should be implemented through the reintroduction of the relevant regulations in force prior to 2011.

Recommendation 7

The requirement for statutory reviews of the scheme should be removed from the *Renewable Energy (Electricity) Act 2000*.

GLOSSARY

TERM	ACRONYM/ ABBREVIATION	EXPLANATION
Australian Energy Market Operator	AEMO	The Australian Energy Market Operator was established in 2009 and is responsible for the operation of the National Electricity Market, which includes the east and south-east regions of Australia (Queensland, New South Wales, Victoria, Tasmania and South Australia).
bankable certificates		Renewable energy certificates for both the large-scale and small-scale market do not have an expiry date. They may be purchased and held for any length of time before they are surrendered.
certificate costs		The amount passed on by liable parties (generally electricity retailers) to end-users to account for the costs of purchasing and surrendering Large-scale Generation Certificates (LGCs) and Small-scale Technology Certificates (STCs).
carbon pricing mechanism		The carbon pricing mechanism created a price on emissions by requiring large emitters to report on and surrender emissions units for their covered emissions. The carbon pricing mechanism commenced operation on 1 July 2012 and was abolished with effect from 1 July 2014.
Clean Energy Regulator	CER	The Clean Energy Regulator is an independent statutory authority that administers regulatory schemes relating to greenhouse gas emissions reductions, including the Renewable Energy Target, the Carbon Farming Initiative and the National Greenhouse and Energy Reporting Scheme.
Climate Change Authority	'the Authority'	Established on 1 July 2012, the Climate Change Authority provides independent expert advice on Australian Government climate change mitigation initiatives.
commercial-scale PV		Larger capacity rooftop solar PV installed on non-residential premises.
compliance period		A full calendar year, the period over which each annual target under the Renewable Energy Target must be achieved.
Council of Australian Governments	COAG	The peak intergovernmental forum in Australia. The members of the Council of Australian Governments are the Prime Minister, State and Territory Premiers and Chief Ministers and the President of the Australian Local Government Association.
deeming		The estimation of the amount of electricity a solar panel or small-scale wind or hydro system generates, or the electricity a solar water heater or heat pump displaces. Deeming allows the owners of these technologies to receive their entitlement to small-scale technology certificates before the system has produced or displaced the electricity.
emissions-intensive trade-exposed	EITE	Businesses conducting specified emissions-intensive trade-exposed (EITE) activities are eligible for assistance under the RET scheme.
gigawatt hours	GWh	A measure of electricity generation or use over a period of time (or energy).
Intergovernmental panel on climate change	IPCC	Scientific intergovernmental body that produces reports that support the United Nations Framework Convention on Climate Change, which is the main international treaty on climate change
kilowatt	kW	A measure of power.
kilowatt hour	kWh	A measure of electricity generation or use over a period of time (or energy).

TERM	ACRONYM/ ABBREVIATION	EXPLANATION
Kyoto Protocol		An agreement adopted under the United Nations Framework Convention on Climate Change in 1997. It entered into force in 2005.
Large-scale Generation Certificate	LGC	Represents one megawatt hour of renewable energy generation.
Large-scale Renewable Energy Target	LRET	Encourages the deployment of large-scale renewable electricity projects such as wind farms.
levelised cost of electricity	LCOE	A common tool for measuring and comparing power generation costs across different technologies. It represents the per kilowatt hour cost (in real dollars) of building and operating a generation technology over an assumed financial life and duty cycle.
liable entities		Entities that make wholesale acquisitions of electricity and are required by the legislation to surrender a specified number of renewable certificates or pay a renewable energy shortfall charge.
Mandatory Renewable Energy Target	MRET	The Mandatory Renewable Energy Target began operation in 2001. It had a target of 9,500 gigawatt hours in 2010 (mandated out to 2020) and interim targets that gradually increased year on year.
megawatt	MW	A measure of power (or demand).
megawatt hour	MWh	A measure of electricity generation/use over a period of time (or energy).
merchant generator		A stand-alone electricity generator that does not have a power purchase agreement (PPA) with an electricity retailer, but rather sells its production to the spot and short-term forward markets.
mothballing		The preservation of a production facility without using it to produce. Machinery in a mothballed facility is kept in working order so that production may be restored quickly if needed.
multiplier credits		Credits that are a multiple of the number of certificates that an eligible technology would generally be able to create. Previously in place under the Small-scale Renewable Energy Scheme.
National Electricity Market	NEM	The National Electricity Market interconnects five regional market jurisdictions (Queensland, New South Wales, Victoria, South Australia and Tasmania). Western Australia and the Northern Territory are not connected to the National Electricity Market.
native demand		Electricity load serviced by scheduled electricity generation, semi-scheduled generation and embedded generation (including rooftop solar PV).
net present value	NPV	Net present value is a standard method for using the time value of money to estimate future costs. It compares the present value of money today to the present value of money in the future, taking inflation into account.
partial exemption certificate	PEC	The *Renewable Energy (Electricity)* Act 2000 and the Renewable Energy (Electricity) Regulations 2001 include provisions to provide partial exemption from Renewable Energy Target liability for electricity used in defined emissions-intensive trade-exposed activities. To obtain exemption, prescribed persons may apply to the Clean Energy Regulator for a partial exemption certificate.
power purchase agreement	PPA	A long-term agreement between an electricity generator and electricity retailer to purchase electricity generated (and in the case of renewable generators, LGCs).

TERM	ACRONYM/ ABBREVIATION	EXPLANATION
'real' 20 per cent target		A 2020 LRET target based on 20 per cent of either current estimated or actual electricity demand in 2020. The current 2020 LRET target is for a fixed amount of generation (41,000 GWh).
Renewable Energy Certificate	REC	The term used for renewable energy certificates generated under the Renewable Energy Target scheme prior to 2011.
***Renewable Energy (Electricity)* Act 2000 (Cth)**	REE Act	The legislative framework for the Renewable Energy Target scheme.
Renewable Energy (Electricity) Regulations 2001	REE Regulation	The detailed rules and provisions of the Renewable Energy Target scheme.
Renewable Energy Target	RET	The Renewable Energy Target operates in two parts—the Small-scale Renewable Energy Scheme and the Large-scale Renewable Energy Target.
Renewable Energy Target review	RET review	The Climate Change Authority's review of the Renewable Energy Target. The review is defined in Section 162 of the Renewable Energy (Electricity) Act 2000 (Cth).
shortfall charge		A charge that applies to the outstanding amount when a liable entity surrenders less than the required number of certificates to meet obligations under the LRET or SRES. The shortfall charge under both the LRET and SRES is currently set at $65.
solar photovoltaic	PV	A method of generating electricity by converting the sun's energy into electricity.
small-scale PV		Rooftop solar PV installed on by households. Also referred to as 'household PV'.
Small-scale Renewable Energy Scheme	SRES	Supports the installation of small-scale systems, including solar photovoltaic systems and solar water heaters, and small generation units.
Small-scale Technology Certificate	STC	Certificates created by small-scale technologies like solar panels and solar water heaters.
Small-scale Technology Certificate Clearing House	STC Clearing House	Facilitates the exchange of small-scale technology certificates between buyers and sellers at the fixed price of $40 (excluding GST).
thermal generators		A power station in which electricity is generated by the production of steam. The steam is typically produced by burning fossil fuels such as gas and coal.
Warburton review		A review of the Renewable Energy Target conducted in 2014 by a panel headed by Dick Warburton AO LVO, supported by a secretariat located within the Department of the Prime Minister and Cabinet.

ABBREVIATIONS AND ACRONYMS

TERM	MEANING
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AiG	Australian Industry Group
AO	Officer of the Order of Australia
APVI	Australian Photovoltaic Institute
BCA	Business Council of Australia
BNEF	Bloomberg New Energy Finance
BREE	Bureau of Resources and Energy Economics
CCA	Climate Change Authority
CCS	Carbon capture and storage
CEC	Clean Energy Council
CER	Clean Energy Regulator
CO_2	Carbon dioxide
CO_2-e	Carbon dioxide equivalent
COAG	Council of Australian Governments
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cth	Commonwealth
DIICCSRTE	Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education
EITE	Emission-intensive trade-exposed
ERF	Emissions Reduction Fund
ESAA	Energy Supply Association of Australia
GWh	Gigawatt hour
IEA	International Energy Agency
IES	Intelligent Energy Systems

TERM	MEANING
IGCC	Investor Group on Climate Change
IPCC	Intergovernmental Panel on Climate Change
kW	Kilowatt
kWh	Kilowatt hour
LGC	Large-scale Generation Certificate
LRET	Large-scale Renewable Energy Target
LVO	Lieutenant of the Royal Victorian Order
MRET	Mandatory Renewable Energy Target
Mt	Million tonnes
MW	Megawatt
MWh	Megawatt hour
NPV	Net present value
OECD	Organisation for Economic Cooperation and Development
PPA	Power Purchase Agreement
PV	Photovoltaic
PwC	PricewaterhouseCoopers
REC	Renewable Energy Certificate
REE Act	*Renewable Energy (Electricity) Act* 2000 (Cth)
RET	Renewable Energy Target
SKM	Sinclair Knight Merz
SKM MMA	Sinclair Knight Merz and McLennan Magasanik Associates
SRES	Small-scale Renewable Energy Scheme
STC	Small-scale Technology Certificate
SWH	Solar water heater
t	Tonne
Wh	Watt hour

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Renewable Energy Target Scheme

Report of the Expert Panel

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15 August 2014

The Hon Tony Abbott, MP
Prime Minister
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CANBERRA ACT 2600

The Hon Joe Hockey, MP
Treasurer
Parliament House
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The Hon Ian Macfarlane, MP
Minister for Industry
Parliament House
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The Hon Greg Hunt, MP
Minister for the Environment
Parliament House
CANBERRA ACT 2600

Dear Prime Minister, Treasurer and Ministers

In accordance with our Terms of Reference we are pleased to present our report on the Renewable Energy Target scheme.

The Panel received more than 23,000 submissions and held over 100 separate meetings with interested stakeholders across Australia. In addition to these meetings and submissions the Panel also drew on modelling analysis of the impact of the scheme on the electricity market. This was undertaken by ACIL Allen Consulting, whose full report forms a companion document to the Panel's Report and is attached.

Our report concludes that the costs of the scheme to the community outweigh its benefits and that significant change is required. The report presents recommendations for the Government's consideration to achieve this.

In preparing its report the Panel was supported by a Secretariat based in the Department of the Prime Minister and Cabinet. We record our appreciation for their consistently professional and diligent assistance. We also record our appreciation for the time and effort of those who made submissions and met us during the course of the review.

Yours sincerely

Dick Warburton AO LVO (Chair)

Dr Brian Fisher AO PSM

Shirley In't Veld

Matt Zema

EXECUTIVE SUMMARY

Key points

- The objectives of the Renewable Energy Target (RET) are to: encourage the additional generation of electricity from renewable sources; reduce greenhouse gas emissions in the electricity sector; and ensure that renewable energy sources are ecologically sustainable.
- The RET has encouraged significant new renewable electricity generation, which has almost doubled as a result of the scheme. Installations of small-scale systems have exceeded expectations, with output from these systems already exceeding levels anticipated for 2020. To date, the RET has delivered a modest level of emissions reductions.
- With the renewables industry now established in Australia, the main rationale for the RET hinges on its capacity to contribute towards the Government's emissions reduction target in a cost effective manner. However, the RET is a high cost approach to reducing emissions because it does not directly target emissions and it only focuses on electricity generation. It promotes activity in renewable energy ahead of alternative, lower cost options for reducing emissions that exist elsewhere in the economy. In the presence of lower cost alternatives, the costs imposed by the RET are not justifiable.
- The economic landscape has changed significantly since the current RET was adopted in 2010. In particular, demand for electricity has been declining and forecasts for electricity demand in 2020 are now much lower. Rather than adding generation capacity to meet growth in electricity demand, the RET is contributing to a large surplus of generation capacity.
- The current RET would require a further $22 billion cross-subsidy to the renewables sector in net present value (NPV) terms over the remainder of the scheme (in addition to the $9.4 billion cross-subsidy provided from 2001 to 2013) and encourage more than $15 billion (in NPV terms) of additional investment in renewable generation capacity to 2020. This investment comes at the expense of investment elsewhere in the economy and the additional generation capacity is not required to meet the demand for electricity.
- Analyses suggest that, overall, the RET is exerting some downward pressure on wholesale electricity prices. This is not surprising given that the RET is increasing the supply of electricity when electricity demand has been falling. Artificially low wholesale electricity prices can distort investment decisions in the electricity market and are unlikely to be sustained in the long term. Over time, all other things being equal, wholesale electricity prices could be expected to rise to better reflect the cost of generating electricity.
- The direct costs of the RET currently increase retail electricity bills for households by around four per cent, but modelling suggests that the net impact of the RET over time is relatively small. The impact on retail electricity prices for emissions-intensive trade-exposed businesses and other businesses is significantly greater. The RET does not generate an increase in wealth in the economy, but leads to a transfer of wealth among participants in the electricity market.
- The Expert Panel has recommended options to the Australian Government for both the Large-scale Renewable Energy Target and the Small-scale Renewable Energy Scheme. The Panel considers the Government should emphasise alternative, lower cost approaches to reducing emissions in the Australian economy. In putting forward its recommendations, the Expert Panel has been mindful of the impacts particular options will have on those who have invested in renewables on the basis of the RET as currently legislated.

The Renewable Energy Target review

On 17 February 2014, the review of the Renewable Energy Target (RET) scheme was jointly announced by the Hon Ian Macfarlane MP, the Minister for Industry, and the Hon Greg Hunt MP, the Minister for the Environment. The Australian Government appointed an Expert Panel (the Panel) to undertake the review, comprising Mr Dick Warburton AO LVO (chair), Dr Brian Fisher AO PSM, Ms Shirley In't Veld and Mr Matt Zema, with support provided by a Secretariat in the Department of the Prime Minister and Cabinet.

The Terms of Reference for the review direct the Panel to examine the operation, costs and benefits of the RET, including the economic, environmental and social impacts, the extent to which the objectives of the scheme are being met and the interaction of the RET with other Commonwealth and state and territory policies.

The Panel consulted with a wide range of stakeholders to inform its review. The Panel received around one thousand general submissions and over 23,000 campaign submissions and held meetings with over 200 different stakeholders around the country.

To assist the Panel, ACIL Allen was commissioned to model scenarios that examine the impacts of the RET as it stands and potential changes to the scheme. While this modelling and other modelling provided by stakeholders has helped the Panel understand the impacts of the RET, the Panel recognises the limitations inherent in these exercises. In forming its recommendations, the Panel has considered the modelling results alongside the information received in submissions and stakeholder meetings.

The objectives and impacts of the RET

The RET has been operating in various forms since the Mandatory Renewable Energy Target (MRET) commenced in 2001. As set down in legislation, the objectives of the RET are to: encourage the additional generation of electricity from renewable sources; reduce greenhouse gas emissions in the electricity sector; and ensure that renewable energy sources are ecologically sustainable. The expanded RET scheme, which commenced in January 2010, is designed to ensure at least 20 per cent of Australia's electricity comes from renewable sources by 2020. To achieve this, the legislation contains annual targets for large-scale renewable generation, expressed in gigawatt hours (GWh) that rise each year to 41,000 GWh in 2020. It also provides upfront support for the installation of small-scale renewable energy systems.

The Panel found that the RET has broadly met its objectives. It has encouraged significant additional renewable electricity generation, with output from large-scale renewable generators having almost doubled as a result of the scheme. Installations of small-scale systems have exceeded expectations, with output from these systems already exceeding levels anticipated for 2020. To date, the RET has delivered a modest level of carbon dioxide equivalent (CO_2-e) emissions reductions. Commonwealth, state and territory environmental regulation provides a framework for ensuring that the RET promotes the use of ecologically sustainable renewable energy sources.

Since the current RET scheme commenced the economic landscape has shifted significantly, leading to questions about whether the objectives for the RET remain appropriate. Over the past five years demand for electricity has been significantly lower than forecast and electricity demand in 2020 is now expected to be much lower than when the current RET was adopted. At the same time the cost of renewable technologies has fallen, particularly for rooftop solar photovoltaic (PV) systems. These factors mean that the RET could achieve a 26 per cent share of electricity from renewable sources by 2020.

Australia's climate change policy framework has also changed since the expanded RET scheme began. The Government is committed to achieving Australia's five per cent CO_2-e emissions reduction target through the Direct Action Plan. In particular, the Government has repealed the carbon tax and intends for the $2.55 billion Emissions Reduction Fund (ERF) to be the primary mechanism to reduce CO_2-e emissions.

Under current settings, the RET could be expected to result in a further $22 billion cross-subsidy to the renewables sector (in NPV terms) over the remainder of the scheme (in addition to an estimated $9.4 billion (NPV) provided over the period 2001 to 2013) and encourage additional investment of $15 billion in new renewable generation capacity. However, this investment is not required to meet likely growth in the demand for electricity, which could largely be met from existing generation capacity. Hence, the RET would be diverting resources from more productive uses elsewhere in the economy, lowering productivity and national income. While the RET has visibly increased employment in the renewable energy sector, this has come at the cost of (less visible) reduced employment in other sectors.

Analyses suggest that, overall, the RET is exerting some downward pressure on wholesale electricity prices, largely because it is contributing to an increase in the supply of electricity when electricity demand has been falling. However, the net impact of the RET on retail electricity prices and electricity bills appears to be small and does not diminish the economic costs associated with the scheme. Also, it does not represent an increase in wealth in the economy, but a transfer of wealth among participants in the electricity market. In addition, artificially low wholesale electricity prices can distort investment decisions in the electricity market and are unlikely to be sustained in the long term. Over time, all other things being equal, electricity prices could be expected to rise to better reflect the cost of generating electricity.

With the renewables industry now established in Australia, the main rationale for the RET hinges on its capacity to contribute towards the Australian Government's CO_2-e emissions reduction target in a cost effective manner. However, the RET is a high cost approach to reducing CO_2-e emissions because it does not directly target CO_2-e emissions and it only focuses on electricity generation. It promotes activity in renewable energy ahead of alternative, lower cost options for reducing CO_2-e emissions that exist elsewhere in the economy.

Although many representatives of the renewables sector favour at least maintaining the current RET, the Panel is of the view that the interests of the broader community should take precedence and that, as the RET in its current form is imposing significant costs on the economy, it should be substantially reformed, with greater emphasis placed on lower cost alternatives for meeting the Australian Government's CO_2-e emissions reduction target.

Options for reforming the Large-scale Renewable Energy Target (LRET)

The Panel considered various options proposed by stakeholders for reforming the LRET. These include extending the target to achieve a 'real 30 per cent' share of generation by 2030, reducing the target to achieve a 'real 20 per cent' share of generation in 2020, setting a target that corresponds to a '50 per cent share of new growth' in electricity demand, 'closing the LRET to new entrants' and 'repealing' the LRET scheme.

Setting a target to achieve a 'real 30 per cent' share of renewables by 2030 would have the effect of reducing the 2020 target (although it would still be higher than a 'real 20 per cent' target) and allowing the targets to rise between 2020 and 2030. The Panel considers that the adoption of a higher target and/or extension of the scheme beyond its current timeframe are inconsistent with the objective of reducing the cost of the scheme and would prolong a relatively inefficient approach to reducing CO_2-e emissions.

Adopting a 'real 20 per cent' target would involve reducing the legislated target for large-scale renewable generation to a level consistent with 20 per cent of the latest projections of electricity demand in 2020, taking into account higher than previously expected growth in small-scale renewables. While many stakeholders were in favour of this approach, the Panel is concerned about fixing targets once again in legislation based on electricity demand forecasts that are inherently uncertain. If electricity demand to 2020 is higher or lower than currently forecast, a 'real 20 per cent' target will not be achieved, and if demand is lower than forecast, the RET will continue to add generation capacity that is surplus to the requirements of the market. Consequently, if the Government wishes to consider a 'real 20 per cent' target, the Panel suggests that targets be periodically updated as electricity demand projections are revised.

Stakeholders in the renewables industry expressed concerns that complete repeal of the legislation would substantially affect both existing and future investments, constituting sovereign risk. The Panel considers that the risk of significant policy change is better characterised as regulatory risk and is always present. Nonetheless, the Panel recognises that repeal may result in adverse financial implications for existing investors.

The Panel has therefore recommended two options to the Government for the LRET. The first is to allow the LRET to continue to operate until 2030 for existing and committed renewable generators, but closing it to new entrants, otherwise known as 'grandfathering'. This will provide investors in existing renewable generation with continued access to certificates so as to avoid substantial asset value loss and retain the CO_2-e emissions reductions that have been achieved so far. Importantly, this approach avoids the costs to the community associated with subsidising additional generation capacity that is not required to meet electricity demand.

Alternatively, the Panel suggests that the LRET could be modified to increase in proportion with growth in electricity demand, by setting targets one year in advance that correspond to a '50 per cent share of new growth'. This would protect investors in existing renewable generators and would support additional renewable generation when demand is growing. Targets would not be mandated for future years, exposing renewable energy investors to the same market risk (that future levels of electricity demand are unknown) that other investors in the sector currently face. If the current forecasts of electricity demand prove accurate, this approach would result in renewables making up a 20 per cent share of forecast electricity demand in 2020, but the share may be different if demand is higher or lower than expected. Importantly, this approach would protect the broader community from the cost of subsidising unnecessary additional generation capacity if electricity demand continues to fall.

Options for reforming the Small-scale Renewable Energy Scheme (SRES)

Small-scale renewable energy systems supported by the SRES generated or displaced around 6,400 GWh of electricity in 2013, which is above the original expectation for the SRES of achieving a minimum of 4,000 GWh of annual generation by 2020. Based on information provided during the review, the Panel considers that the significant cost reductions of small-scale solar PV systems combined with the increase in retail electricity prices means that the small-scale renewable energy industry is becoming commercially viable. Additionally, the cost of the CO_2-e emissions reductions achieved by the SRES is very high, in the order of $100-$200 per tonne and at least two or three times that of the large-scale scheme.

Given these factors, the Panel considers that there is a strong case for winding back the SRES, through either closing the scheme immediately or accelerating the phase-out of the scheme.

Modelling indicates that repeal of the SRES would have an immediate effect of reducing the install rates of rooftop PV by at least 30 per cent and the number of solar water heaters by around 16 per cent. However, by the early 2020s, the rate of small-scale solar PV systems installed each year would recover to a rate similar to that if the SRES was left in place.

If the Government is concerned about the immediate impacts of repeal of the SRES and does not wish for the industry to contract below its long-term sustainable level, rather than immediately closing the scheme the Government could bring forward its closure from 2030 to 2020. Under this approach, the Panel recommends additional measures to reduce the cost of the scheme, including earlier reductions in the levels of support (certificate deeming periods) provided for the installation of solar PV and solar water heater systems. The Panel also recommends reducing the size eligibility threshold for rooftop solar PV systems from no more than 100 kilowatts to no more than 10 kilowatts, to ensure the scheme is targeted towards households.

Exemption arrangements

The direct (certificate) costs of the RET are borne by electricity consumers, both households and businesses, through electricity prices. Businesses conducting emissions-intensive, trade-exposed (EITE) activities receive an exemption for a portion of RET costs in recognition that these businesses are price takers in a global market. Many EITE businesses claim that the current exemption is not sufficient to prevent a loss of global competitiveness as a result of the additional cost of the RET.

If adopted, the Panel's recommendations on both the LRET and the SRES would reduce the costs of the RET for all electricity consumers, including EITE businesses. The Panel does not consider that an increase in the EITE exemption is warranted in addition to these changes, as this would increase the cost of the RET faced by all other electricity users, including other manufacturers, some of which are also trade-exposed. If the Government does wish to consider extending the EITE exemption, the Panel suggests that the electricity they consume be excluded from calculations of the target in order to avoid imposing additional costs on other electricity users (although this would be difficult to achieve if the RET is closed to new entrants).

The RET also provides an exemption for entities that generate and use their own electricity - the self-generation exemption. Strict eligibility requirements result in more limited access to this exemption than appears to have been intended. The Panel therefore recommends that the self-generation exemption be amended to extend the distance limit between the point of generation and use, and to include a threshold to permit self-generators to supply incidental amounts of electricity to third parties without attracting a RET liability.

Native forest wood waste

The Panel supports the Government's election commitment to reinstate the eligibility of native forest wood waste as a renewable energy source. It considers that reinstatement should be based upon the regulations previously in place, which allowed eligibility on the condition that native forest wood waste was being harvested under a Regional Forestry Agreement, complied with relevant government planning and approvals processes, and was demonstrated to be genuine waste. The Panel has not been presented with any evidence that these regulations resulted in unsustainable logging activities.

The interaction of the RET scheme with other policies

A range of national and state based climate change and energy policies affect the renewables industry and potentially have an impact on the operation and effectiveness of the RET.

The ERF is the centrepiece of the Government's Direct Action Plan. There is some potential for duplication between the ERF and RET schemes and the Panel is of the view that projects should not be eligible for funding under the ERF if they are eligible for support under the RET. In a similar vein, the Panel considers that projects that receive support under the RET should not be eligible to receive further assistance from the Clean Energy Finance Corporation or the Australian Renewable Energy Agency.

The Panel is supportive of the continuing development of a nationally consistent energy market framework. This framework should minimise differences between jurisdictions and eliminate excess regulation and duplication. The Panel also supports the reforming of network regulation. This will minimise cross subsidies between different customers and should lead to more efficient investment and energy choices, including whether to invest in solar PV systems.

Administrative arrangements, frequency of reviews and implementation of recommendations

Based on its consultations, the Panel considers that the administration of the RET scheme is generally efficient and meets the expectations of most stakeholders. Nonetheless, it identified some areas that could be improved. The Panel has put forward suggestions that could provide greater certainty for liable entities over their RET obligations, reduce compliance costs of the scheme and improve the efficiency of the scheme's operation.

The Panel recommends that the requirement for statutory reviews be removed from legislation. The Government can initiate a review of the legislation at any time it considers appropriate and the Panel heard from a wide range of stakeholders that frequent statutory reviews undermine investor certainty, hinder the achievement of the scheme's objectives and reduce the likelihood of any renewable energy target being met.

The Panel has identified some implementation issues associated with its recommendations on the LRET, the SRES and the self-generation exemption. In general, these concern ensuring stable certificate markets and support for existing investments that were undertaken on the assumption of the continuation of the current RET scheme. The Panel considers that consultation on the detail of implementation arrangements would be required once the Government has decided its preferred approach.

LIST OF RECOMMENDATIONS

Recommendation	Detail
1	The Renewable Energy Target (RET) should be amended in light of the changing circumstances in Australia's main electricity markets and the availability of lower cost emission abatement alternatives.
2	The Large-scale Renewable Energy Target (LRET) should be amended in one of the following two ways: *Option 1 – Closed to new entrants ('grandfathering')* In order to reduce the cost of the LRET and its impact on electricity markets, the Panel recommends that the LRET should be closed to new entrants. a. The LRET is closed to new renewable energy power stations (subject to limited exceptions described below). The Clean Energy Regulator (CER) should set targets annually based on estimated output from accredited power stations. b. In addition to those renewable energy power stations already accredited under the scheme, eligibility would be extended to: i. Renewable energy power stations already under construction. ii. Renewable energy power stations to be constructed where project proponents can demonstrate that there is full financial and contractual commitment to the project (e.g., final investment decision, engineering and procurement contract) within one month of the announcement of this approach. c. The last year of the operation of the LRET is 2030. *or* *Option 2 – Share of growth in electricity demand* In order to provide support for new renewable power stations and contribute to Australia's emissions reduction target while achieving less reduction than Option 1 in the cost of the LRET, the Panel recommends that the target be set to allocate a share of growth in electricity demand to renewables in the following manner: a. The target is set annually by the CER, increasing each year to 2020 by an amount equivalent to 50 per cent of projected growth in national electricity demand, ensuring that new renewable energy power stations are only supported under the RET where electricity demand is increasing. b. Where national electricity demand is projected to remain flat or fall, the target is held at the previous year's level. c. From 2021 onwards, the target is fixed at the 2020 level until 2030, the last year of the operation of the LRET. Based on current electricity demand forecasts, this approach would achieve a 20 per cent share of renewables in the electricity generation mix by 2020.
3	The Small-scale Renewable Energy Scheme (SRES) should be amended in one of the following two ways: *Option 1 – Abolition* In order to address the cost of the SRES (and its effect on electricity markets), the Panel recommends that it be closed immediately in the following manner: a. The SRES should terminate upon announcement. b. Those who contracted before the announcement for the installation of a small-scale system should receive the certificates they would have done.

3 - Continued	*or* *Option 2 – Bring forward the phase-out of the SRES* In order to reduce the cost of the SRES while providing some support for new small-scale renewable energy systems, the Panel recommends that the phase-out of the SRES be brought forward in the following manner, to take effect immediately: a. Bring forward the last year of operation of the SRES from 2030 to 2020. b. Reduce the period for which certificates may be created for rooftop solar PV systems from 15 years to 10 years, and in each year from 2016 onwards further reduce the period for which certificates may be created, as set out below: *Rooftop solar PV: period certificates may be created* Year installed — Period Prior to announcement — 15 years From announcement — 10 years 2016 — 9 years 2017 — 8 years 2018 — 7 years 2019 — 6 years 2020 — 5 years 2021 — Scheme closed c. Reduce system size eligibility threshold for rooftop solar PV systems from no more than 100 kilowatts to no more than 10 kilowatts. d. Reduce the period for which certificates may be created for solar and heat pump water heaters by one year each year, commencing in 2016, as set out below: *Solar and heat pump water heaters: period certificates may be created* Year installed — Period Prior to 2016 — 10 years 2016 — 9 years 2017 — 8 years 2018 — 7 years 2019 — 6 years 2020 — 5 years 2021 — Scheme closed
4	The current partial exemption arrangements for emissions-intensive trade-exposed businesses should be maintained.
5	The self-generation exemption should be amended to extend the one kilometre radius restriction and to permit self-generators to supply incidental amounts of electricity (below a set threshold) to third parties without attracting a RET liability. The Government should consult with affected parties to determine an appropriate distance limit and threshold for incidental off-takes.
6	The Government's commitment to the reinstatement of native forest wood waste as a renewable energy source under the LRET should be implemented through the reintroduction of the relevant regulations in force prior to 2011.
7	The requirement for statutory reviews of the scheme should be removed from the *Renewable Energy (Electricity) Act 2000*.

8	Projects, or components of projects, receiving support under the RET should be excluded from participating in Emissions Reduction Fund auction processes.
9	Projects that receive support under the RET should not be eligible to receive further assistance from the Clean Energy Finance Corporation or the Australian Renewable Energy Agency.
10	To further reduce the costs of the RET the Government should consider the following proposals to improve the operation of the scheme: a. Bring forward the dates for setting the Small-scale Technology Percentage and the Renewable Power Percentage from 31 March in the compliance year to a date prior to the commencement of the compliance year (e.g., 1 December). b. Align the acquittal of LRET and SRES obligations so that both are acquitted six monthly, and allow liable entities to carryover a shortfall of small-scale technology certificates (as is currently the case for large-scale generation certificates). c. Publish the RET liable entity with whom an EITE business will negotiate the provision of the Partial Exemption Certificate. d. Update guidelines for determining the renewable components in waste for electricity generation.
11	The Government should consult with affected parties on implementation of the Panel's recommendations for the RET including: a. Measures for ensuring that large-scale generation certificates trade in a suitable price range that provides an appropriate level of support for accredited power stations. b. Methods for setting targets. c. Setting the distance limit and threshold for third party off-takes for the self-generation exemption.
12	The Panel's recommendations for progressively reducing the deeming rate for solar PV installations and reducing the size eligibility threshold from 100 kilowatts to 10 kilowatts should take effect from the date of announcement. Transitional arrangements should be provided for parties that have entered into contracts on the basis of the current policy at the date of announcement.

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1 INTRODUCTION

1.1 About this review

The Review of the Renewable Energy Target (RET) scheme was jointly announced by the Hon Ian Macfarlane MP, the Minister for Industry, and the Hon Greg Hunt MP, the Minister for the Environment, on 17 February 2014.

The Terms of Reference state that the review is to examine the operation, costs and benefits of the RET scheme including the economic, environmental and social impacts, the extent to which the objectives of the scheme are being met and the interaction of the RET with other Australian Government and state and territory government policies. The review is to provide advice on whether the objectives of the RET scheme are still appropriate and the range of options available for reducing its impact on electricity prices. The full Terms of Reference is in Appendix A.

An Expert Panel (the Panel) was appointed to undertake the review comprising: Mr Dick Warburton AO LVO (chair), Dr Brian Fisher AO PSM, Ms Shirley In't Veld and Mr Matt Zema. The Panel was supported by a Secretariat in the Department of the Prime Minister and Cabinet.

The Panel consulted widely with interested parties to gather information for this review. A paper calling for public submissions was released on 5 April 2014 and in response the Panel received around 1,000 general submissions with a wide variety of views on the future of the RET. The Panel also received over 23,000 campaign letters and emails supporting the continuation or expansion of the scheme, including from GetUp Australia, Hepburn Wind, Australian Wind Alliance, Engineers Australia and Lighter Footprints. The Panel conducted around 100 face to face meetings with more than 200 stakeholders representing the renewables industry, electricity retailers and generators, electricity consumers, environmental and welfare groups and state and territory governments. Further details on the consultation process and submissions received are in Appendix B.

The Panel has drawn on information contained in submissions to this review throughout this report to illustrate the issues raised by and the views of various stakeholders. However, the inclusion of a quote from a submission does not mean that the Panel agrees with or endorses this material.

In addition to the submissions and stakeholder consultations, the Panel's recommendations were informed by detailed electricity market modelling undertaken by ACIL Allen for the Panel that assessed the impacts of the current RET policy and alternative options. A consultation paper on the proposed approach to key modelling assumptions was released by the Panel as part of its *Call for Submissions* on 5 April 2014. The modelling assumptions were discussed at a stakeholder workshop on 23 April 2014. Feedback from both submissions and the workshop was considered when the Panel finalised the assumptions.

Preliminary modelling results were presented at a second stakeholder workshop held on 23 June 2014 that was attended by 78 participants. After the workshop, the Panel requested ACIL Allen to model an additional scenario, the '50 per cent share of new growth' in electricity demand scenario. The final results of the modelling are referred to throughout this report and are presented in detail in ACIL Allen's report, which is a companion document to the Panel's report. The approach to the modelling scenarios is described in Chapter 4 and the executive summary of the modelling report is reproduced in Appendix C of this report.

The Panel also gave consideration to other modelling of the RET provided as part of submissions to the review.

1.2 History of the RET and context of the Review

The Mandatory Renewable Energy Target (MRET) scheme was first introduced in 2001 to achieve an additional two per cent of renewable energy in the electricity mix by 2010. In 2009, the *Renewable Energy (Electricity) Act 2000* (the REE Act) was amended, replacing the MRET with the RET. From 2010, the scheme was expanded to ensure that an equivalent of at least 20 per cent of Australia's electricity would come from renewable sources by 2020. The target increased to 45,000 gigawatt hours (GWh) of additional renewable generation in 2020, staying at that level until 2030. At the time the scheme was expanded, the Solar Credits multiplier was introduced to boost support for small-scale solar photovoltaic (PV) systems, and Partial Exemption Certificates (PECs) were introduced to provide assistance with the costs of the RET to emissions-intensive, trade-exposed businesses (EITEs).

Shortly after the expansion of the scheme there was a boom in the installation of small-scale renewable energy systems (mostly rooftop PV systems), driven by generous feed-in-tariffs introduced by state and territory governments, the Solar Credits multiplier under the RET and falling system costs. This resulted in a large surplus of Renewable Energy Certificates (RECs) in the market, causing REC prices to fall. This created uncertainty in the REC market for potential investors in large-scale renewable generation. In response, the Australian Government amended the legislation to split the RET scheme into two parts, the Large-scale Renewable Energy Target (LRET) and the Small-scale Renewable Energy Scheme (SRES). Both schemes commenced on 1 January 2011. RECs created from the installation of small-scale systems prior to the split of the schemes can be used to meet obligations under the LRET, and there remains a substantial surplus of certificates in this market equivalent to roughly one and a half times the LRET target in 2014.

When the schemes were split, it was estimated that small-scale systems would contribute at least 4,000 GWh of renewable generation to the target. To ensure that a 20 per cent share of renewables would be achieved, 4,000 GWh was subtracted from the original 45,000 GWh target to derive the current LRET of 41,000 GWh in 2020, which is fixed in legislation.

Since the commencement of the expanded RET scheme in 2010, the policy and economic landscape has changed significantly. Over the past five years demand for electricity has been significantly lower than forecast and projections of electricity demand to 2020 have been repeatedly revised down, meaning that the RET is likely to achieve a greater than 20 per cent share of electricity from renewable sources by 2020 (Appendix D explains how the percentage share of renewables can be calculated). Wholesale electricity prices in the National Electricity Market (NEM) have been falling as demand for electricity has declined while supply has increased. However, this has not been mirrored in retail electricity prices, which have increased substantially mainly due to increasing network costs. At the same time the cost of renewable technologies has fallen, particularly for rooftop solar PV systems for which installations have grown much more quickly than anticipated.

The RET was reviewed in 2012 by the Climate Change Authority which did not recommend any major structural changes to the scheme.

The Australian Government has a commitment to reduce Australia's carbon dioxide equivalent (CO_2-e) emissions by five per cent below 2000 levels by 2020 and is introducing the Emissions Reduction Fund (ERF), in place of the carbon tax, as the primary mechanism for achieving this. The Australian Government is also committed to reducing business costs, cutting red and green tape and minimising cost of living pressures.

1.3 The operation of the RET

The RET scheme is underpinned by the REE Act, the *Renewable Energy (Electricity) Regulations 2001* (REE Regulations), the *Renewable Energy (Electricity)(Large-scale Generation Shortfall Charge) Act 2000* and the *Renewable Energy (Electricity)(Small-scale Technology Shortfall Charge) Act 2010*.

The RET works by allowing renewable energy power stations and owners of small-scale renewable energy systems (solar water heaters, heat pumps, and small-scale solar PV, wind, and hydro systems) to create certificates for every megawatt hour (MWh) of renewable electricity they produce. Liable entities (generally electricity retailers) are obligated to purchase certificates and surrender them to the Clean Energy Regulator (CER) each year to demonstrate compliance with the scheme. This creates a market which provides financial incentives to both large-scale renewable power stations and owners of small-scale systems.

If a liable entity does not surrender the required amount of certificates, it must pay a shortfall charge of $65 per certificate to the CER.[1] However, because the cost of a certificate is tax deductible and the shortfall charge is not, the effective price for the shortfall charge is around $92/MWh, depending on the liable entity's marginal rate of tax.

The RET scheme contains two types of exemptions. The first is a partial exemption for businesses that are deemed to be EITE businesses. The second is for generators producing and consuming their own electricity (self-generators). Further information on these exemptions is provided in Section 7.1.

The LRET and the SRES components of the RET have separate certificate markets and obligations for liable entities. The certificates created in each of the schemes are not interchangeable.

1.3.1 The Large-scale Renewable Energy Target (LRET)

The LRET encourages additional generation from large-scale renewable energy projects, such as wind and solar farms and hydro facilities, by allowing eligible renewable energy generators to create large-scale generation certificates (LGCs) for the electricity they produce, with each certificate representing one MWh of renewable generation.

Figure 1 provides an overview of the LGC market under the LRET. The CER administers the LRET by managing the REC Registry (a secure web-based application that facilitates the creation, trade and surrender of certificates), accrediting renewable power stations and establishing the annual LRET liability by setting the renewable power percentage (RPP). The amount of LGCs that a liable entity is required to surrender each year is proportionate to its liable electricity purchases – the RPP determines this proportion.

[1] The REE Act allows liable entities to carry forward a 10 per cent shortfall of LGCs to the following year. If the shortfall exceeds 10 per cent, the liable entity is required to pay the shortfall charge.

Figure 1 LGC Market under the LRET

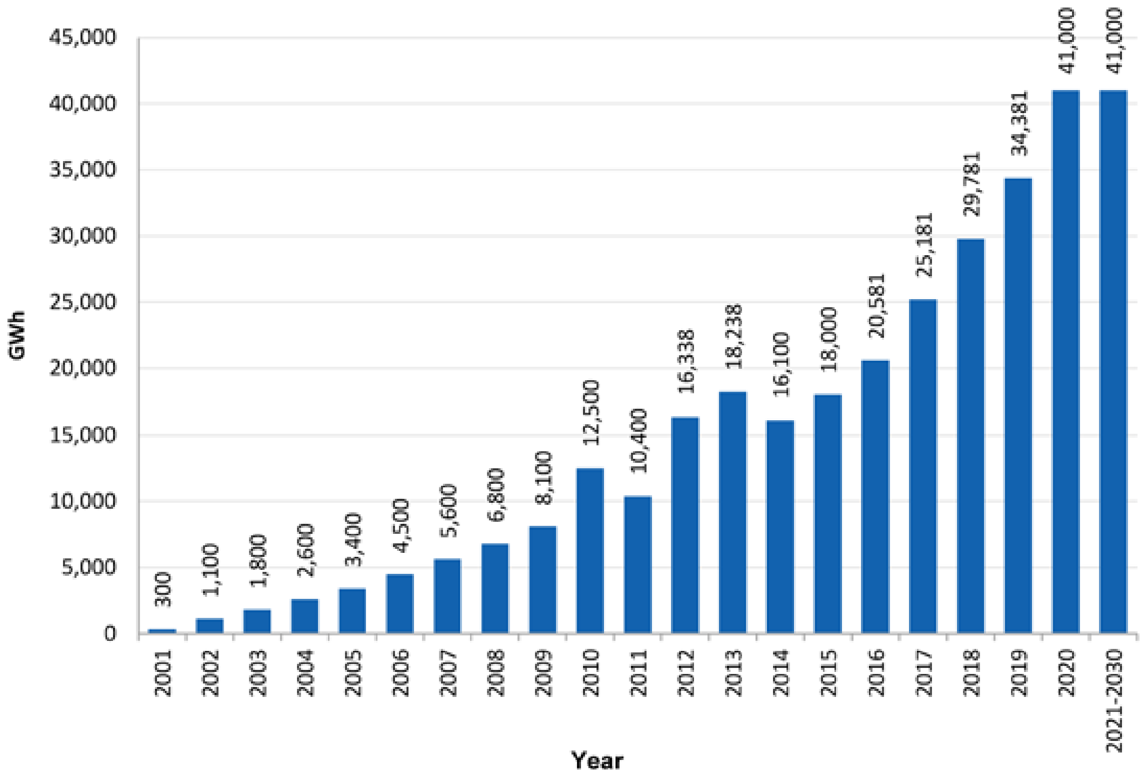
Accredited power stations can trade the LGCs they create with liable entities or other certificate traders through the REC Registry. The majority of LGCs are sold as part of a power purchase agreement (PPA), which provides a contract between a renewable generator and an electricity retailer for the purchase of both electricity and LGCs. If LGCs are not sold through contracts, they are sold in the LGC market, where the LGC spot price is determined by the supply and demand of certificates in the market. The CER does not regulate these prices.

To meet requirements under the REE Act, each year liable entities purchase and surrender LGCs equal to their liability for the previous calendar year to the CER. The purchase of PECs from EITE businesses may reduce this liability.

LGCs are only awarded for renewable generation above 1997 levels. Eligible generators producing electricity prior to 1997 (for example hydro generators) are able to create LGCs for annual generation above a set baseline, which is determined by the CER based on the electricity generated by that power station over the period 1994 to 1996.

The LRET includes legislated targets for large-scale generation each year that increase to 41,000 GWh of renewable electricity in 2020 and remain at this level until 2030. Figure 2 shows the currently legislated annual targets from 2001 to 2030.

Figure 2 Profile of annual targets under the LRET



Annual targets exclude allowance for waste coal mine gas generation
Source: Derived from data on the Clean Energy Regulator website.

As of 1 July 2012, electricity generated using waste coal mine gas (WCMG) from selected power stations that were operating prior to 2008 is also eligible to receive LGCs under the LRET, although it is not a renewable energy source. This forms part of transitional arrangements relating to the phase out of state based greenhouse gas reduction schemes and will be in place until 2020. The annual LRET targets were increased out to 2020 to account for this change. No new WCMG power stations can be accredited under the LRET.

Native forest wood waste was included as an eligible source of renewable energy when the MRET was established in 2001. In November 2011, eligibility for native forest wood waste under the four eligible sub-categories of wood waste was removed from the RET. Transitional measures were introduced for the 22 power stations that listed wood waste as an eligible energy source and are effective until 2020. As part of its election commitments, the Australian Government announced that it would reverse the exclusion of native forest sourced wood waste as an eligible renewable energy source.[2] Section 7.2 discusses the administrative and regulatory arrangements that should be in place to ensure that the reinstatement of native forest wood waste is consistent with the sustainable management of native forests.

1.3.2 The Small-scale Renewable Energy Scheme (SRES)

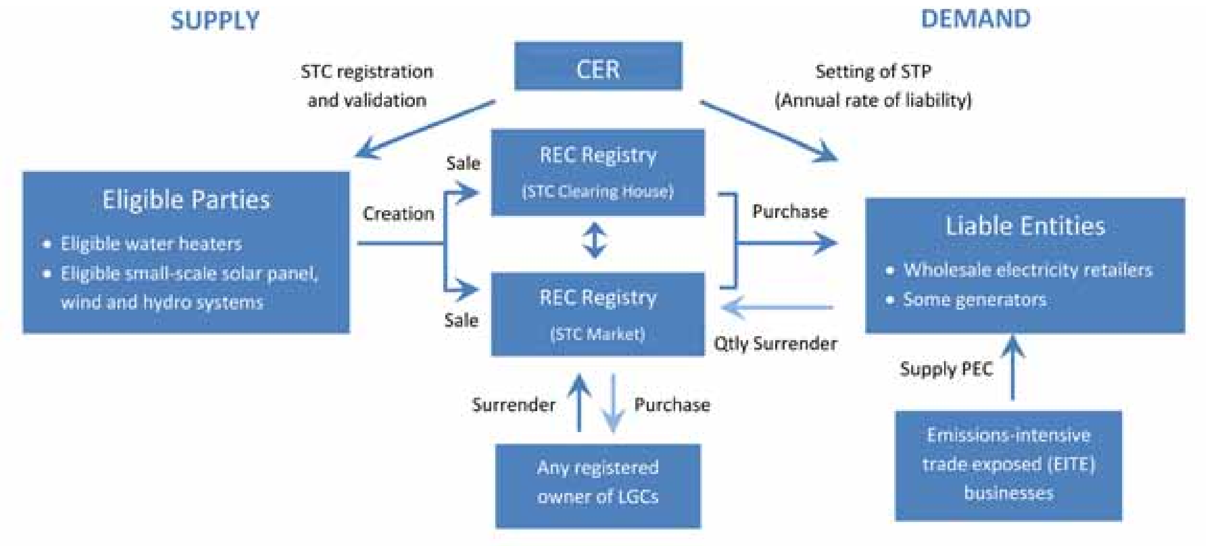
The SRES supports the installation of new small-scale renewable energy generation systems such as rooftop solar PV and micro wind and hydro systems. It also supports solar water heaters and air source heat pumps that displace other sources of energy used to heat water.

[2] The Coalition's Policy for a Strong and Sustainable Forestry Industry, September 2013.

When the LRET and SRES schemes were split, it was estimated that the SRES would deliver at least 4,000 GWh of generation by 2020. However, unlike the LRET, the SRES does not have binding annual targets. Rather, the scheme is uncapped allowing all eligible installations to receive assistance. Small-scale installations generated or displaced the equivalent of 6,400 GWh of electricity in 2013.

Figure 3 provides an overview of the Small-scale Technology Certificate (STC) market. The CER administers the SRES by managing the REC Registry, registering and validating STCs, and establishing the annual SRES liability by setting the Small-scale Technology Percentage (STP). The STP is based on modelled estimates of the number of STCs expected to be created in that year, adjusted for any surplus or deficit of certificates from the previous year.

Figure 3 STC Market under the SRES



Owners of eligible systems are able to create STCs through deeming arrangements that estimate the quantity of electricity an eligible system will generate or displace over its lifetime. For example, solar PV systems are entitled to create 15 years' worth of certificates at the time of installation. From 2017, support provided for small-scale solar PV systems gradually falls through reductions in the deeming period until it is phased out completely in 2030.

The Solar Credits multiplier was introduced in mid-2009 to provide further support for solar PV by multiplying the number of certificates that systems were able to create. The multiplier was originally set at five, so systems were eligible to create five times 15 years' worth of certificates. The multiplier was scheduled to progressively phase-out by reducing by one each year to mid-2015, however due to rapidly falling system costs and strong uptake, the mechanism was terminated on 1 January 2013.

Creators of STCs may sell certificates on the STC market for the market price or through the voluntary STC Clearing House at a fixed price of $40. The primary purpose of the Clearing House is to ensure that liable entities can meet surrender requirements at a maximum price of $40. If supply of certificates is greater than demand (as has typically been the case) the market price will be lower than the Clearing House price and liable entities will purchase from the market. However, if demand exceeds supply, STCs can be bought from the Clearing House at the capped price. To meet the requirements under the REE Act, liable entities surrender STCs to the CER on a quarterly basis.

2 PERFORMANCE OF THE RET AGAINST OBJECTIVES

The RET scheme is aimed at increasing renewable energy generation and reducing greenhouse gas emissions from the electricity sector. It is designed to ensure that the equivalent of at least 20 per cent of Australia's electricity comes from renewable sources by 2020.

The scheme is established by the *REE Act*. The formal objects of the *REE Act* are to:

a. encourage the additional generation of electricity from renewable sources;

b. reduce emissions of greenhouse gases in the electricity sector; and

c. ensure that renewable energy sources are ecologically sustainable.

2.1 Encouraging electricity generation from renewable sources

Box 1: Understanding generation and capacity

A power station's capacity refers to how much electricity it can deliver at a single instant in time. It is measured in watts (W). A kilowatt (kW) is a thousand watts, a megawatt (MW) is a thousand kW, and a gigawatt (GW) is a thousand MW.

Electricity delivered over time is typically measured in kilowatt hours (kWh), megawatt hours (MWh) or gigawatt hours (GWh). For example, a 10 MW generator running at maximum power continuously for one hour will deliver 10 MWh of electricity.

Power stations do not operate continuously at maximum power. A power station's capacity factor refers to the amount of electricity it actually produces relative to the maximum it could produce if it were operating continuously at full power. Typically, fossil fuel power stations have capacity factors of around 80 per cent while renewable power stations have capacity factors of around 30 per cent.

For example, a 100 MW wind farm with a 35 per cent capacity factor would generate 306,600 MWh of electricity per year (100 MW x 35% x 24 hours x 365 days). A wind farm of this size in Australia might have around 40 turbines (of 2.5 MW capacity each).

2.1.1 Installed capacity

Around 8,000 MW of large-scale renewable capacity, consisting mostly of hydro power stations, existed prior to 1997.[3] These power stations were accredited in 2001 and annual generation needs to be above their 1997 'baselines' (as determined by the CER) to create certificates and benefit from the RET.

Large-scale renewable generation capacity has grown by around 5,100 MW to 13,100 MW in July 2014. 2,400 MW of this capacity has been added since the RET scheme was expanded in 2010. As of July 2014 there were 416 renewable energy power stations accredited under the LRET, of which 125 gained accreditation since 2010.

[3] RET Review estimate based on data provided by the Clean Energy Regulator.

Table 1 shows the breakdown of additional large-scale renewable capacity by state and fuel source. The majority of the additional capacity has occurred through wind development in South Australia and Victoria, with total wind capacity increasing by over 3,800 MW since the MRET was introduced in 2001.

Table 1 Large-scale renewable capacity installed by state and fuel source, 2001 - 2014

Eligible energy source	ACT	NSW	NT	QLD	SA	Tas	Vic	WA	Additional installed capacity	Total accredited power stations
	MW	MW	MW	MW	MW	MW	MW	MW	MW	
Biomass	-	49	-	12	-	1	7	126	196	81
Hydro	1	32	-	16	3	26	174	-	252	105
Landfill gas	4	33	1	509	1	5	27	16	597	61
Solar	21	2	4	3	1	-	7	11	50	87
WCMG	-	29	-	130	-	-	-	-	158	7
Wind	-	454	-	12	1,473	312	1,070	488	3,809	75
Additional installed capacity (MW)	26	599	5	682	1,478	344	1,285	642	5,062	416

Installed capacity excludes accredited co-fired power stations: Bayswater, Liddell, Gladstone, Hazelwood, Vales Point and Wallerawang.
Source: RET Review estimates based on data provided by the Clean Energy Regulator, current at 16 July 2014

Over 2 million small-scale renewable energy systems have been installed under the RET, including around 1.3 million small generation units (SGUs), with an installed capacity of 3,500 MW, and 870,000 solar water heaters.[4] Rooftop PV systems make up the majority of the SGUs and new installations increased from around 100 per year in 2001, to a peak of over 360,000 in 2011. The rate of installation has fallen since 2011 to 215,700 installations in 2013[5], largely due to the removal of the Solar Credits multiplier and reductions in support under state and territory feed-in-tariffs. However the average rooftop solar PV system size has grown from 1.9 kW in 2010 to 3.7 kW in 2013.[6]

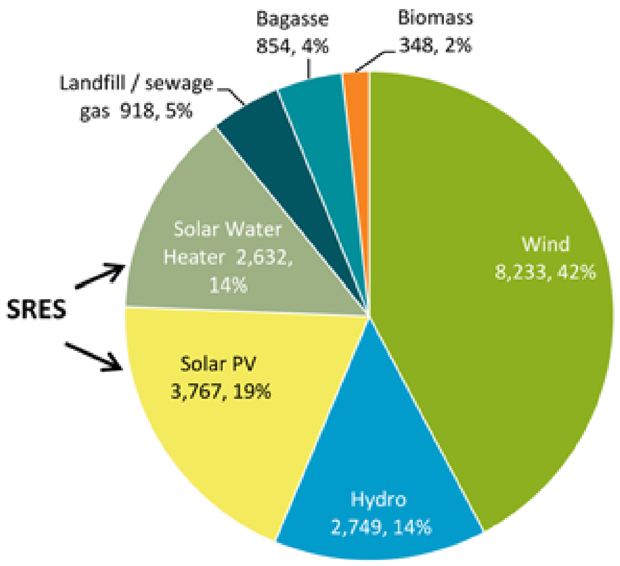
2.1.2 Generation

The Bureau of Resources and Energy Economics (BREE) estimated that around 18,000 GWh of electricity was generated from renewable sources in 2000-01, representing around 8 per cent of total electricity generation in that year.[7] In 2013, total renewable generation was around 33,000 GWh, representing approximately 14 per cent of electricity generation.[8]

Figure 4 shows that the total renewable generation or displacement supported by the RET in 2013 was around 19,500 GWh.[9] Of this, the LRET accounted for around 13,100 GWh (with wind energy being the largest contributor) and the SRES accounted for around 6,400 GWh.

[4] Clean Energy Regulator, *Small-scale installations by postcode*, July 2014.
[5] Green Energy Markets, *Small-scale technology certificates data modelling for 2014 to 2016*, January 2014.
[6] Ibid.
[7] Bureau of Resources and Energy Economics, *2014 Australian energy statistics*, July 2014, Table O.
[8] Renewable generation includes 2013 below baseline generation of around 16,000 GWh and excludes solar water heater displacement. There is no single data series that provides renewable energy generation for the period 2001 to 2013. The 2000-01 estimate is from Bureau of Resources and Energy Economics while the 2013 estimate is based on data provided by the Clean Energy Regulator.
[9] Based on data provided by the Clean Energy Regulator.

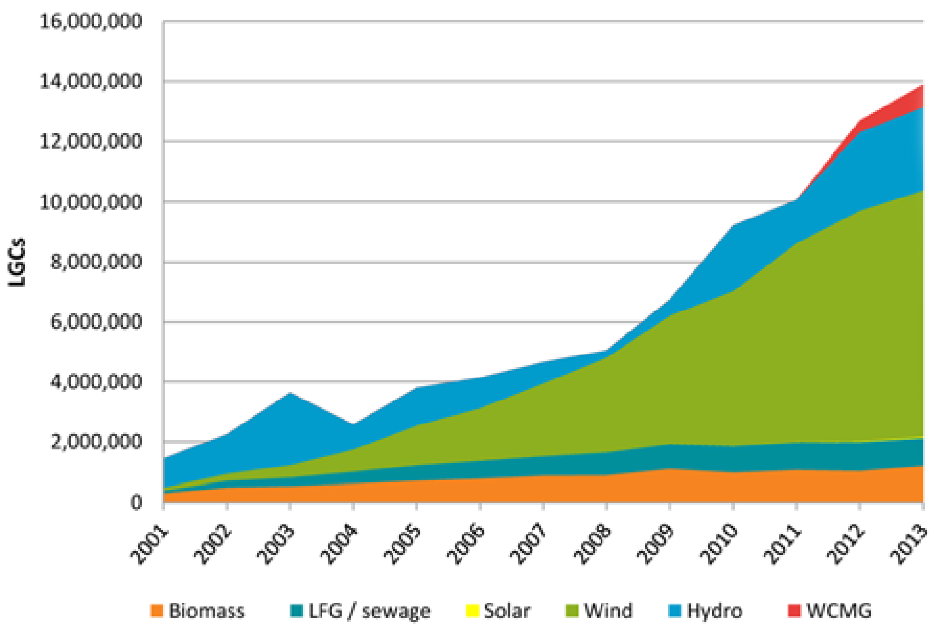
Figure 4 Renewable generation and displacement supported by the RET, 2013 (GWh)



Source: Data provided by the Clean Energy Regulator, current at 3 June 2014

Figure 5 shows the supply of LGCs by fuel source and highlights the growth in wind generation, which now accounts for around 60 per cent of LGCs. The total value of certificates that have been created by large-scale renewable generators from 2001 to 2013 is approximately $5.2 billion.[10] This represents the cross-subsidy received by large-scale renewable generators under the RET.

Figure 5 LGCs created by fuel source, 2001 - 2013

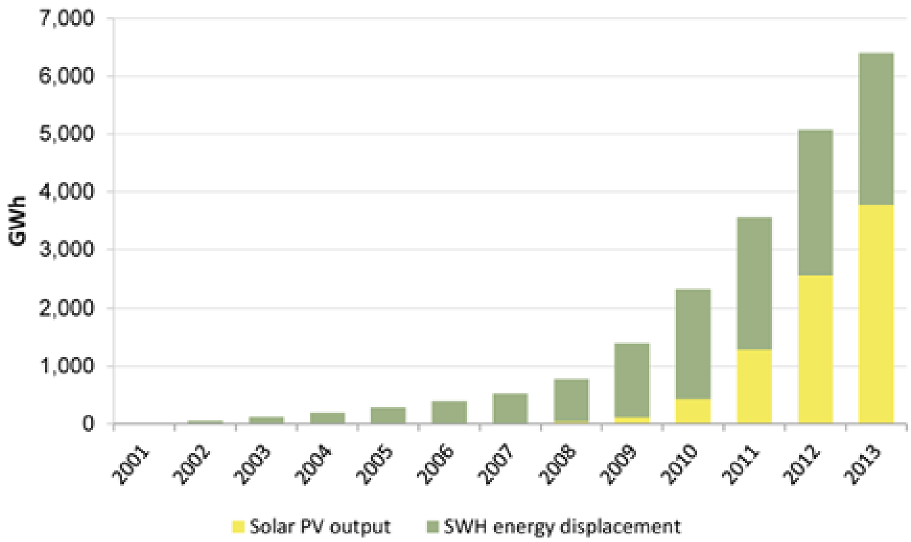


Source: Clean Energy Regulator *Register of Large-scale Generation Certificates, current at 3 June 2014*

[10] Calculation by the RET Review Secretariat based on data provided by the Clean Energy Regulator.

Since the commencement of the RET, over 110 million STCs have been created under the SRES, with solar PV systems accounting for around 94 per cent of these.[11] The total value of certificates that have been created by owners of small-scale renewable energy systems is approximately $4.2 billion over the period 2001 to 2013.[12] The number of STCs created in a particular year is greater than actual renewable generation by small-scale solar PV in that year due to the effects of the Solar Credit multiplier and deeming arrangements. The CER has estimated the generation from small-scale solar PV and displacement attributable to solar water heaters (SWH) and heat pumps over the period of the scheme as shown in Figure 6. Uptake of small-scale systems has been strong, with generation and displacement from small-scale systems estimated at 6,400 GWh of electricity in 2013.

Figure 6 Historical generation and displacement from small-scale PV and SWH, 2001 - 2013



Source: Data provided by the Clean Energy Regulator

A number of submissions commented on the performance of the RET against the objects in the REE Act. Most submissions acknowledged that the RET has delivered on the objective of encouraging the additional generation of renewable electricity. For example, Pacific Hydro noted the considerable investment in renewables since the commencement of the RET:

> *The Renewable Energy Target has performed exceptionally well against the objects of the REE Act on generation, investment and emissions. Some $18.5 billion has been invested in new renewable generation with annual output growing from under 2,000 GWh to around more than 14,000 GWh today. (Pacific Hydro, p.7)*

The REC Agents Association submitted that the SRES meets the objects of the Act:

> *The SRES continues to meet the objects of the Act. It has certainly encouraged the additional generation of electricity from renewable sources. Indeed, it has helped transform Australia's energy system, with more than 2 million homes – 5 million Australians – installing solar panels or solar hot water systems. (REC Agents Association, p.2)*

[11] Clean Energy Regulator, *Renewable Energy Target 2013 Administrative Report*, 2014.
[12] Calculation by the RET Review Secretariat based on data provided by the Clean Energy Regulator.

Although there is overall agreement that the RET has encouraged renewable generation, some stakeholders expressed the view that this has resulted from inefficient investment in non-competitive renewable energy, which has displaced fossil fuel generation and reduced CO_2-e emissions at a high cost.

The Institute of Public Affairs stated:

> *Wind and other renewables should be left to stand on their own feet commercially. They have achieved their current market position only through subsidies and show no sign of reaching commercial viability without them. Their on-going subsidisation severely weakens the national economy and imposes significant penalties on consumers both directly and indirectly. (Institute of Public Affairs, p.2)*

Major Energy Users Inc. stated:

> *The REE Act makes no reference to the promotion of the most cost-efficient solutions to renewable generation. It would be all the better, and more coherent, for doing so, and for linking explicitly to the National Electricity Objective and the long term interests of consumers. (Major Energy Users Inc., p.7)*

Some submissions argued that the RET encourages deployment of the most cost effective, commercial renewable energy technologies and suggest that it has driven down the cost of deployment of these technologies. In its submission, the Clean Energy Council indicated:

> *The RET has been fundamental to driving the development of the Australian renewable energy industry over the past 10 years. This has resulted in increasing scale and efficiency and in turn driving down the cost of deploying renewable energy; encouraging innovation, both in deploying proven technologies and seeking ways to maximise their output, but also in the development of new and exciting technologies; and developing Australian capability in the skills and supply chains that drive innovation, local jobs and flow-on economic benefits. (Clean Energy Council, p.10)*

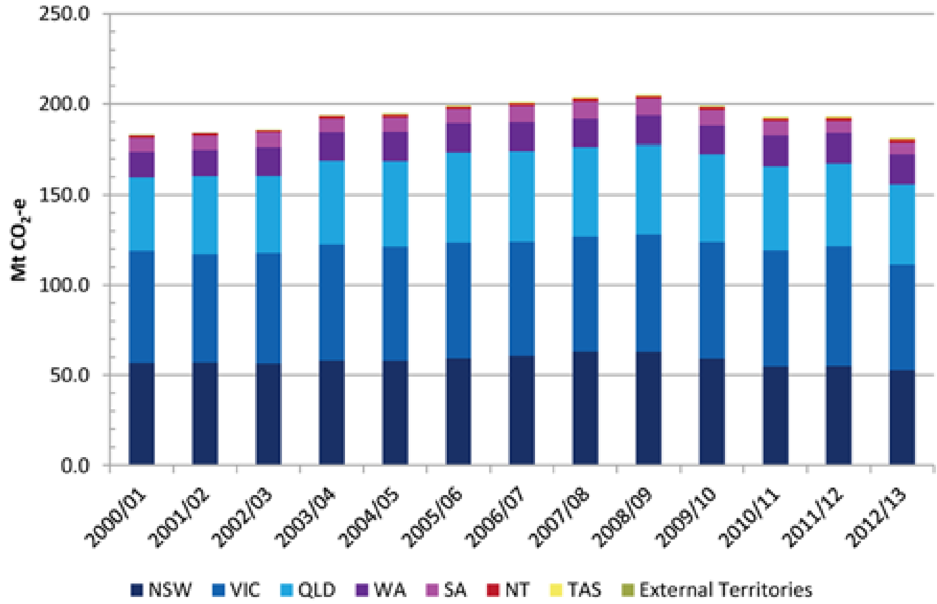
2.2 Reducing greenhouse gas emissions in the electricity sector

The second major objective of the REE Act is to reduce CO_2-e emissions from the electricity sector. The RET reduces CO_2-e emissions by providing an incentive for additional renewable energy which displaces electricity that would have been generated from fossil fuels. The CO_2-e emissions reductions achieved will depend on the emissions-intensity of the fuel source that would have otherwise been used. This counterfactual scenario cannot be observed, so the level of abatement can only be estimated, not measured.

Figure 7 shows that total CO_2-e emissions from Australia's electricity sector over the period 2000-01 to 2012-13 were approximately 2,500 Mt CO_2-e. Historical CO_2-e emissions abatement from the RET has been estimated by SKM to be around 20 Mt CO_2-e between 2001 and 2012.[13] The modest level of abatement achieved to date primarily reflects the small targets in effect under the scheme from 2001 to 2009.

[13] SKM, *Benefit of the Renewable Energy Target to Australia's Energy Markets and Economy*, 2012.

Figure 7 CO_2-e emissions in the Australian electricity sector, 2000-01 to 2012-13



Source: Data provided by the Department of the Environment to the RET Review Secretariat

A number of submissions stated the RET has achieved its objectives in delivering CO_2-e emissions reductions. The Australian Capital Territory (ACT) Government submitted that:

> *After a long history of growth, Australia's electricity emissions have declined over the last five years, in large part because of the RET. It is important that the momentum of this decline is sustained through maintenance of the current RET target. The chances of Australia meeting its national greenhouse gas emission reduction targets in the medium to long term will be greatly diminished if the current RET target is reduced or pushed out to a later year. (ACT Government, p.2)*

Although CO_2-e emissions reductions have been achieved through the RET, some submissions have indicated that this has been at a high cost relative to other opportunities for reducing CO_2-e emissions. For example the Independent Pricing and Regulatory Tribunal stated:

> *In terms of reducing emissions, the CPM [carbon pricing mechanism] or the ERF would achieve the objective at a lower cost. These schemes allow producers and consumers to develop the most cost effective way to reduce carbon emissions by sending a price signal about the cost of carbon emissions. (Independent Pricing and Regulatory Tribunal, p.3)*

The cost of abatement of the RET is further discussed in Section 5.6.

2.3 Ensuring the ecological sustainability of renewable energy sources

The third objective of the REE Act is to ensure that participants in the RET use renewable energy sources that are ecologically sustainable. The REE Act defines 'ecologically sustainable' as an action that is consistent with the following principles of ecologically sustainable development defined in the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EBPC Act):

a. Decision making processes should effectively integrate both long term and short term economic, environmental, social and equitable considerations.

b. If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

c. The principle of inter generational equity, which is that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

d. The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.

e. Improved valuation, pricing and incentive mechanisms should be promoted.

There are 19 eligible renewable energy sources described in the REE Act. The main eligible renewable energy sources are wind, hydro, solar, landfill gas and biomass sources. There are no specific requirements set out in the REE Act for eligible renewable energy sources to be ecologically sustainable. However, to become accredited under the RET a power station must be operating in accordance with any relevant Commonwealth, state, territory or local government planning and environmental approval requirements. 'Standing notices' to this effect must be provided to the CER along with annual compliance statements. The CER also conducts risk based compliance monitoring visits to power stations. If a power station operates in contravention of a relevant law then it may be suspended by the CER.

Submissions to the review generally agreed that the RET is meeting the sustainability objective. For example the WA Renewable Energy Alliance stated that:

> *The RET has never been credibly challenged on the basis of ecological sustainability, largely because the eligibility requirements surrounding the creation of certificates have been sufficiently stringent. We believe it is of utmost importance that these standards are maintained so the public and industry can have continued faith in the legislation to deliver forms of renewable energy that are:*
>
> - *Ecologically sustainable;*
> - *Demonstrate clear environmental benefits relative to conventional electricity generation technologies;*
> - *An important addition to Australia's fuel diversity, security and reliability of supply. (WA Renewable Energy Alliance, p.9)*

The Clean Energy Council stated:

> *Every large-scale renewable energy project is subject to a rigorous environmental impact assessment through the relevant state planning approval process. Projects may also require planning and environmental approval by the Commonwealth if they are deemed to potentially affect matters of national environmental significance under the Environmental Protection*

> *and Biodiversity Conservation Act 1999 (EPBC Act). This ensures their impact on the environment is minimised. (Clean Energy Council, p.6)*

Other stakeholders submitted that they were unclear on the meaning of this objective or how it could be assessed. For example Synergy stated that:

> *Synergy is not clear how the third objective could be assessed. To the extent that the RET avoids greenhouse gas emissions this would be captured by the second objective. "Ecological sustainability" may be captured by the discussion about the purposes of the RET in the Climate Change Authority's 2012 review which considered both "promoting energy security" and "avoiding some of the health and broader environmental costs associated with the production and use of fossil fuels". Synergy agrees with the conclusions of that review which found that:*
>
> *"the RET is unlikely to be the most appropriate mechanism for reducing the negative health effects from fossil-fuel generation, and that such issues are more likely to be better addressed directly through regulations and planning permission"*
>
> *The [CCA] Review did not consider whether there is a general environmental benefit from the RET. While it is likely that there may be localised environmental concerns associated with some fossil fuel plants, Synergy believes these would be more effectively addressed by regulations and planning permission consistent with the Climate Change Authority's view above.*
>
> *Synergy therefore does not believe there is any strong evidence that this third objective has been delivered by the RET. (Synergy, p.4)*

2.4 Findings: Performance of the RET against objectives

The RET has been successful in promoting additional generation from renewable sources, with renewable energy generation almost doubling from 2001 to 2013. This reflects the considerable cross subsidy that the RET delivers to owners of renewable energy power stations and small-scale systems, estimated to be about $9.4 billion over the same period.

The RET has resulted in a modest reduction in CO_2-e emissions from electricity generation, reflecting the relatively small targets for renewables in effect prior to the expansion of the scheme in 2010.

Commonwealth, state and territory environmental regulations provide a framework for ensuring that the RET promotes the use of ecologically sustainable renewable energy sources.

3 IMPACTS OF THE RENEWABLE ENERGY TARGET

Chapter 1 described how the RET supports additional renewable generation by requiring liable parties (electricity retailers) to purchase and surrender certificates created by renewable power stations and owners of small-scale renewable energy systems. Electricity retailers will generally pass the cost of purchasing these certificates to their customers. The RET is therefore not a government subsidy for renewable generation, but a cross-subsidy that transfers wealth from electricity consumers and other participants in the electricity market to renewable generators and owners of small-scale renewable energy systems.

3.1 Energy markets and electricity prices

3.1.1 Trends in electricity demand

In order to evaluate the impact of the RET on electricity markets and the economy it is important to understand the changed circumstances since the expanded scheme commenced in January 2010. At that time it was assumed that electricity demand would increase, in keeping with historical trends, to around 300,000 GWh in 2020. A target of 45,000 GWh for additional renewable generation in 2020 was fixed in legislation to ensure that at least a 20 per cent share of renewables would be achieved.[14]

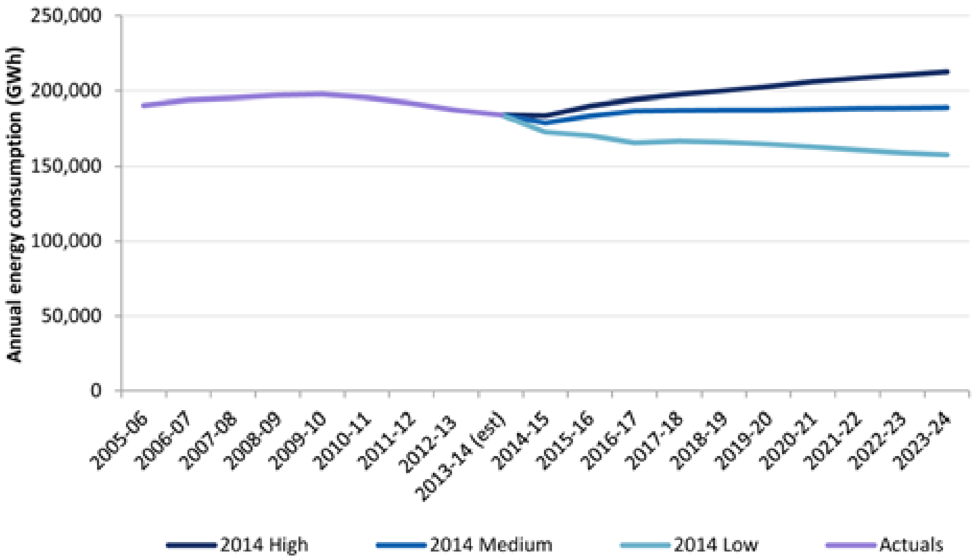
However, annual electricity consumption sourced from centralised electricity generators has been declining in the NEM. Electricity demand has fallen from around 198,000 GWh in 2009-10 to around 184,000 GWh in 2013-14, which is a drop of around 1.7 per cent per year on average.[15] This is likely to have occurred for a range of reasons, such as declining activity in the industrial sector (including the closure of the Kurri Kurri aluminium smelter in New South Wales in 2012), global economic trends, energy efficiency initiatives and consumers responding to increasing electricity prices. The strong growth in rooftop solar PV systems has also contributed to a reduction in demand for electricity sourced from the grid.

The Australian Energy Market Operator's (AEMO's) latest forecasts for electricity demand in the NEM (Figure 8) suggest that there will be a temporary uptick in demand growth, largely driven by liquefied natural gas (LNG) projects in Queensland, followed by a period of subdued growth, with demand in 2023-24 projected to remain below the peaks of 2009-10. The drivers for this include the decline in energy intensive industries (including the closure of the Point Henry aluminium smelter in Victoria in August 2014), strong projected growth (24 per cent annually) in rooftop PV installations, particularly in Queensland and Victoria, and strong growth (10 per cent annually) in total energy efficiency savings, with key contributions from air conditioning, refrigeration and electronics.[16]

Forecasts by the Independent Market Operator for the South-West Interconnected System (SWIS) in Western Australia suggest growth in electricity demand of around two per cent per year over the period 2015 to 2040.

[14] It was estimated that underlying generation from existing renewable generators would represent 15,000 GWh per year, so an additional 45,000 GWh would be required to reach 20 per cent of 300,000 GWh in 2020. When the RET was split into the LRET and SRES schemes on 1 January 2011, it was assumed that small-scale systems would contribute 4,000 GWh of generation to the target, so the LRET was fixed at 41,000 GWh in 2020.
[15] Australian Energy Market Operator, Final NEM and Regional Forecasts (2014 NEFR – NEM), 16 June 2014. http://www.aemo.com.au/Electricity/Planning/Forecasting/National-Electricity-Forecasting-Report (native annual energy forecasts including small non-scheduled generation).
[16] Australian Energy Market Operator, *National Electricity Forecasting Report*, 2014, p.2-1.

Figure 8 Annual energy consumption in the NEM, actual and forecast, 2005-06 to 2023-24

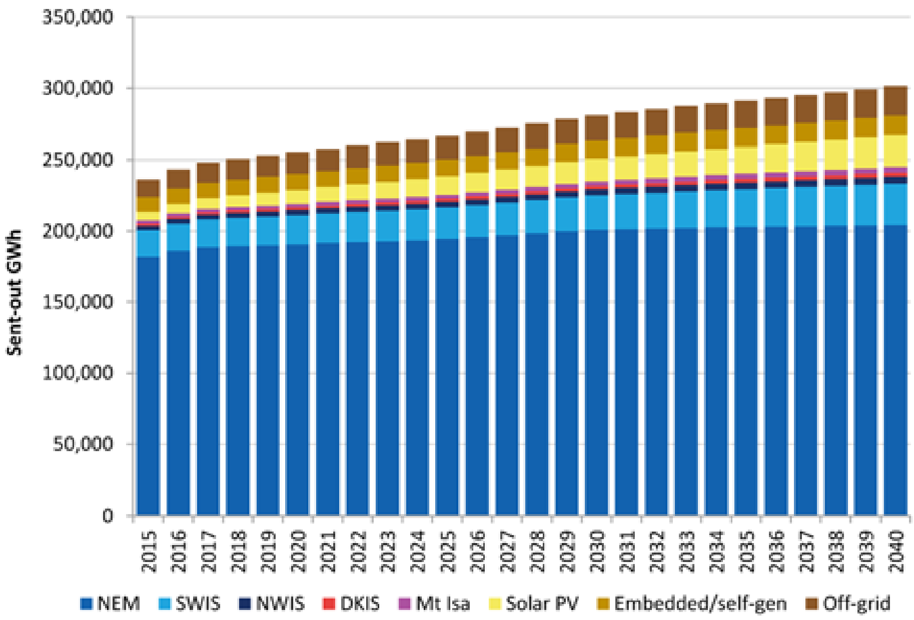


Source: Based on Australian Energy Market Operator (2014) data published with the National Electricity Forecasting Report.

Regional electricity grids and off-grid electricity use is predicted to grow at a higher rate than the NEM and the SWIS, though this represents a small share of Australia's total electricity demand. Figure 9 shows the forecast electricity demand for electricity in Australia over the period to 2040.

Falling electricity demand in recent years and a subdued outlook mean that the RET is likely to deliver more than a 20 per cent share of renewable energy in 2020. Modelling by ACIL Allen for the review suggests the RET as currently legislated would deliver around a 26 per cent share of renewables by 2020 (see Section 5.1).

Figure 9 Forecast Australian electricity demand, 2015 - 2040



Source: ACIL Allen

As electricity demand has declined, the RET has resulted in investment in new generation capacity that would not otherwise have been required, contributing to some incumbent fossil fuel generators being mothballed or curtailed. This was noted in a number of submissions, for example, EnergyAustralia stated that:

> *The RET was not designed to operate in a declining energy demand environment where renewable generation capacity is effectively 'forced' into a wholesale energy market when additional capacity is not required. (EnergyAustralia, p.3)*

ACIL Allen estimates that around 4,155 MW of coal-fired generation capacity has been mothballed since mid-2012 and 385 MW of gas-fired capacity is due to be mothballed in October 2014.

3.1.2 Impacts on electricity prices

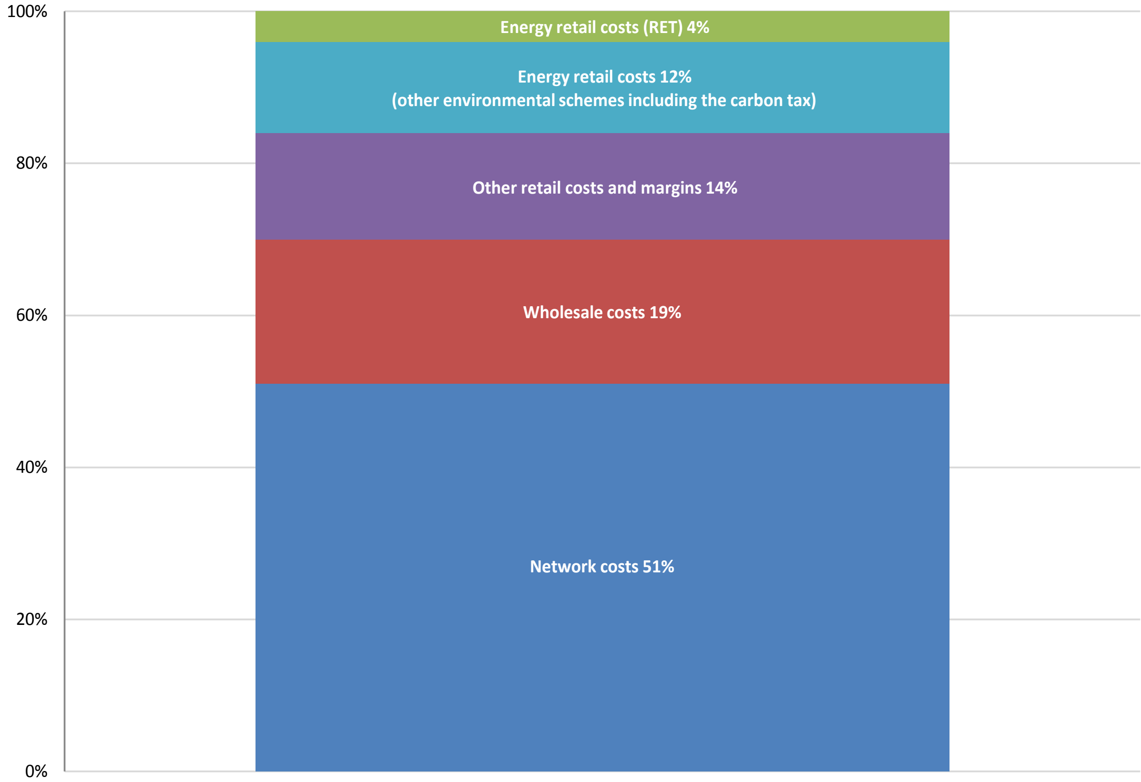
Until July 2014, all jurisdictions except Victoria and South Australia regulated retail electricity prices for residential and small business customers. New South Wales has deregulated retail prices from July 2014.

Residential and small business customers in regulated jurisdictions have access to two types of electricity contracts – standing offer (default) contracts set by state regulators, or market contracts offered by energy retailers. Both types of contracts include mandatory terms and conditions, with market offers also including options such as different billing periods, discounts, fixed-term contracts, switching incentives and bundling services.

There are three broad components of household electricity prices: the cost of generating electricity (wholesale costs); the cost of sending it through poles and wires (network costs); and costs from retailers which includes the cost of complying with government policies such as the RET. Figure 10 shows the proportion of these components for retail prices in 2013-14 as estimated by the Australian Energy Market Commission (AEMC). On average, the cost of generating electricity accounts for around 19 per cent of retail electricity prices, network costs account for 51 per cent and retail costs account for around 30 per cent (including the cost of environmental schemes).

Over the past five years, household retail electricity prices have risen on average by 78 per cent nationally, largely due to increases in network costs.[17] Environmental schemes such as the carbon tax, the RET and state and territory feed-in-tariffs have also contributed to higher prices.

Figure 10 Breakdown of Australian average residential electricity prices, 2013-14



Source: Based on Australian Energy Market Commission, *2013 Residential Electricity Price Trends report, Dec 2013*

The RET influences both wholesale and retail electricity prices. The RET places a direct cost on liable entities (electricity retailers) who are required to purchase certificates (LGCs and STCs) to comply with the scheme. These costs are passed onto customers through electricity bills and represented an average of four per cent of residential retail electricity prices in 2013-14.[18]

The RET has affected the wholesale electricity market by encouraging additional generation capacity into the market at a time of falling demand, putting downward pressure on wholesale electricity prices. The additional renewable capacity deployed as a result of the RET may have lower short-run marginal costs than traditional fossil fuel generation, which may have the effect of further lowering wholesale electricity prices as it displaces coal or gas generation with higher short-run marginal costs. This is referred to as the 'merit order effect'.

Numerous submissions commented on the impact of the RET on electricity prices. For example, Acciona's submission stated that:

> *The introduction of renewable energy generation supply, with a very low marginal cost both increases competition in the supply mix, and on an economic basis displaces coal and gas fired generation (both have higher marginal costs). This results in the wholesale marginal cost of electricity supply being lower than what it might otherwise be. (Acciona, p.6)*

[17] Australian Bureau of Statistics (ABS) *Consumer Price Index (CPI)* Cat no. 6401.0 TABLE 7. CPI: Group, Sub-group and Expenditure class, weighted average of eight capital cities electricity. (Based on the period June 2009 - June 2014).
[18] Australian Energy Market Commission, *Residential Electricity Price Trends report*, December 2013, p.12.

The net impact of the RET on retail electricity prices will depend on the extent to which any reduction in wholesale prices is passed through to consumers and offsets the direct cost of the certificates. As market retail prices reflect decisions by retailers in a competitive market, and there are many factors influencing wholesale electricity prices, the net impact of the RET on electricity bills cannot be directly observed. The impact of the RET on electricity prices is further analysed in Chapters 5 and 6.

Households and small business

For households and businesses on standing offer contracts, the state regulator determines the maximum cost pass through for each component of the retail tariff, including the cost of the RET. The RET component will vary by jurisdiction according to methodologies used to calculate this tariff component. For example, the submission from the New South Wales regulator, the Independent Pricing and Regulatory Tribunal, stated that the RET cost around $107 for a typical New South Wales customer on regulated prices in 2013-14.[19] According to the Queensland regulator, the Queensland Competition Authority, the cost impact of the RET for a typical household in Queensland for 2014-15 is around $65.[20] In Western Australia, the AEMC forecasts the RET to contribute 4 per cent or $62 to electricity bills in 2013-14.[21]

The RET helps households with the cost of installing their own rooftop solar PV system, providing an opportunity for households to save on electricity bills. Some have argued that the SRES benefits high and middle income households who can afford to install rooftop solar PV systems and reduce exposure to increasing retail electricity prices, while renters and those on lower incomes may not be able to do so, despite the cross-subsidy.

However, analysis by the REC Agents Association found that to date, the installation of rooftop solar PV systems has been higher in postcodes in outer-metropolitan and regional areas. The REC Agents Association concluded that:

- *Rural and regional areas have 42 per cent of all solar systems installed, despite having only 32 per cent of the housing stock. This translates into rural and regional areas having the highest uptake of solar systems per household at 29 per cent;*
- *Installation of solar systems in the capital cities were typically characterised by postcodes in the outer metropolitan mortgage belt;*
- *There is an inverse relationship between average incomes and solar penetration levels (as income levels increased, solar uptake declined). (REC Agents Association, p13)*

The combination of premium feed-in-tariffs offered by state and territory governments and strong support under the RET have increased the affordability of rooftop solar PV systems for low and middle income households, which are more sensitive to the upfront costs of systems. A different trend may emerge in the future as incentives to install rooftop solar PV have been substantially reduced.

[19] Independent Pricing and Regulatory Tribunal submission to the Renewable Energy Target Review, p.5.
[20] Queensland Competition Authority, *Estimate of the Impact of the Carbon Tax and RET - 2014-15*, (corrected) June 2014.
[21] Australian Energy Market Commission, *2013 Residential Electricity Price Trend*, December 2013.

Large energy users

Electricity represents a significant proportion of costs for many large businesses. For example, the mining and manufacturing sectors are the biggest industrial consumers of electricity, spending around $1.6 billion and $5.5 billion respectively in 2011-12.[22]

Australia's largest trade-exposed energy users receive assistance with RET costs through PECs. This assistance was introduced in recognition of the combined impact that the expanded RET and the introduction of carbon pricing would have on the competitiveness of these businesses that are price takers on global markets. Over recent years, highly emissions-intensive business activities have received an exemption for around 68 to 78 per cent of the costs of the RET, and moderately emissions intensive business activities have received an exemption for around 50 per cent of the costs.[23]

A number of large energy users, such as aluminium smelters, have entered into long-term electricity supply contracts and in some instances, the location and viability of these energy-intensive businesses has been influenced by the availability of low cost electricity. Some stakeholders have indicated that where these contracts have been recently renegotiated, the increase in retail electricity prices has been significant while there has not been any wholesale price reduction associated with the RET.

Many large energy users claim that the cost of the RET remains significant despite the partial exemption. For example, the Business Council of Australia submission states:

> *Increases in electricity prices caused by the RET add to the cost base of many of Australia's electricity intensive industries, such as steel manufacturing and aluminium smelting. Australia's historically low electricity prices mean there are many sectors that have built up around what has been one of Australia's previous comparative advantages. Higher electricity prices, however, are eroding the competitive edge once held by these businesses and the RET is a contributing factor towards increases in electricity prices. (Business Council of Australia, p.5)*

The submission from the Cement Industry Federation notes that:

> *In general, since the RET effectively subsidises the renewables industry at the expense of households, industry and existing generators – this program impacts on the international competitiveness of energy intensive trade exposed industries such as cement manufacturing. (Cement Industry Federation, p.4)*

Australia's manufacturing sector has declined in recent years, with increasing retail electricity prices, the high Australian dollar and global competition all contributing to difficult trading conditions over a sustained period. This has particularly affected the aluminium sector. In 2012, the Kurri Kurri aluminium smelter ceased operation and Alcoa closed its Point Henry facility in August 2014. The aluminium sector argues that it is highly affected by the RET as electricity represents around 30-40 per cent of production costs. For example, the submission from the Australian Aluminium Council states that:

[22] Australian Bureau of Statistics, *Energy Use, Electricity Generation and Environmental Management Australia 2011-12*, Cat no. 4660.0.
[23] Information provided by the Clean Energy Regulator to the RET Review Secretariat.

> *Since the inception of the M(RET) scheme, aluminium smelting has generated RET liabilities of more than half a billion dollars. The ongoing RET liabilities generated by aluminium are $70-80 million per annum in total and $15-25 million per annum per smelter.*
> *(Australian Aluminium Council, p.5)*

Other industries also consider the RET adds significant costs to their operations. Cotton Australia submitted that the RET and carbon tax equate to 20 per cent of their electricity costs, which have increased by 300 per cent since 2009:

> *Even a small cost increase has a large impact on farm business income and productivity. There is already some evidence to suggest that the rapid escalation in electricity price has forced some growers to abandon drip irrigation systems in favour of lower energy use methods. Some irrigators are even borrowing money and selling water rights to pay electricity bills. (Cotton Australia, p.1)*

These concerns have led energy intensive industries, particularly the aluminium industry, to call for a decrease in the target along with an increase in exemption arrangements to cover 90 or 100 per cent of the costs of the RET. Options for adjusting the target are discussed in Chapter 6 and exemption arrangements are discussed in Section 7.1.

3.1.3 Findings: The impact on electricity prices

The RET impacts on electricity prices in two, countervailing ways:

- The direct costs of renewable energy certificates contribute to higher retail electricity prices. This impact on household electricity bills is estimated to be in the range of four per cent in 2013-14 and higher for energy-intensive businesses.
- By encouraging additional renewable energy generation into the market and increasing electricity supply capacity, the RET is also exerting downward pressure on wholesale electricity prices. This impact has likely been made more pronounced by the recent declines in demand in the NEM and the low fuel costs of renewables compared with fossil fuel generation.

3.1.4 Impacts on electricity supply

Reliability and security of electricity supply

Some submissions raised concerns about the implications of high levels of variable wind and solar PV generation on market price volatility and power system security. For instance, Synergy submitted:

> *The RET impacts on reliability arising from variable renewable energy resources. Synergy concurs with the* [RET Review] *Issues Paper's conclusion that this is currently manageable but notes the Economic Regulation Authority's conclusion that the impact may become more significant as more wind generation capacity is being added to the system. (Synergy, p.10)*

The submission from AEMO, the organisation responsible for system security in the NEM, concluded that:

> *Whilst there are technical challenges [from integrating renewable generation], AEMO feels the NEM design is well placed to deal with them. This includes some existing beneficial features, such as:*
>
> - *Five-minute security constrained economic dispatch and pricing.*
> - *The Australian Wind Energy Forecasting System which is forecasting variations in output and thereby assisting non-intermittent plant to predict dispatch. This system is being expanded to also forecast the output of large solar plants.*
> - *The semi-scheduled generator provisions in the National Electricity Rules (NER) that requires intermittent generators such as wind generators to respond to AEMO dispatch signals to reduce output when network security is threatened.*
>
> *The NEM has been uniquely successful in securely integrating wind generation to date at low cost. For example, AEMO has not had to change or materially increase the quantity of ancillary services purchased to maintain system security. (AEMO, p.2)*

AEMO considers that it is technically feasible to integrate the renewable energy likely to emerge from the current RET:

> *Based on experience to date and analysis of likely future outcomes, AEMO considers that it is technically feasible to integrate the renewable energy likely to emerge from the existing RET settings while maintaining the security of the power system. At higher levels there is likely to be some additional costs, though any such costs are expected to be of a much lower order than the consumer and investment costs being modelled by the panel, so their exclusion from the modelling process should not undermine the analysis. (AEMO, p.3)*

Grid integration

Notwithstanding the conclusions above, AEMO has undertaken work on the challenges of integrating the level of wind generation expected under the RET into the power system. These challenges are expected to arise first in South Australia and Tasmania, where forecast levels of wind generation are highest compared with demand. Further challenges could arise from increased distributed generation, such as rooftop PV, and from changing consumer behaviour contributing to declining consumption from the grid.[24]

The challenges identified by AEMO include lower system inertia, particularly in South Australia and Tasmania, making control of power system frequency more challenging.[25]

There are a range of options to address these challenges. Some options could be implemented through existing processes and systems, for example using constraint equations in the dispatch process to limit the dispatch of wind generation at certain times (i.e., to constrain wind off). Other options that could be considered would require changes to processes, systems and regulatory instruments, for example, new ancillary services markets could be introduced to provide frequency control when there is low system inertia. The costs of such measures would be passed through to consumers.

[24] Australian Energy Market Operator, *Integrating Renewable Energy - Wind integration studies report*, 2013.
[25] Inertia is the rotating energy in the system. Asynchronous renewable energy does not provide this property, which affects the frequency control capability of the system. Ancillary service markets can provide incentives for adequate control of frequency.

AEMO is continuing to study these issues and intends to release further reports.

SRES impacts on demand for grid electricity and network business models

In recent years there has been unprecedented growth in consumers generating their own power in the form of rooftop solar PV. This was initially supported through premium feed-in-tariffs in different jurisdictions, with the Solar Credits multiplier under the RET also playing a role. Rapid reductions in solar PV costs combined with higher retail electricity prices have underpinned ongoing growth in solar PV, albeit at a slower pace, despite moves away from premium feed-in-tariffs and reductions in support under the RET. This expansion in solar PV has contributed to the decline in demand for grid electricity.

Solar PV connections and reduced demand from the residential sector in turn affect network business models and may, in part, contribute to higher network charges as network businesses seek to recover expenditure from fewer units of energy sold.

Concerns have been raised that consumers without solar PV may subsidise those that have it. Consumers with solar PV use less total electricity from the network and pay less, while still using the infrastructure for reliable supply, especially in locations where the output from their own systems is low at times when electricity use is high. Other consumers therefore have to pay more per unit of energy to cover the fixed costs of the network, which have not changed.[26]

This raises the issue of how to reflect the full costs and benefits of rooftop PV systems connected to the grid. Structuring tariffs to recognise the many cost drivers and incorporate time-of-use pricing could help provide the right price signals for efficient investment decisions by both consumers and network operators.

The potential for cross-subsidisation of electricity prices between consumers in the context of rapidly changing technology capabilities is not part of the scope of this review but is a priority area for energy market reform, which is discussed further in Section 8.4.

3.1.5 Findings: The impact on electricity supply

While the integration of significant levels of intermittent renewable generation into electricity markets has presented new challenges for market operators, the reliability and security of electricity supplies have so far been maintained.

Electricity market operators and regulatory authorities will need to continue to analyse and, where appropriate, respond to the implications of future growth in the deployment of renewables for the safe, reliable and secure supply of electricity.

3.2 Environmental and social impacts

There are socio-economic and environmental impacts of wind and solar farm developments supported by the RET, particularly in regional and rural communities (aside from CO_2-e emissions abatement which is discussed in Chapter 2). The RET has stimulated employment opportunities in renewable energy and associated industries and communities have benefited from the increased investment in their local regions. There is also potential for renewables to reduce the grid dependency of rural communities.

[26] ACIL Tasman, *Distributed Generation - Implications for Australian electricity markets*, Prepared for the Energy Supply Association of Australia (ESAA), April 2013.

On the other hand, concerns have been raised about uneven allocation of benefits from local investment in renewable energy and about the overall burden on the economy of the additional economic cost of the RET.

3.2.1 Employment

The RET has the effect of creating local employment opportunities in the renewable energy sector. The Clean Energy Council's Clean Energy Australia report states that 21,000 people were directly employed by the renewable energy industry in a construction, installation, operations or maintenance role at the end of 2013, with over 13,000 people employed in the solar PV industry.[27]

A large proportion of this employment is transitory and has occurred in rural and regional areas where other work opportunities are not easily found. CATCON, a civil construction company that has been engaged with renewable energy projects, noted:

> *CATCON have been supplying services to the Gas Fired Power Station industry since our inception (nearly 20 years) - we are in a position to advise that there are different outcomes in relation to local community involvement between a Gas Fired PS Project and a Renewable WTG Project and we can confirm there is a significantly greater benefit to a local community during the construction phase of renewable project. (CATCON, p.3)*

However, this employment occurs as a result of a cross-subsidy that transfers investment from elsewhere in the economy and is offset by other job losses, such as jobs at fossil-fuel generation plants. Therefore the RET does not result in an increase in employment at a national level. The effect of the RET on economy-wide employment was not analysed in the modelling by ACIL Allen for the Review, but it was considered in modelling by Deloitte undertaken for the Australian Chamber of Commerce and Industry, the Business Council of Australia and the Minerals Council of Australia which found that an average of 5,000 full-time jobs would be created to 2030 if the RET was abolished.[28] The submission from the Australian Chamber of Commerce and Industry stated:

> *Another key objective of the scheme is to stimulate the development of a renewable energy industry in Australia. Whilst the scheme has done this up to a point, it has also come at a significant cost, with consumers forced to support the renewable energy industry via a large subsidy to renewable energy production. The jobs and investment created have been costly and are more than offset by the loss of other job and investment opportunities, resulting in an overall lowering of economic welfare. (Australian Chamber of Commerce and Industry, p.15)*

3.2.2 Socio-economic impacts

A diverse range of views were expressed on the impacts of the RET in regional areas. Submissions opposing renewable energy projects in rural areas noted the potential for wind farms to cause division in rural communities between landowners hosting turbines and other interests. For example, the Tablelands Wind Turbine Action, a group of Atherton Tableland residents concerned about the impacts of wind farms in far north Queensland, highlighted this potential conflict in relation to agriculture:

[27] Clean Energy Council, *Clean Energy Australia Report 2013*, p.18.
[28] Deloitte, *Assessing the Impact of the Renewable Energy Target*, July 2013, p.2.

> *The experiences overseas and in other areas of Australia are the costs of wind turbine developments are externalised to other sectors, especially agriculture. These impacts are wide ranging, beginning during construction when road congestion disrupts agricultural industries which rely on the road network to haul cane, bananas and other produce. (Tablelands Wind Turbine Action, p.2)*

However, many community group and individual submissions expressed strong support for renewable energy including community ownership of renewable power stations. For example, Hepburn Wind's submission stated that:

> *The Hepburn Community Wind Farm is owned by almost 2000 members, the majority of whom are local to the region. With massive volunteer effort and nearly $10m of community capital, the members of Hepburn Wind have shown that under the right conditions, regional communities will embrace the opportunities presented by wind farms. (Hepburn Wind, p.1)*

The Australian Wind Alliance articulated the benefits for rural communities as:

> *… greater income security for farmers, ongoing local jobs, a more diversified economic base, income for rural councils, retention of people in local schools, community and sporting groups…(Australian Wind Alliance, p.2)*

Submissions also noted that renewable energy presents rural communities with opportunities to diversify their electricity supply. For example Regional Development Australia stated:

> *...renewable energy has a key role to play in securing the energy future of the region in remote (off-grid), rural (fringe-off-grid) and regional locations. (Regional Development Australia, p.2)*

3.2.3 Health impacts

In general terms, submissions suggested that electricity generation from pollution free energy should be good for the environment and human health. Engineers Australia noted there are health hazards associated with the mining, transport and burning of coal, citing figures from the Australian Academy of Technological Sciences and Engineering for the health and environmental costs of coal and gas fired electricity.[29]

The Panel also received some submissions raising concerns about adverse health impacts of wind farms. The Panel notes that the Government is addressing these concerns through separate processes involving the National Health and Medical Research Council.

The regulation and approval of wind farm developments, including the setting of noise limits, is a matter for the relevant state and territory authorities. The Australian Government only becomes involved where matters of national environmental significance trigger the application of the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*.

3.2.4 Land uses

Increased renewable energy generation has resulted in a greater amount of land used for wind and solar projects and landowners leasing land for wind turbines have supported renewable generation as an additional source of income. However, some submissions from individuals in regional communities argued that there is no direct benefit to the properties surrounding wind farms yet there are direct negative impacts, such as potential decreases in land values. Many of these concerns are planning matters and are the responsibility of state and territory governments.

[29] Engineers Australia, *Submission to the review of the Renewable Energy Target*, May 2014, p.6.

3.2.5 Broader economic impacts of the RET

The economic impact of the RET is broader than simply the impact on electricity prices. There are several ways these costs can be measured, which include:

- The additional resource cost to the electricity sector. This includes the additional capital expenditure on new generation capacity, refurbishment of existing and new generators, fixed operating costs and variable operating costs (fuel etc.) brought on by the deployment of renewables under the RET.
- The total certificate cost. This is the total cost of certificates created and sold through both the SRES and LRET schemes (i.e., total quantity of certificates multiplied by the price). This represents the value of the cross-subsidy that flows to renewable generators and owners of small-scale renewable energy systems through the RET.
- The economy-wide impact. This represents the total economic impact of subsidising investment in renewable electricity generation. In the case of the RET, this is a cost as the investment in renewables comes at the expense of more efficient investment opportunities elsewhere in the economy and the benefit of the abatement brought about by the RET can be achieved at a lower cost through other methods.

Chapter 5 further discusses these impacts in relation to the current RET scheme, and Chapter 6 provides analysis of the economic impacts of various options for reforming the RET.

3.2.6 Findings: Environmental and social impacts

The RET has encouraged significant levels of employment in both the small-scale and large-scale renewable energy industries. However, this employment occurs as a result of a cross-subsidy that transfers investment from elsewhere in the economy and is offset by other job losses. Net employment is likely to be lower overall as a result of the RET.

Stakeholder feedback suggests that the RET has both positive and negative consequences for broader socio-economic outcomes such as those relating to health, land values, and environmental amenity. The Panel has not conducted in-depth or quantitative analysis of these factors. The Panel notes that there are deeply held and divergent views about the benefit or otherwise of renewables at the community level, with most debate focused upon the impacts of wind farms.

4 APPROACH TO MODELLING THE RET

ACIL Allen was commissioned to model for the Panel the impacts of the current RET scheme and alternative options for the RET on the electricity generation mix, wholesale and retail electricity prices, CO_2-e emissions, renewable energy certificate prices, capital costs and resource costs. While the modelling estimates the effects of the RET on the electricity market, it does not assess broader, economy-wide impacts, which the Panel has also considered, informed by submissions to the Review.

A consultation paper on the proposed approach to key modelling assumptions was released by the Panel as part of its *Call for Submissions*. Feedback on the consultation paper and at the assumptions workshop was considered when the Panel finalised the assumptions. The details of the assumptions are included in ACIL Allen's modelling report. In brief, the key assumptions were developed as follows:

- Electricity demand – uses market operator projections for the NEM and SWIS and previous analysis involving ACIL Allen and the Government for other grids and off-grid generation.
- Capital costs – uses Australian Energy Technology Assessment (AETA) and ACIL Allen projections.
- Gas and coal prices – uses International Energy Agency (IEA) and ACIL Allen projections.

The modelled policy options (scenarios) were chosen to reflect a range of views expressed to the Panel during consultations. The scenarios are as follows:

- Reference case – the current legislated scheme. This includes an LRET target of 41,000 GWh by 2020 and an uncapped SRES scheme, where solar PV installations receive 15 years of deemed certificates (progressively phased out from 2017) and solar water heaters receive 10 years of deemed certificates (progressively phased out from 2022).
- Real 30 per cent by 2030 – the LRET is reset to achieve a 30 per cent share of renewables in the generation mix by 2030, based on the electricity demand projections used in the modelling, and the targets remain at 2030 levels until 2040. There is no change to the current legislated SRES (it remains uncapped and the scheme is progressively phased out by 2030).
- Real 20 per cent by 2020 – the LRET targets are reset to achieve a 20 per cent share of renewables in the generation mix by 2020, based on the electricity demand projections used in the modelling. The LRET targets are maintained at 2020 levels until 2030. The SRES ceases in 2020, with deeming for solar PV lowered from 15 years to 10 years from 1 January 2015 and fixed at that level until 2020.
- 50 per cent share of new growth in electricity demand (scenario added following the modelling workshop) – annual LRET targets are set corresponding to the previous year's target plus a 50 per cent share of expected growth in electricity demand on the main networks and large-scale off-grid demand over the next year. The LRET targets are retained at 2020 levels until 2030. The SRES ends in 2020. Deeming is reduced from 15 years to 10 years for solar PV installations on 1 January 2015, and then reduces by one year each year until 2020 when the deeming rate is five years.

- Repeal of the RET – the complete removal of both the LRET and SRES schemes from 1 January 2015.
- Closing the RET to new entrants – the LRET scheme continues to operate, but only large-scale renewable energy power stations currently accredited under the scheme and those currently under construction or fully committed are able to create LGCs. For modelling purposes a fixed price of $40 in nominal terms per LGC was chosen. The SRES ceases from 1 January 2015, with transitional arrangements in place for those with contracts to install systems.

Reflecting uncertainty in key assumptions, sensitivities of the results to changes in some of the central assumptions were also modelled. The choice of sensitivities was informed by stakeholder views expressed to the Panel. Modelled sensitivities include:

- Low and high electricity demand – uses low and high market operator projections for the NEM and SWIS, while growth in other generation is held flat in the low sensitivity case and grows one per cent faster in the high sensitivity case.
- High capital costs – uses higher wind (around 15 per cent) and higher solar (around 20 to 30 per cent) capital cost projections.
- A shadow carbon price from 2021, starting at around $10 per tonne CO_2-e and growing at three per cent (real) per year thereafter.
- A greater withdrawal of fossil-fuel capacity in response to the large amount of renewable capacity installed in the reference case.

The ACIL Allen modelling has not incorporated the impact of the ERF as information was not avaliable at the time of modelling about the nature and magnitude of the impact of the ERF on electricity markets.

In weighing the results from ACIL Allen's modelling in its deliberations, the Panel has also given consideration to other modelling and analysis of the RET presented in submissions to the Review as well as qualitative submissions on the impact of the RET.

5 THE CURRENT RET POLICY

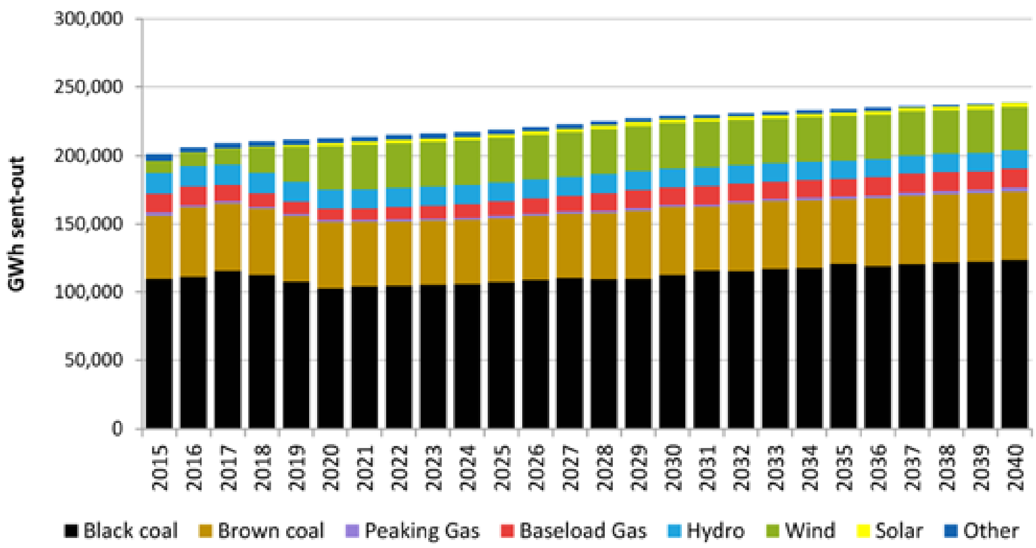
This chapter analyses the impacts of continuing with the RET under current settings (the reference case), measured against a scenario in which there is no RET (the repeal case).

5.1 Generation mix

ACIL Allen projects that around 26,000 GWh of additional renewable generation will be needed to meet the 41,000 GWh LRET in 2020. This would require around 9,000 MW of new renewable capacity to be built to deliver this additional generation. Figure 11 shows that wind development is expected to make up the majority of new renewable generation in the NEM and the SWIS regions over the period 2016 to 2021 and will displace primarily black coal generation. Once the wind development necessary to meet the LRET target is complete, the future generation mix is relatively static, with most generation growth beyond 2020 being met by increased output from existing coal-fired generators.

A small amount of large-scale solar PV installations occur in the regional markets (the North-West Interconnected System, the Darwin-Katherine Interconnected System and Mt Isa) in the period 2018 to 2020 as higher wholesale prices prevail in these regions.

Figure 11 Generation mix: Reference case, 2015 - 2040

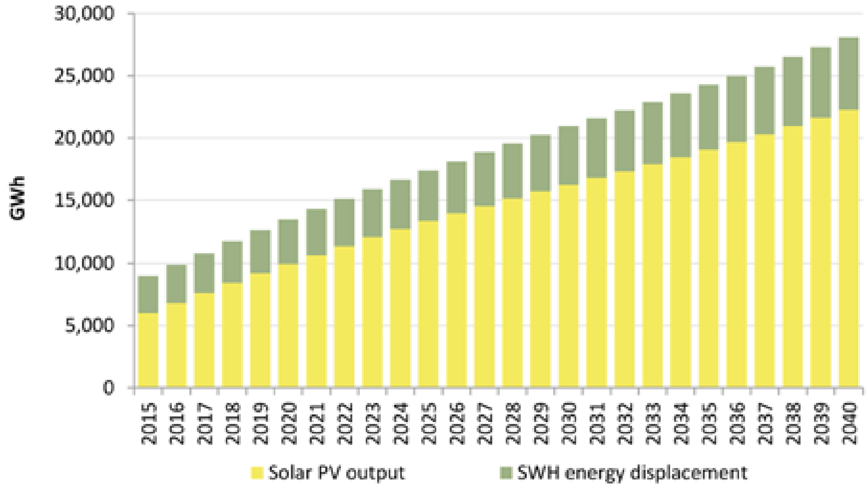


Source: ACIL Allen

Figure 12 shows ACIL Allen's projections for electricity generation from small-scale systems and solar water heaters in the reference case. Generation from small-scale solar PV is expected to increase from around 5,200 GWh in 2014 to 10,000 GWh by 2020 and to 16,300 GWh by 2030. This growth occurs despite declining support from the SRES as certificate deeming rates decline from 2017.

Growth in installations of new solar water heaters is projected to maintain a relatively stable pace, with total installations increasing from an estimated 916,000 at the end of 2014 to over 1.5 million systems by 2030. Annual installations are projected to be around 35,000 to 43,000 systems over 2014 to 2030. The energy displaced from solar water heaters increases from around 2,900 GWh in 2014 to around 3,500 GWh in 2020 and to 4,700 GWh by 2030.

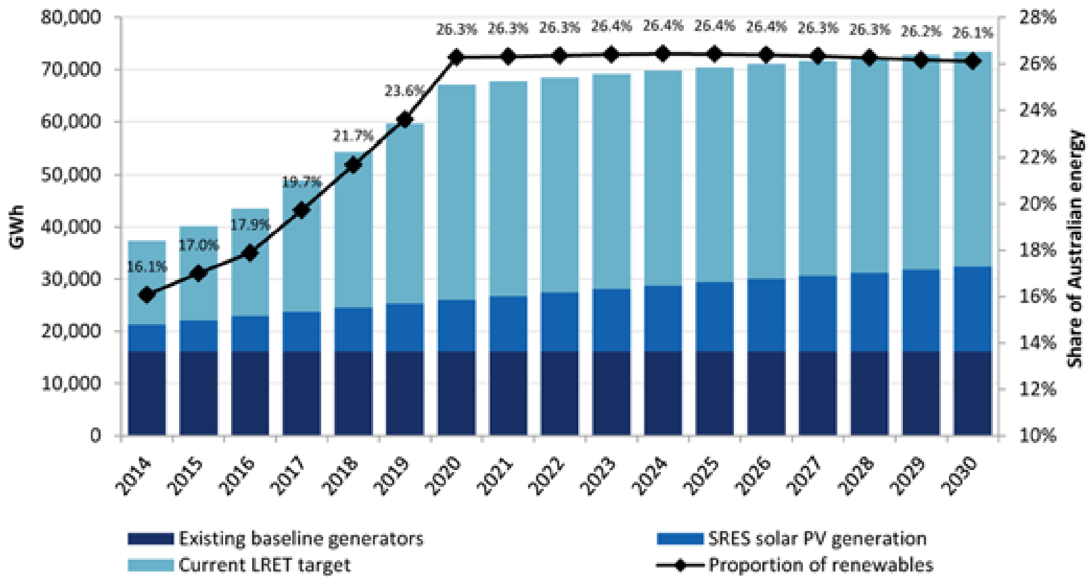
Figure 12 Generation and displacement from small-scale PV and SWH: Reference case, 2015 - 2040



Source: ACIL Allen

ACIL Allen's modelling results for the RET as currently legislated indicate that the proportion of renewables in Australia's energy mix will reach around 26 per cent by 2020 and will then remain steady to 2030 (Figure 13). This percentage for renewable generation does not include energy displaced from solar water heaters and voluntary LGC surrender volumes. The methodology for calculating the share of renewables is discussed in Appendix D.

Figure 13 Proportion of renewables in Australia's electricity mix: Reference case, 2014 - 2030



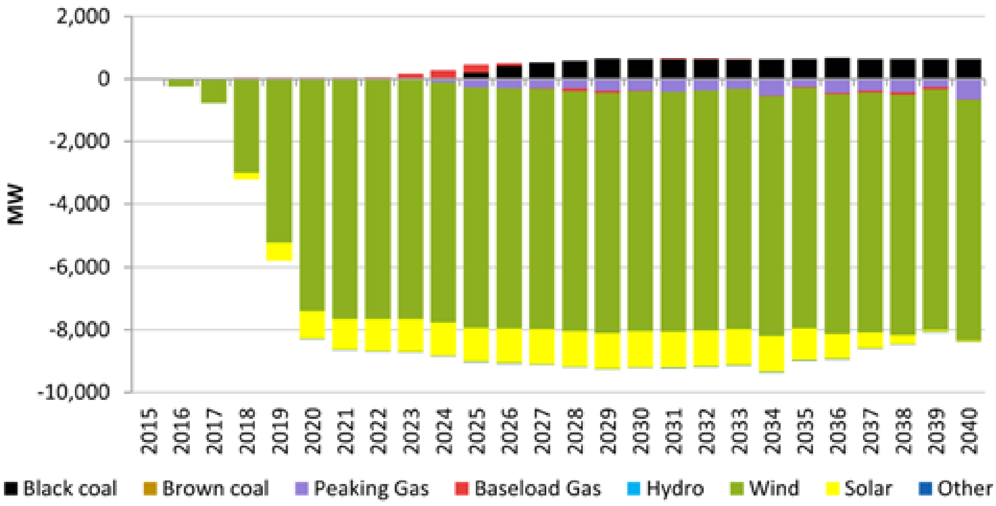
Source: ACIL Allen

As mentioned in Chapter 3, the deployment of additional renewable generation capacity under the RET has the effect of displacing the output of incumbent fossil fuel generators. The ACIL Allen modelling projects that some of the 4,155 MW of currently mothballed coal capacity will come back to service over the next couple of years as a result of the repeal of the carbon tax and lower gas plant utilisation (one gas-fired plant, Swanbank E, is expected to be taken offline in 2014 and replaced with one of the currently mothballed coal-fired plants, Tarong). However, the modelling suggests a further 1,200 MW of black and brown coal-fired generating capacity will be subsequently withdrawn from the market by 2020.

Figure 14 compares the ACIL Allen modelling results for the new generation capacity that would be built if the RET is repealed relative to the current RET scheme. It shows that while almost 9,000 MW of renewable generation capacity is required by 2030 to meet the current RET, only 640 MW of additional new coal capacity in the SWIS and a small amount of new baseload gas capacity would be brought forward in the absence of the scheme. This underlines that the vast majority of the generating capacity that would be brought on by the LRET – predominantly wind farms – is surplus to market needs. Without this additional wind capacity, mothballed existing capacity would return to service sooner as market conditions warrant.

The 2014 *Electricity Statement of Opportunitites* released by AEMO estimates that there is more than 7,500 MW of generation capacity that could be removed from the NEM without disrupting system adequacy.[30]

Figure 14 Change in new installed capacity: 'Repeal' – Reference case, 2015 - 2040

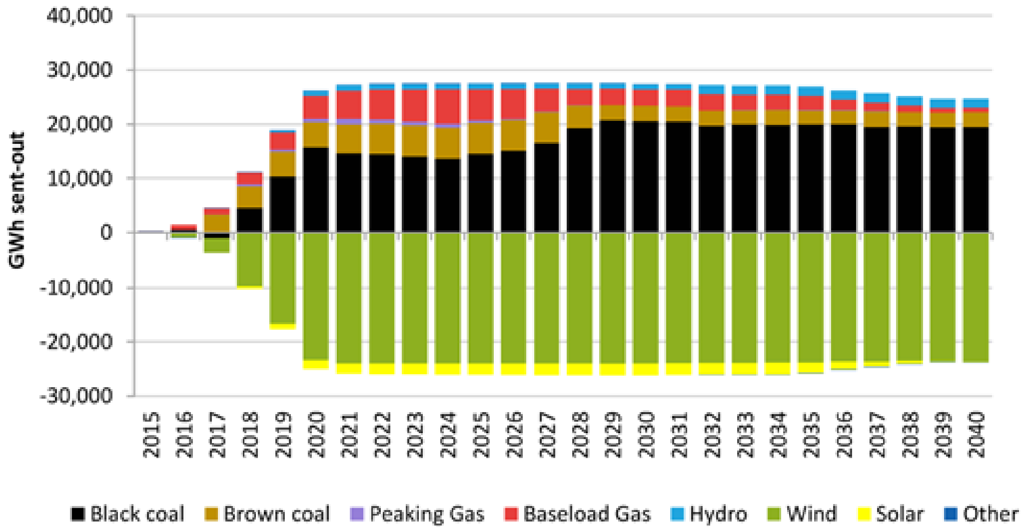


Source: ACIL Allen

The ACIL Allen modelling shows (Figure 15 and Figure 16) that if the RET were to be repealed, the additional wind and solar generation that occurs under the RET would be replaced by coal and a small amount of gas-based generation.

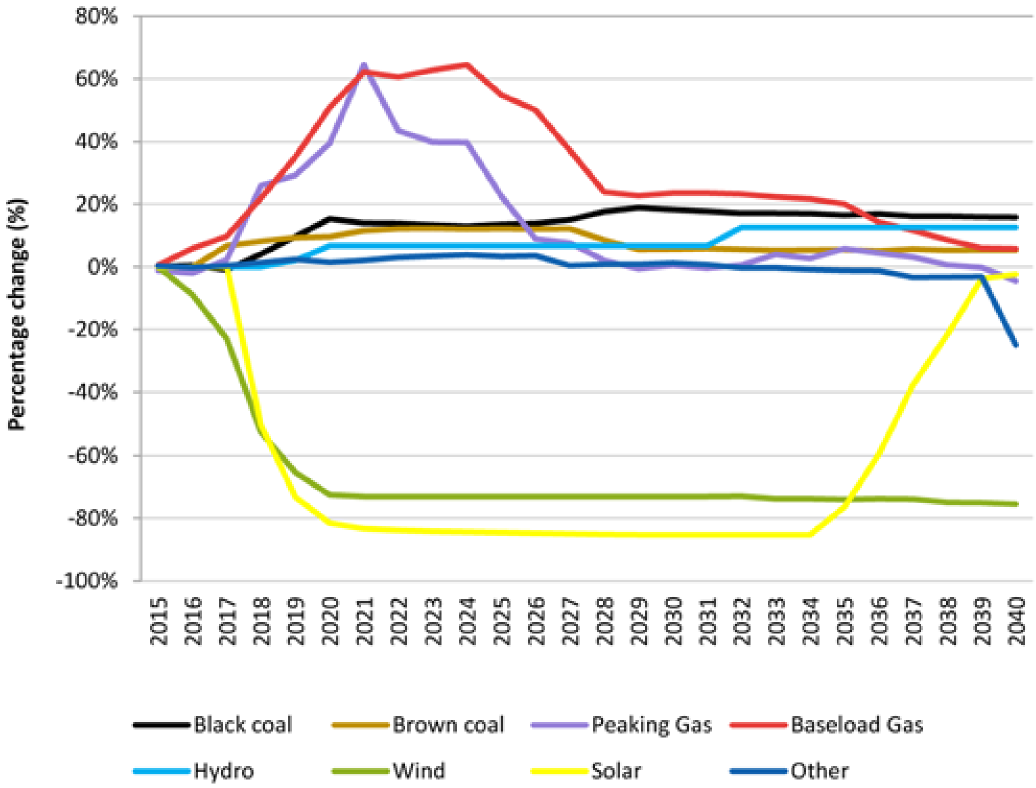
[30] Australian Energy Market Operator, *Electricity Statement of Opportunities for the National Electricity Market*, August 2014.

Figure 15 Change in generation mix: 'Repeal' – Reference case, 2015 - 2040



Source: ACIL Allen

Figure 16 Percentage change in generation mix: 'Repeal' – Reference case, 2015 - 2040



Source: ACIL Allen

5.2 Can the LRET be met?

An important consideration is whether it is feasible that 9,000 MW of new renewable capacity can be built in time to meet the 41,000 GWh generation target by 2020.

Information on the planning and development of large-scale renewable energy projects is contained in BREE's 2013 Electricity Generation Major Projects Database and AEMO's 2014

Electricity Planning Database. The CER has investigated the status of these projects in 2014 and its findings are shown in Table 2. The project pipeline consists of 16,800 MW of wind farm projects and 1,700 MW of large-scale solar projects, and about 6,000 MW of this has planning approval. Given this pipeline, it appears technically possible that sufficient projects could go ahead to reach the target, subject to the resolution of commercial contracts and the availability of finance.

Table 2 Large-scale renewables project pipeline

Project Status	Capacity (MW)
Project Status Monitoring/economic feasibility/waiting for RET Review outcome before conducting approvals	6,850
Undergoing approvals/approvals finished, other issues require solving before financial close	4,750
Has all approvals and will go ahead if financially viable	6,000
Is undergoing construction/will go ahead	900
Total	**18,500**

Source: Information provided by the Clean Energy Regulator to the RET Review Secretariat

A number of stakeholders expressed a view on the likelihood of the current legislated target being met. Some had the view that the industry is on track to meet the current target. For example, Infigen Energy stated:

> *The rate of build of new renewable energy plant is keeping pace with the current target trajectory to date, and there is currently 15,799 MW of proposed wind generation and 639 MW of proposed solar generation projects, of which ~6,000 MW have already received development approval. Therefore there is a sufficiently advanced project development pipeline to meet the current LRET scheme, which would require 6,000 – 8,000 MW of new capacity between now and 2020, subject to the restoration of regulatory certainty. (Infigen Energy, p.15)*

Acciona, a wind farm owner that has a pipeline of large-scale renewable energy projects in Australia, stated in its submission:

> *In addition to those projects already developed, there are around 5,000 MW of capacity that is permitted and ready for construction, in addition to over 10,000 MW of projects in the planning and permitting stage. (Acciona Energy, p.4-5)*

Other stakeholders suggested that the target will not be met on time due to the regulatory uncertainty surrounding the RET, the oversupply of generation capacity and the build rate for renewables. For example, the submission from the Energy Supply Association of Australia, drawing on modelling by Oakley Greenwood, stated:

> *Oakley Greenwood's modelling shows that based on current market environment – low demand, low wholesale prices and an oversupply of generating capacity – the existing RET is unlikely to be met economically. Wholesale prices have become unbalanced because falls in demand have not been matched by falls in supply. Aside from the LRET requiring new entrant plant, existing plant is not exiting in a timely manner, in strong measure due to the significant barriers to exit that exist. (Energy Supply Association of Australia, p.3)*

EnergyAustralia also had the view that the LRET would not be achieved:

> *Deployment of 10,000 MW of new large-scale renewable generation required to achieve the legislated LRET of 41 TWh by 2020 is virtually impossible for two key reasons:*
>
> - *The current 'new build' rate for large-scale renewable generation would need to increase more than 5 fold, from an average of 300 MW per year to about 1500 MW per year — it is important to note that the time required to undertake adequate community consultation for the development of new projects presents a challenge at even the current rate of 'new build'.*
> - *suppressed wholesale electricity market conditions are testing the economics of investment proposals which are highly sensitive to the LRET certificate value, the duration over which certificates can be created and the wholesale price of energy over the life of a project — the combination of an oversupplied wholesale generation market, imminent removal of the carbon price and RET policy uncertainty, make it extremely difficult for the market to finance and deploy substantial volumes of large-scale renewable generation capacity by 2020. (EnergyAustralia, p.4)*

5.3 Resource costs

There is an economic cost associated with building new generation infrastructure that is not necessary to meet demand for electricity. ACIL Allen estimates that new capital expenditure on large-scale generation required under the RET is $15 billion by 2030 in net present value (NPV) terms, and only $2 billion of this would be required if the RET is removed.

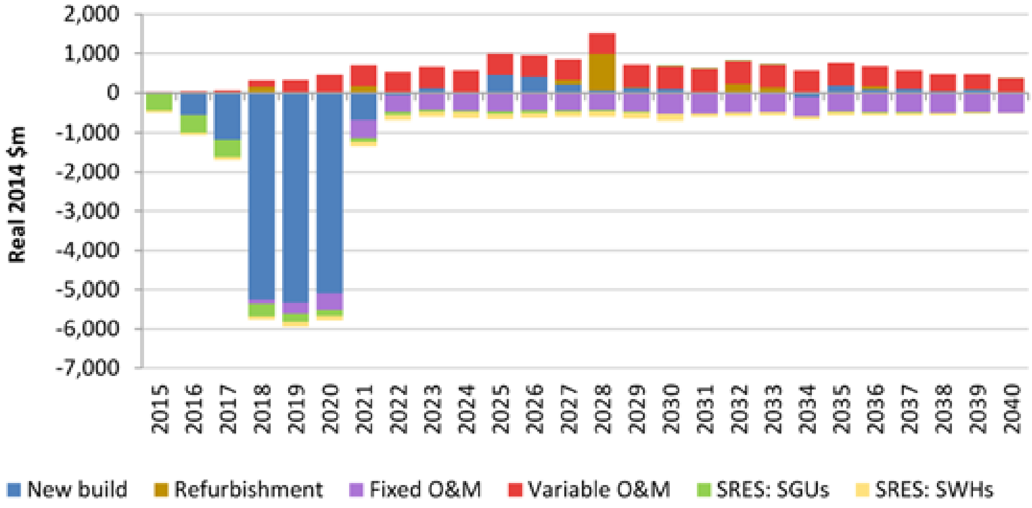
Other modelling reports provided to the review have also estimated the capital costs of the current RET scheme. For example, the modelling undertaken by Deloitte estimates there is a $10.2 billion increase in investment in NPV terms should the RET continue in its current form relative to repeal and modelling by ROAM Consulting for the Clean Energy Council suggests that additional investment of nearly $15 billion in NPV terms would be required under the RET by 2019-20.[31]

ACIL Allen estimates that total resource costs for the generation sector in the reference case total approximately $122 billion in NPV terms over the period to 2040. This includes capital expenditure on large-scale electricity generation, investment in small-scale solar PV and solar water systems, refurbishment of existing new generators and fixed and variable operating costs. The largest component of this cost is new build costs followed by fixed and variable operating costs associated with fuel and maintaining the existing generation fleet Network costs are not included in these estimates.

If the RET were repealed, resource costs for the sector would total approximately $108 billion. Figure 17 shows that additional resource costs of continuing with the current RET scheme (compared to repealing the scheme) are estimated to be around $14 billion in NPV terms.

[31] ROAM Consulting, *RET Policy Analysis*, 2014, p.4.

Figure 17 Change in generation sector resource costs: 'Repeal' – Reference case, 2015 - 2040



Source: ACIL Allen

Submissions also pointed out that the economy-wide cost of the cross-subsidy to renewable generators could be greater than the direct costs to the electricity sector. For example, the Australian Industry Greenhouse Network stated:

> *AIGN's submission highlights the distributional impacts of the RET on industry with a particularly heavy burden borne by the Other Metals sector and other energy intensive sectors. The burden is imposed on a few highly exposed sectors, and is contrary to the general proposition that climate policies should allow for economic growth.*
>
> *Overall, the long run reduction in GDP resulting from the RET is around 0.2 per cent each year (this is the reduction in GDP compared with what it would have been without the RET). This is a large impact for a single policy. The GDP cost needs to be assessed against the claimed benefits of the RET. (Australian Industry Greenhouse Network, p.2-3)*

ACIL Allen estimates that the total cross-subsidy provided to renewable energy through the RET will be in the order of $22 billion over the period 2015 to 2030 in NPV terms, $19 billion of which is associated with large-scale investment. The ACIL Allen modelling did not estimate the economy wide impacts of the RET scheme – the costs that result from investment being diverted to renewables and away from more efficient investment opportunities elsewhere in the economy.

The Government has identified the importance of lifting Australia's productivity performance in raising the living standards of Australians in the longer term.[32] The investment forced by the RET scheme will reduce multi factor productivity (MFP) in the electricity sector as more capital is unnecessarily deployed for no increase in output. The Productivity Commission noted recently that:

> *To the extent that demand growth can be met without the need for new investments in capacity, this should provide positive impetus for measured MFP growth in the electricity sector. (Productivity Commission, p.15)[33]*

[32] Commonwealth of Australia, *Budget Paper No. 1, Statement 4: Sustaining strong growth in living standards.*
[33] Productivity Commission, *PC Productivity Update*, April 2014, p15.

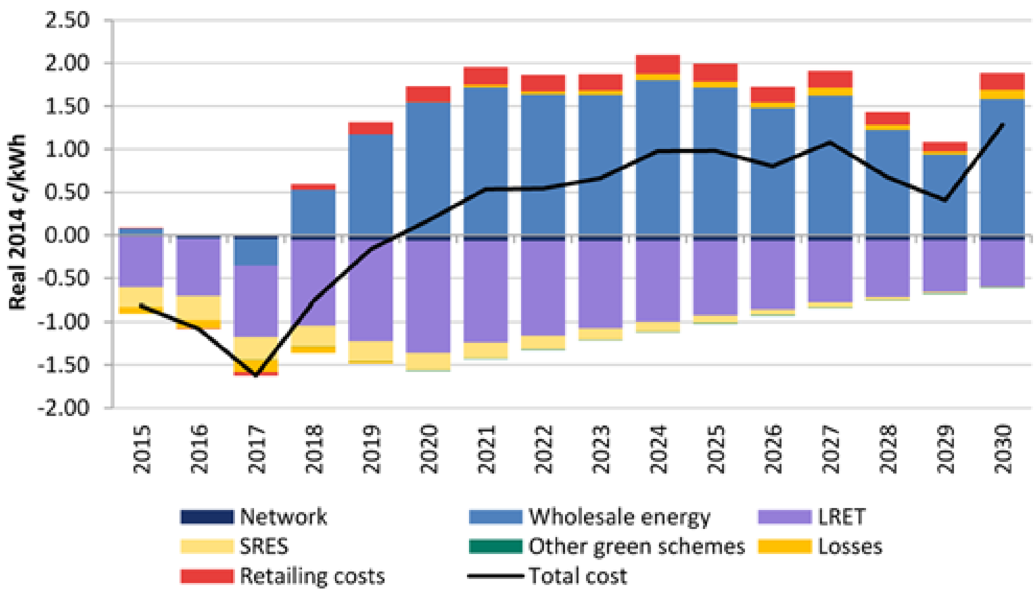
An indication of the consequences of lower productivity and the longer term cost to living standards comes from modelling by Deloitte that suggests that the distortionary effects of subsidising higher cost renewable technologies will reduce cumulative real Gross National Product (GNP) in NPV terms by around $33 billion to 2030.[34]

5.4 Electricity prices

The ACIL Allen modelling results indicate that under the current RET scheme, wholesale electricity prices would fall slightly over the period 2015 to 2020 due to significant amounts of new wind capacity entering the market. Wholesale electricity prices then rise slowly from 2025 onwards, as demand growth begins to absorb the excess generation capacity. Lower wholesale prices outweigh the direct cost of certificates over the period 2020 to 2030, meaning that retail electricity prices over this period are lower with the RET in place.

However, the cumulative impact of the RET on household bills over time appears to be small. The ACIL Allen modelling shows (Figure 18) that repealing the RET would lead to a small increase in electricity prices over the period 2020 to 2030, but prices would remain within 1.5 per cent of current levels. The NPV of the cost of the RET to households is estimated to be $247 over the period 2015 to 2020 and one dollar over the period 2015 to 2030 (Figure 19).

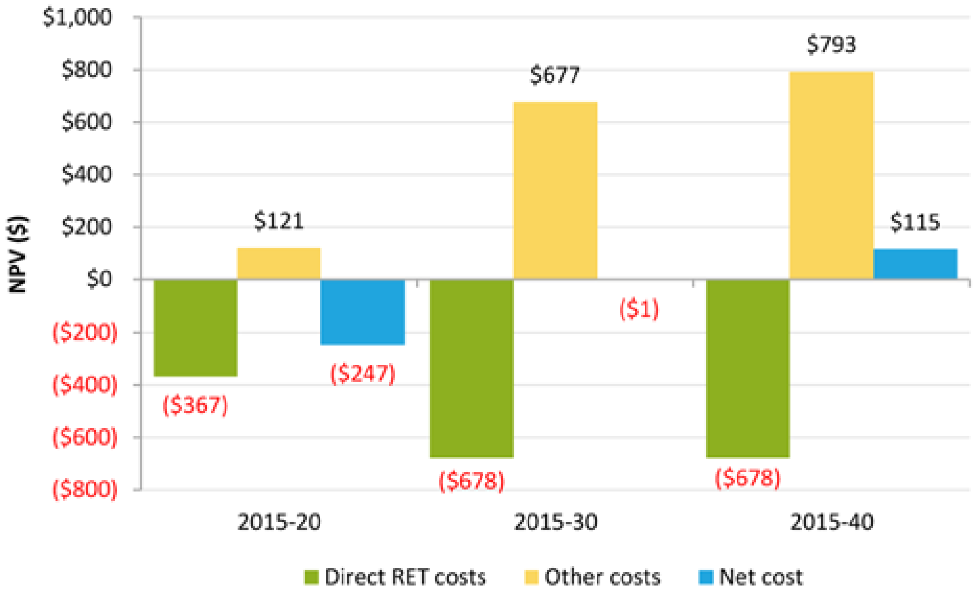
Figure 18 Change in annual residential retail electricity prices: 'Repeal' – Reference, 2014 - 2030



Source: ACIL Allen

[34] Deloitte, *Assessing the impact of the Renewable Energy Target scheme*, July 2014, p25.

Figure 19 NPV of change in residential retail bills: 'Repeal' – Reference case, 2015 - 2040



Source: ACIL Allen

Other modelling exercises present varying results for the net impact of the RET on retail electricity prices.

Similar to the ACIL Allen modelling, modelling undertaken by ROAM Consulting, Bloomberg New Energy Finance and Schneider Electric show that repealing the RET would result in lower retail electricity prices initially, but higher retail prices in the medium term due to a rise in wholesale electricity prices.

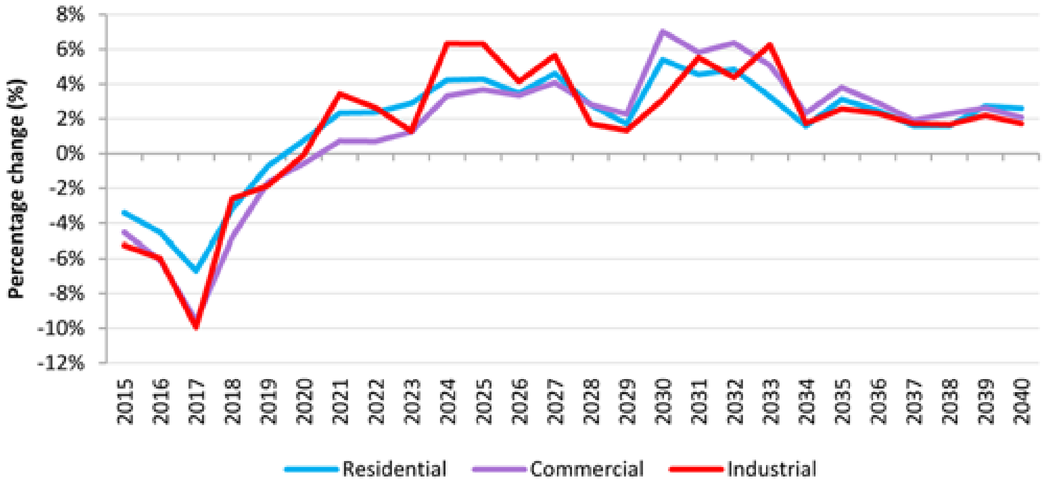
Modelling by Deloitte indicates that retail electricity prices will remain lower if the RET is repealed, on average by $50 per year from 2014 to 2020 as the savings in certificate costs are greater than the increase in wholesale prices.[35] Modelling by Frontier Economics for the AEMC found that the RET will increase retail prices in the period to 2020, but from the mid-2020s the impact of the RET on electricity prices is uncertain.

For businesses, the ACIL Allen modelling shows that as a share of retail electricity costs, direct RET costs will peak in 2020 at nine per cent for commercial consumers and 11 per cent for non EITE industrial consumers. ACIL Allen's modelling indicates the cost impact of the RET for commercial and industrial businesses declines after 2020 due to lower wholesale prices and lower LGC prices.

Figure 20 shows the ACIL Allen modelling results for the change in retail electricity prices for different consumers when the RET is removed.

[35] Deloitte, *Assessing the impact of the Renewable Energy Target scheme*, July 2014, p.19.

Figure 20 Change in average retail electricity prices: 'Repeal' – Reference case, 2015 - 2040

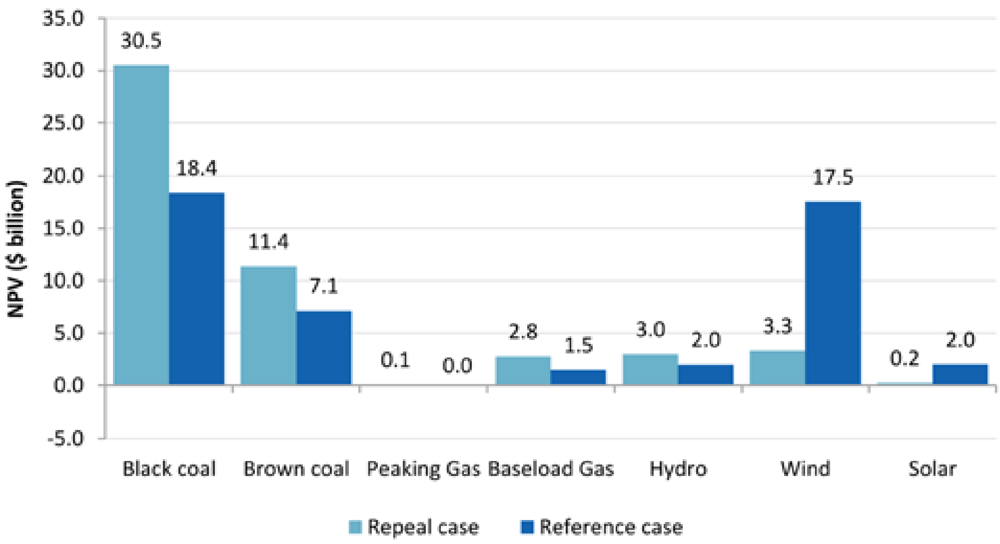


Source: ACIL Allen

In contrast to the ACIL Allen modelling results, the Deloitte modelling concluded that electricity prices for businesses would be marginally higher under the current RET and this would flow through to other sectors of the economy, having a dampening effect on economic activity.

The ACIL Allen modelling indicates that the suppression of wholesale prices will come at the expense of revenues of incumbent generators. Figure 21 shows the net revenue of generators under the current RET policy compared with having no RET in place, including revenue from the sale of wholesale electricity and certificates.

Figure 21 Revenue to generators: 'Repeal' and Reference case, 2015 - 2040



Source: ACIL Allen

Some submissions questioned the extent to which incumbent capacity will respond to demand signals. In theory, incumbent plant will only continue operating while wholesale electricity prices cover variable operating and maintenance (O&M) costs. However, a number of stakeholders suggested that incumbent fossil fuel generators may have an incentive to keep operating even when O&M costs are not covered in the short-run. If a generator could stay in operation and avoid being the first to exit, it may benefit from the departure of a competitor, as this would tighten the supply-demand balance in the electricity market and raise wholesale prices for the remaining generators. Other factors, such as contractual arrangements and the prospect of large site remediation costs may also lead to deferred exit from the market.

There is a risk that lower profits flowing to incumbent generators could lead to less investment in existing power stations, including maintenance expenditure, and could result in lower reliability of supply from these generators over time. Some submissions noted that subdued wholesale prices distorted investment signals away from meeting demand efficiently when needed. For example, the submission from the AEMC stated:

> *In the NEM, the efficacy of the price signal is critical to market participants making efficient decisions. This is because short term dispatch and long term investment decisions are driven primarily by wholesale market prices or derivative prices in the contract market. If prices are influenced by external factors unrelated to supply and demand (e.g. subsidies that favour specific technologies), this can result in an inefficient mix of generation being dispatched. Over the longer term, it can result in an inefficient level of investment in capacity, increasing costs for consumers. (AEMC, p.8)*

The extent to which renewable energy deployed under the RET can reduce wholesale electricity prices in the long-run is unclear. When new capacity (either thermal generation or unsubsidised renewable generation) is eventually required in the market, wholesale electricity prices should rise to equal the long-run marginal cost of the new entrant. This was noted in submissions that argued that while the RET may depress wholesale prices, it still represents a cross-subsidy paid by incumbent generators and cannot be efficient in the long-run. For example, a Principal Economics report provided by the Minerals Council of Australia argued that:

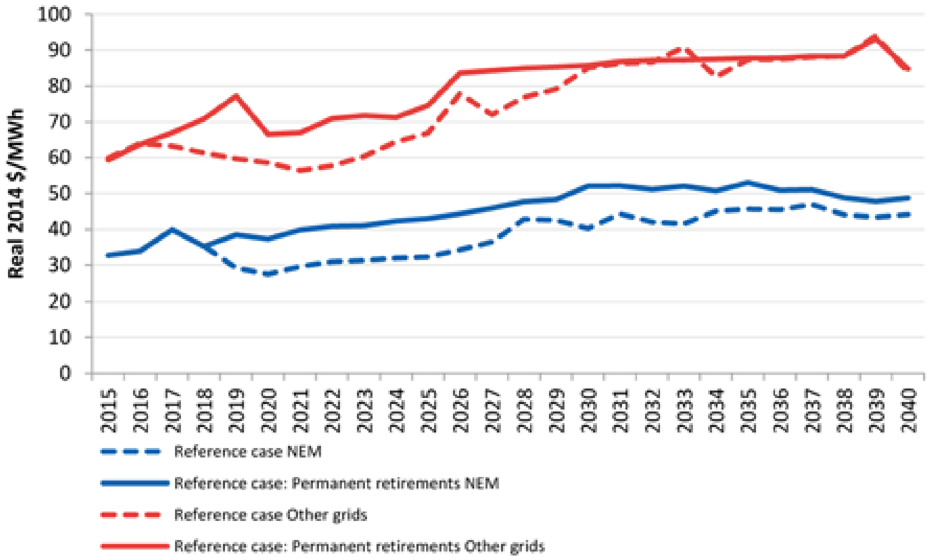
> *In the NEM, the LRET has had the effect of depressing wholesale prices and reducing the revenues of existing thermal generators. Falling wholesale prices tend to offset some of the cost burden of the RET on consumers, but this outcome cannot be considered a 'benefit'. Artificially depressed prices have effectively stranded a share of thermal capacity, which is progressively being withdrawn from the market. Any wholesale price reductions observed to date are therefore likely to be short-lived. Longer-term, a policy such as the RET that reduces wholesale prices undermines investment in thermal capacity that is essential to maintaining reliable electricity supply. (Minerals Council of Australia, p.2)*

In modelling the reference case, ACIL Allen has assumed that incumbent fossil fuel power stations will withdraw from the market temporarily as additional renewable capacity is deployed, to ensure that all remaining plants are operating on a commercial basis. As market conditions improve over time, this capacity is returned to service. ACIL Allen also modelled a sensitivity where the supressed profitability of incumbent fossil fuel generators led to around 2,400 MW of capacity being withdrawn over the period 2017 to 2021 and not being returned to service over the remainder of the modelling period.

The results for the sensitivity show that if generation plant retires permanently, continuation of the current RET scheme would lead to higher retail electricity prices. In the reference case, the RET has the effect of supressing wholesale electricity prices due to an over-supply of generation capacity in the market. If plant is retired permanently, the modelling suggests this wholesale price suppression would not occur and wholesale electricity prices would be well above the price estimated for the reference case (Figure 22).

Permanent retirement of fossil fuel plant would increase the NPV of household electricity bills by $584 over the period 2014 to 2030 compared with the reference case.

Figure 22 Wholesale electricity prices: 'Permanent retirement sensitivity' and Reference case, 2015 - 2040

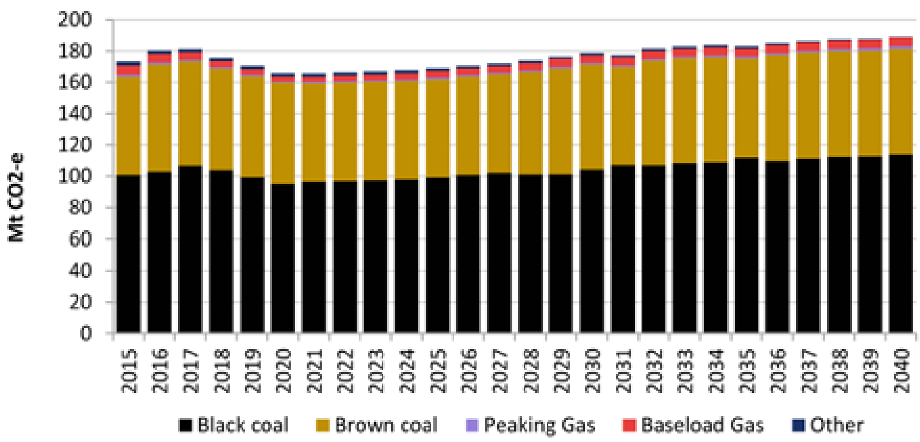


Source: ACIL Allen

5.5 Carbon dioxide emissions

Figure 23 shows ACIL Allen's modelling results for annual CO_2-e emissions from the electricity sector to 2040 under the RET. Annual CO_2-e emissions increase in the short term with the withdrawal of the carbon tax and decreased output from east coast gas-fired generation (largely a result of increasing wholesale gas prices), before declining out to 2020 as a result of renewable energy development. Emissions increase thereafter as more fossil fuel generation is deployed.

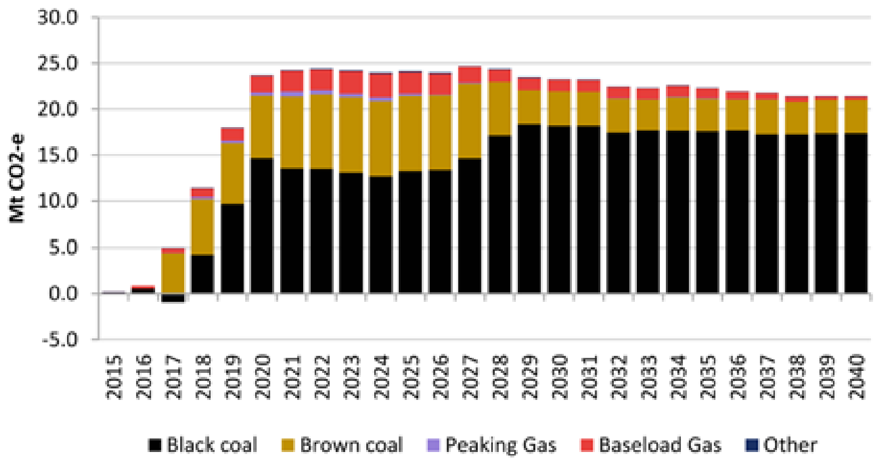
Figure 23 Annual CO_2-e emissions from the electricity sector: Reference case, 2015 - 2040



Emissions for the generation sector only. Excludes non-scheduled generation in NEM regions and own-generation generation in the SWIS and off-grid generation. Source: ACIL Allen

Figure 24 shows the ACIL Allen modelling results of the impact of repealing the RET on annual CO_2-e emissions. Repealing the RET is estimated to lead to an increase in annual emissions of about 24 Mt CO_2-e from 2020 to 2030. Cumulative emissions would increase by 58 Mt CO_2-e over the period 2015 to 2020 and by 299 Mt CO_2-e over the period 2015 to 2030.

Figure 24 Increase in annual emissions from repealing the RET: 'Repeal' – Reference case, 2015 - 2040



Average emissions for modelled grids. Excludes non-scheduled generation in NEM regions, own-generation in the SWIS and off-grid generation. Source: ACIL Allen

A number of other modelling exercises have produced comparable results. Bloomberg New Energy Finance estimates that removing the RET would increase cumulative emissions from the power sector by 57.3 Mt CO_2-e over the period 2015 to 2020 and 259 Mt CO_2-e over the period 2015 to 2030.[36] Modelling by ROAM Consulting for the Clean Energy Council found that cumulative emissions would be 34.7 Mt CO_2-e higher by 2019-20 if the RET is repealed[37] and modelling by Schneider Electric suggests that removing the LRET would increase cumulative emissions in the National Electricity Market by around 50 Mt CO_2-e by 2020 and by 260 Mt CO_2-e by 2030.[38]

CO_2-e emissions from the electricity sector have declined significantly from 2009 to the present. A number of factors contributed to this decline, including one off supply events such as milder weather conditions, the Queensland floods and the closure and/or reduced production from energy-intensive activities. Longer term trends also contributed to the decline in emissions including reduced absolute demand for electricity, uptake of renewable generation (both large and small-scale) and lower growth in economic activity.

Projections for CO_2-e emissions from the electricity sector are also lower than in the past. CO_2-e emissions are forecast to rise slightly over the medium term to 2020 before growing steadily from 2020 to 2030 attributed to growth in demand from LNG facilities and increased generation from black coal capacity.[39] The reduction in CO_2-e emissions from the electricity sector and the lower projected growth means that a smaller contribution is required from the RET in order to achieve CO_2-e emissions reductions in the sector.

[36] Bloomberg New Energy Finance, *Modelling Options for Australia's RET Review*, May 2014, p.14.
[37] ROAM Consulting, *Report to Clean Energy Council*, *RET Policy Analysis*, April 2014, p.44.
[38] Schneider Electric, *Australia's Large-scale Renewable Energy target: Three Consumer Benefits*, April 2014, p.8.
[39] Commonwealth of Australia (2013), *Australia's Abatement Task and 2013 Emissions Projections*.

5.6 Cost of abatement

The cost of abatement is an estimate of the cost of a policy measure in reducing CO_2-e emissions, expressed in dollars per tonne of abatement. It is a tool that enables an assessment of the relative cost-effectiveness of different emissions reduction policies. As a key objective of the RET is to lower CO_2-e emissions in the electricity sector, the cost of abatement of the RET is an important consideration when assessing the merits of the scheme.

Two methodologies were used by ACIL Allen to calculate the cost of abatement from the RET. Both used the present value of the change in resource costs[40] (the numerator), while one method applied a discount factor to the change in emissions (the denominator). In addition to the choice of methodology, the cost of abatement estimate depends on modelling assumptions, particularly capital costs.

ACIL Allen's estimates for the cost of abatement of the RET are summarised in Table 3. The cost of abatement of the current RET policy is estimated to be $35 to $68 per tonne over the period 2014 to 2030, with the SRES being higher than the LRET at $95 to $175 per tonne in comparison with $32 to $62 per tonne to 2030.

Table 3 ACIL Allen estimates of the cost of abatement of the RET ($/t CO_2-e)

	2014 to 2030			2014 to 2040		
	RET	LRET	SRES	RET	LRET	SRES
Undiscounted	35	32	95	25	22	79
Discounted	68	62	175	62	56	185

Similar cost of abatement estimates have recently been made elsewhere. Modelling by Frontier Economics estimates that the cost of abatement from the RET is between $55 and $65 per tonne.[41] Modelling by Deloitte estimates the cost of abatement (based on LGC costs alone) of the RET to be $72 per tonne in 2020, increasing to $82 per tonne in 2030.[42]

These estimates of the cost of abatement can be compared with estimates from other CO_2-e emission reduction measures. ClimateWorks has used bottom-up modelling to develop a CO_2-e emissions reduction cost curve that estimates the size and cost of CO_2-e emissions reduction opportunities across Australia for the year 2020.[43] This analysis helps to identify the scope for potential CO_2-e emissions reductions that could result if various actions were implemented across the economy. The analysis indicates that there are many measures offering abatement at lower cost compared with the RET, such as energy efficiency improvements and pasture and grassland management measures.

[40] Described in Section 5.3
[41] Frontier Economics, *RET Review Analysis*, June 2014, p.32.
[42] Deloitte Access Economics, *Assessing the impact of the renewable energy target scheme*, July 2014, p.20.
[43] ClimateWorks, *Low Carbon Growth Plan (2011 update)*, 2011.

5.7 Findings: Continuation of the current RET scheme

Technically, there is a sufficient pipeline of renewable energy projects for the 41,000 GWh LRET to be met in 2020, subject to the resolution of commercial contracts and the availability of finance. However, the increasing targets to 2020 necessitate a significantly higher build rate of renewable energy power stations than has been required to date.

Under current settings, assuming the 41,000 GWh target is met the RET could deliver a renewable energy share of around 26 per cent in 2020, with the RET resulting in an additional 9,000 MW of new large-scale renewable generation capacity, entailing capital expenditure of around $15 billion in NPV terms.

In the absence of the RET, over the period to 2030 none of this investment in large-scale renewable generation is likely to be needed and only a very small amount of fossil-fuel capacity would be likely to be built. This highlights that the additional investment in generation capacity to 2020 resulting from the RET is not required to meet electricity demand, based on current projections.

Generation from small-scale solar PV is expected to roughly treble by 2030, despite support under the SRES gradually phasing out over this period. With the SRES in place, the installation of solar water heaters continues at a steady pace.

The RET as currently legislated would deliver a cross-subsidy, as measured by the value of renewable energy certificates created under the LRET and SRES, to the renewable energy sector of around $22 billion in NPV terms from 2015 to 2030.

With the RET in place, modelling shows that retail electricity prices could be expected to be higher to 2020 but lower thereafter. Over the period to 2030, these outcomes balance each other out such that households pay almost the same with or without the RET. However, these results are sensitive to the response of incumbent generators. If incumbent generators shut down permanently, rather than temporarily, the additional renewable generation capacity deployed as a result of the RET would lead to increased retail electricity prices.

The RET is estimated to deliver cumulative emissions reductions of around 58 Mt CO_2-e from 2015 to 2020, compared with there being no RET in place. Modelling for the review provides estimates of the cost of abatement of the RET in a range from $35 to $68 Mt CO_2-e over the period 2014 to 2030.

5.8 Conclusion

To meet its five per cent CO_2-e emissions reduction goal, the Government's projections indicate that Australia needs to reduce its cumulative emissions by 421 Mt CO_2-e in the period to 2020, including by 131 Mt CO_2-e in 2020. The CO_2-e emissions reduction task has fallen over recent years due to declining industrial activity, reduced demand for electricity and a carry-over of surplus emissions units from exceeding the target in the first commitment period of the Kyoto Protocol (2008 to 2012). It could fall further if industrial activity or electricity demand more generally, continues to decline. Nonetheless, Australia will need to lower its CO_2-e emissions below current levels to meet the target.

In 2012, electricity generation contributed just over one-third of Australia's CO_2-e emissions. Emissions from this sector have been declining, in part due to declining demand for electricity but also as a result of government policies including the RET, solar PV feed-in-tariffs and energy efficiency measures. However, access to cheap and reliable power (historically, predominately provided by coal) helps to underpin Australia's economic growth and Australia needs to balance its emissions reduction efforts with the need to maintain this source of competitive advantage.

To the extent that policies are required to meet Australia's five per cent CO_2-e emissions reduction target and longer term goals, a policy targeted directly at CO_2-e emissions reduction would be more efficient than a policy such as the RET that may promote renewable generation ahead of other lower cost abatement opportunities in other areas of the economy. The Government has repealed the carbon tax and is adopting the ERF as the primary mechanism for meeting the 2020 target.

Most recent modelling exercises suggest that the RET is exerting some downward pressure on wholesale electricity prices, largely because the RET is increasing the supply of electricity when electricity demand has been falling. There is some uncertainty over these results in the long term, and the ACIL Allen modelling showed that different assumptions around the permanent withdrawal of fossil fuel plant from the market could lead to different wholesale electricity price outcomes. Nonetheless, all of these studies indicate that the net impact of the RET on retail electricity prices, whether positive or negative, is relatively small.

The Panel considers that the RET is providing an incentive for investment in renewable generation that is not required to meet demand for electricity and is not viable without the cross-subsidy from the RET. This subsidy is substantial, in the order of $22 billion from 2015 to 2030 in NPV terms, and is funded by a wealth transfer from incumbent generators, electricity retailers and consumers.

The Panel considers that the significant changes that have occurred, and will continue to occur, in the Australian economy since the expanded RET scheme was put in place in 2010 will cause the RET to have much greater costs to Australians than was anticipated.

Given the findings of this review, that $13 billion of new large-scale generation capacity built under the RET will not be required in light of lower demand for electricity, and that the benefits of the scheme, in terms of reductions in CO_2-e emissions, come at high cost per tonne, the Panel concludes that significant reform is required.

In deciding the appropriate extent and nature of the reform that is called for, the Panel considers that the clear aim of such reform should be to avoid, or materially reduce, the cost to the community of this cross-subsidy. In doing so, the effects of potential changes and their impacts on different groups need to be understood and weighed, while the effect of the scheme, and changes to it, on the secure and reliable supply of energy services also needs to be considered. It is crucial that reform achieves a better balance between the interests of the renewable energy sector and those of the economy as a whole than the present legislation delivers.

Recommendation 1: The Renewable Energy Target (RET) should be amended in light of the changing circumstances in Australia's main electricity markets and the availability of lower cost emission abatement alternatives.

6 OPTIONS FOR REFORMING THE RET

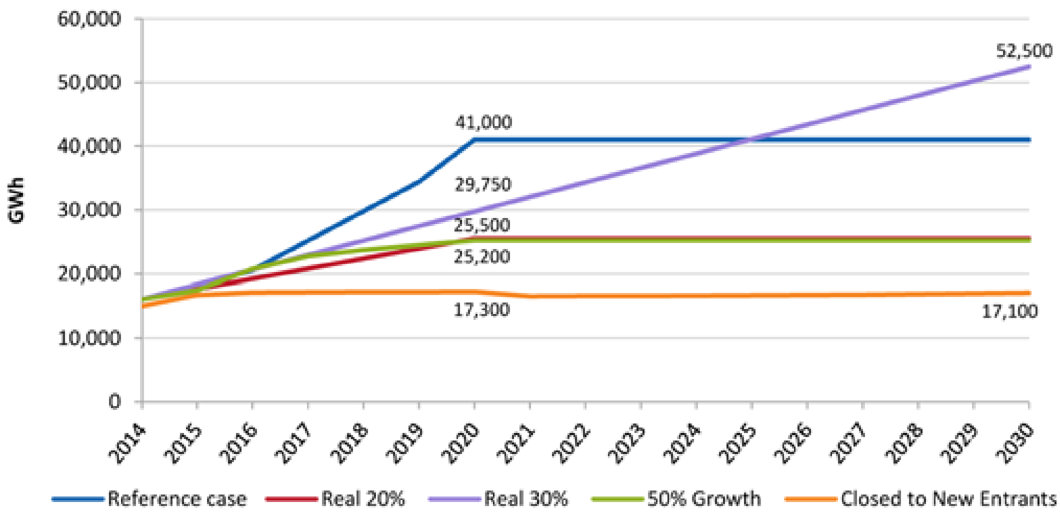
During the course of this review stakeholders advocated potential changes to the RET scheme that broadly fall within the scenarios described earlier in Chapter 4. This chapter examines these five scenarios in turn and sets out the implications of each, as suggested by both the modelling results and stakeholders themselves, in order to assess the ability of each to achieve the significant reform that the Panel has identified is needed. The LRET is addressed in the first part of the chapter and the SRES in the second.

As outlined in Chapter 4, various sensitivities were run against the scenarios to examine how results change with different modelling assumptions. In most cases, the sensitivities did not materially affect modelling outcomes. Instances where a sensitivity makes a material impact on results are noted in the sections that follow. For example, the outcomes of the share of growth scenario are, by design, responsive to changes in electricity demand, and this is discussed in Section 6.1.3.

6.1 Options for reforming the LRET

Figure 25 below shows the profile of targets for large-scale renewable generation under each of the scenarios modelled (noting that under the 'repeal' scenario there would be no formal target profile and the same level of generation would result as in closing the RET to new entrants).

Figure 25 Target profiles for LRET options, 2014 - 2030



Source: ACIL Allen

6.1.1 Extending the LRET to a 'real 30 per cent'

Some environmental groups, community groups and individuals expressed support for ambitious and increasing renewable targets that would achieve a greater share of renewables beyond 2020 than the current RET scheme. For example, 350.org submitted:

> *We believe that it would be appropriate to raise the LRET in a steady, predictable way, and to continue to raise it until renewable energy represents the overwhelming majority of Australia's energy requirements… We suggest that the Australian target be based on a similar objective, with appropriate intermediate targets, such as 35 per cent by 2030 and 45 per cent by 2040. (350.org, p.4)*

Alternatively, some stakeholders suggested reducing the 2020 LRET, but continuing to increase it beyond 2020 as a means of providing long-term support for renewables, while reducing the current impacts of the RET on the electricity market. For example, Snowy Hydro submitted:

> *The current 41,000 GWh target by 2020 is technically feasible. However achieving this may create significant distortions in the energy market due to a combination of low demand and low wholesale energy prices. For this reason, moderating the 2020 target, extending the end date out further beyond 2030, and keeping the total number of LGCs whole may be a more appropriate target and trajectory for the LRET. (Snowy Hydro, p.4)*

In a similar approach, the New South Wales Government supported retaining the 41,000 GWh LRET target, but extending the timeframe to the stage where 41,000 GWh matches 20 per cent of demand:

> *An alternative option then is to keep the existing target, but extend the timeframe for achieving it, until it is consistent with a true 20 per cent level. This would allow a more incremental increase in renewable energy capacity over a period that may be more in line with forecast requirements for new capacity. The timeframe for the target should give consideration to providing industry certainty and a sensible investment period for attracting finance. (New South Wales Government, p.15)*

In a slightly different approach, renewable energy developers, operators and financiers supported the current legislated target of 41,000 GWh by 2020, but proposed retaining the 41,000 GWh target to 2035 or 2040 (rather than 2030) to allow projects to secure PPAs, finance and earn a greater return on investment.

For example Infigen Energy's submission stated:

> *Infigen also submits that maintenance of the present target should also include extension of the requirement to meet the target until at least 2040 because the investment horizons for new generators are at least 20 years. (Infigen Energy, p.28)*

The submission from the Investor Group on Climate Change expressed a similar view:

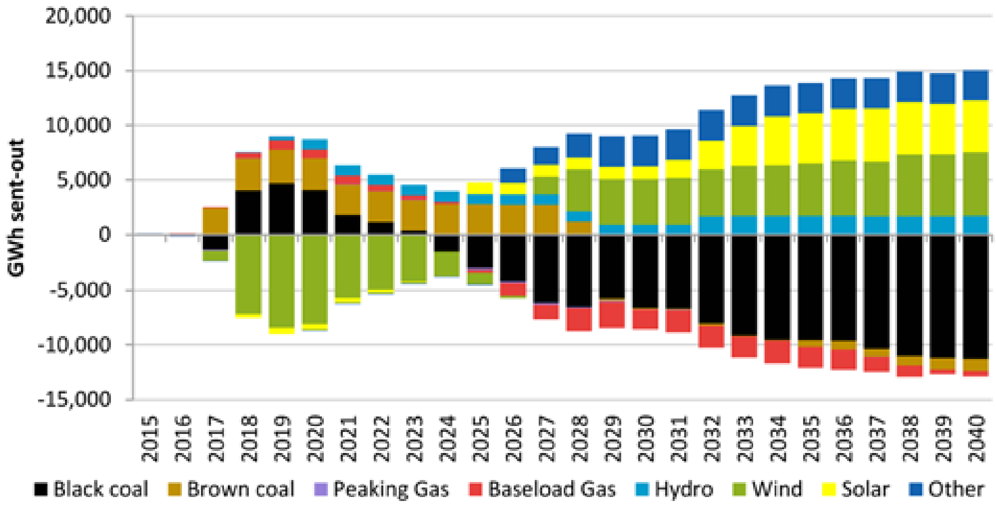
> *To overcome these earnings risks, the Government may consider extending the current flat 41,000 GWh target to 2035. This would improve the economics of current investment opportunities by extending the life of revenue supports for these assets. The effect of such a change would be to improve investor confidence in making generation investments in the short term, leading to an earlier build out of capacity to meet the 2020 target, a smoother project deployment development pipeline and avoidance of bottlenecks in project delivery in the decade. (Investor Group on Climate Change, p.8)*

Generation mix

ACIL Allen modelled a scenario of extending the LRET to achieve a 30 per cent share of generation by 2030 ('real 30 per cent'). Under this scenario, the target profiles were set in a straight line from 2014 to 2030. The modelling shows generation supported by the LRET in 2020 is greater than that achieved in the 'real 20 per cent' scenario discussed in Section 6.1.2. Generation rises to meet the 2030 target.

Figure 26 shows that renewable generation declines between 2014 and 2020 in the 'real 30 per cent' scenario relative to current RET settings. However, from the late 2020s, strong deployment of renewables (mostly wind) leads to an additional 9,000 GWh of renewable generation by 2030. Increased generation from renewables displaces generation from black coal and baseload gas.

Figure 26 Change in generation mix: 'Real 30 per cent' – Reference case, 2015 - 2040



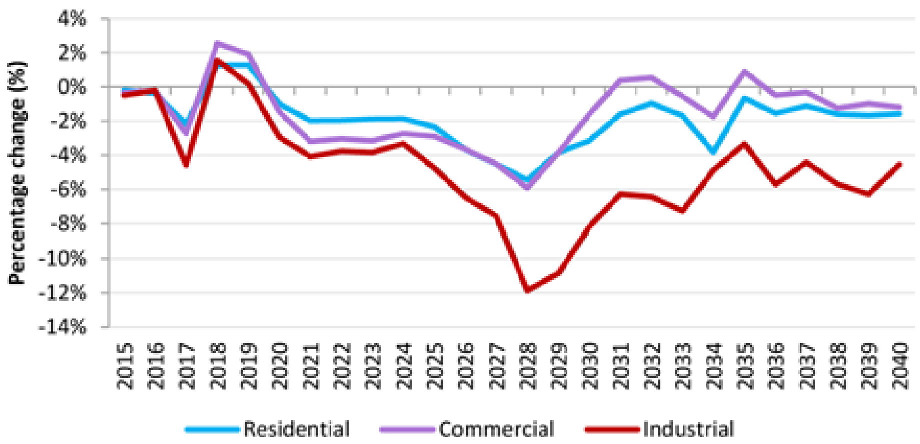
Source: ACIL Allen

Electricity prices

Figure 27 shows the ACIL Allen modelling results of the impact of a 'real 30 per cent' scenario on retail electricity prices compared with the current RET policy. The modelling forecasts average retail prices to fall for the period 2015 to 2040 for all electricity consumers. Average residential and commercial customers will experience similar price reductions of around two per cent while industrial retail prices will fall by an average of five per cent.

The modelling indicates that average cumulative household electricity bills would be $17 lower between 2015 and 2020 in NPV terms. Between 2015 and 2030 the additional renewable generation lowers wholesale electricity prices, resulting in a cumulative saving of $233 in NPV terms for the average household electricity bill over this period.

Figure 27 Change in average retail electricity prices: 'Real 30 per cent' – Reference case, 2015 - 2040



Source: ACIL Allen

The reduction in wholesale electricity prices is in part due to the RET contributing to an oversupply of generation capacity in the market over the period 2015 to 2040. While this may contribute to marginally lower wholesale electricity prices in the short-run, ultimately, renewable generators must recover their long-run marginal costs, which are greater than that of fossil fuel generators. As discussed in Section 5.4, wholesale electricity prices must be high enough in the long-term to allow generators to cover long run marginal costs.

Resource costs

Adjusting the LRET to achieve a 'real 30 per cent' share of generation from renewables would decrease the resource cost to the electricity sector by $1.3 billion in NPV terms from 2015 to 2030 relative to the current RET.

Certificate costs

ACIL Allen estimates that the NPV of cumulative certificate costs for large-scale renewable generation would represent around $6.5 billion between 2015 and 2020 and $15 billion between 2015 and 2030, which is approximately $2 billion and $4 billion lower than continuing with the current policy, respectively. However, as the targets continue to 2040 under this scenario, additional certificate costs would be incurred over the period 2030 to 2040, leading to a total cross-subsidy to renewable generators of $18 billion in NPV terms over the period 2015 to 2040.

CO_2-e emissions[44]

Lower targets from 2015 to 2020 are estimated to result in an increase in cumulative emissions of 28 Mt CO_2-e compared to current settings over this period. However, strong growth in renewables from the mid 2020s leads to higher emissions reductions by 2030 and 2040. Cumulative emissions reductions are estimated to increase by 69 Mt CO_2-e by 2040, compared to the current policy.

[44] Emissions results presented under each scenario arise from the modelled changes to both the LRET and the SRES; the former accounts for almost all of the impact.

6.1.2 Reducing the LRET to a 'real 20 per cent'

This scenario adjusts the targets in line with current projections for electricity demand in 2020 to achieve a 'real 20 per cent' share of generation from renewables. This option is supported by many stakeholders, such as electricity retailers (including EnergyAustralia and Origin Energy), some peak bodies and industry groups (including Major Energy Users, the National Generators Forum, the Energy Supply Association of Australia and the Business Council of Australia). For example, EnergyAustralia's submission stated:

> *In our view recalibration of the RET to equate to the original '20 per cent by 2020' policy commitment is the most balanced approach to addressing the problem for all stakeholder groups. (EnergyAustralia, p.6)*

There are two broad approaches to implementing a 'real 20 per cent' target. The first involves retaining 'fixed' legislated targets in gigawatt hours but recalibrating those annual targets based on current projections of electricity demand, and leaving them at the revised levels for the duration of the scheme. Like the current scheme, the targets would remain flat at the level set for 2020 until 2030. Setting fixed targets provides certainty to the renewable energy industry over the amount of new generation that is required each year. However, if electricity demand in 2020 is higher or lower than currently projected, the share of renewables will not correspond to 20 per cent. If demand is lower than forecast, the additional generation from renewables will exacerbate the existing situation of over-capacity in the electricity market and result in further investment that is not required to meet demand for electricity.

Most stakeholders, particularly in the renewable energy industry, supported retaining fixed gigawatt hour targets in legislation. For example, Snowy Hydro stated:

> *Because demand is difficult to predict and to minimise the risk in having to manage variable targets which could change year on year, we advocate that the LRET should continue to be expressed as a fixed GWh target. (Snowy Hydro, p.5)*

The second approach is to implement 'floating targets' where targets would be regularly updated in line with the most recent projections of electricity demand, ensuring the scheme delivers a 20 per cent share of renewable generation in 2020. Some stakeholders, including the AEMC and the Major Energy Users support this option:

> *The LRET target should be expressed as a percentage of demand, with an indicative percentage target for 2020 and a 'directional' non binding target for 2030 (rather than the capped 41,000 GWh amount to 2030). (Major Energy Users, p.3)*

This approach would result in a degree of uncertainty for the renewable energy industry and liable entities, and there is a risk it may not provide sufficient notice to meet the targets, given the lead time required to build new large-scale projects. Uncertainty over future targets could also mean that retailers purchase higher-cost certificates on the spot market, rather than through PPAs, making it harder for renewable projects to secure finance. However, this approach does provide a mechanism to adjust the targets should market conditions change.

ACIL Allen modelled a 'real 20 per cent' scenario for the Panel. The modelling results apply to both a floating and fixed real 20 per cent target, but actual outcomes would differ between the two approaches if electricity demand outcomes varied from the assumptions used in the modelling.

Generation mix

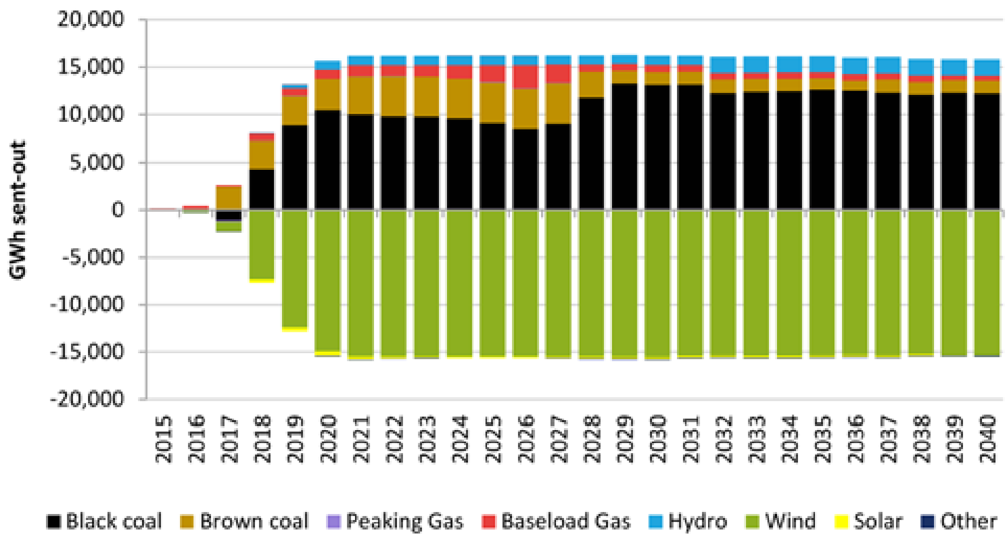
Adjusting the LRET to achieve a 'real 20 per cent' share of generation in 2020 would result in a target of 25,200 GWh of additional large-scale renewable generation in 2020, which is 15,800 GWh lower than the current 41,000 GWh target. A further 2,600 MW of wind capacity and 600 MW of new large-scale solar capacity would be developed by 2020 to meet a 'real 20 per cent' target. The ACIL Allen modelling suggests that, compared to the current policy, the output from wind capacity that would have come online to meet the 41,000 GWh target is offset by increased generation from existing coal fired and baseload gas generators (Figure 28).

Growth in demand is largely met by new wind capacity with some development of large-scale solar in remote grids in the early 2020s. This allows fossil fuel generators to maintain their current level of output (assuming the current demand forecast for 2020 eventuates) and improves the financial position of incumbent fossil fuel generators. In this scenario there is less mothballed fossil fuel capacity than under current settings with some currently mothballed capacity brought back online sooner than would otherwise have been the case.

Some new fossil fuel capacity is projected to enter the market around 2025, mostly baseload and peaking gas generation with a small amount of new coal capacity being developed in the SWIS.

ACIL Allen estimates that a further $6 billion would be invested in the sector to 2030 (in NPV terms) to meet the lower target, about $8 billion less than under current settings. A majority of the decline in expenditure relates to reduced investment in wind capacity.

Figure 28 Change in generation mix: 'Real 20 per cent' – Reference case, 2015 - 2040



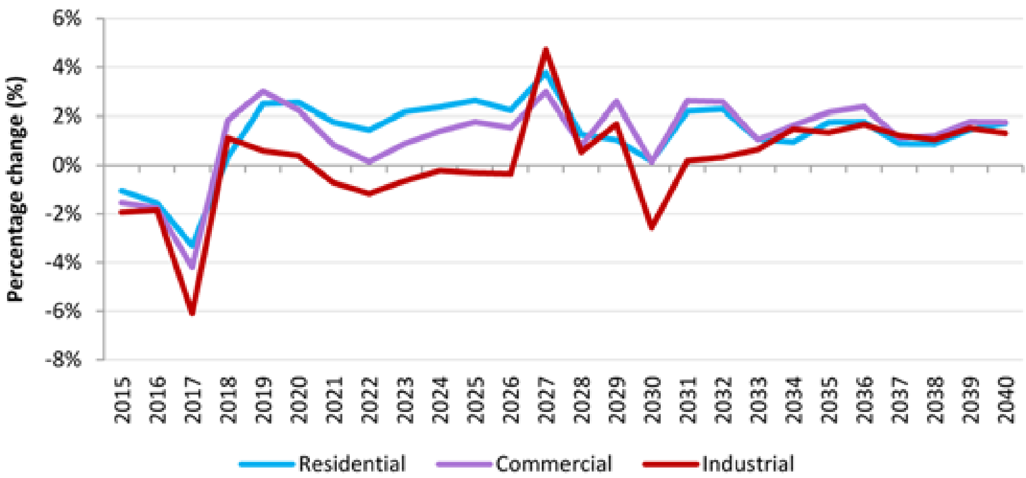
Source: ACIL Allen

Electricity prices

Figure 29 illustrates ACIL Allen's modelled retail electricity prices in a 'real 20 per cent' scenario compared to the current policy. The modelling estimates that reducing the target to a 'real 20 per cent' will initially result in lower retail electricity prices as the cost of purchasing LGCs and STCs is reduced and wholesale prices remain low due to excess capacity in the market. The modelling forecasts average retail prices to remain fairly constant out to 2040 for all electricity consumers. Industrial customers could expect no change in retail prices, whilst residential and commercial customers could expect an increase in retail price of around one per cent.

Average cumulative household electricity bills would be $24 lower between 2015 and 2020 in NPV terms. By 2020, these initial savings would be outweighed by a subsequent rise in wholesale electricity prices due to less renewable generation in the market compared to the reference case. The cumulative increase in average household bills from 2015 to 2030 would be $118 in NPV terms.

Figure 29 Change in average retail electricity prices: 'Real 20 per cent' – Reference case, 2015 - 2040



Source: ACIL Allen

Modelling by Frontier Economics for the AEMC also suggests that a lower target will result in lower retail electricity prices in the short-term, but this reverses between 2020 and 2025 as a rise in wholesale prices offsets the savings from reducing the target. The Deloitte modelling provides different electricity price outcomes. It projects retail electricity prices to remain lower over the period to 2030 if the target is reduced to a 'real 20 per cent' as the increase in wholesale prices is outweighed by the reduction in costs associated with purchasing certificates.

Resource costs

Adjusting the LRET to achieve a 'real 20 per cent' share of generation from renewables would reduce the NPV of resource costs associated with large-scale electricity generation by around $6.5 billion by 2030, compared with the current policy.

Certificate costs

The total cross-subsidy provided to large-scale renewable generation would be around $5 billion over the period 2015 to 2020 and $11 billion over the period 2015 to 2030 (in NPV terms), which is approximately $3.5 billion and $8.5 billion lower than continuing with the current policy, respectively.

CO_2-e emissions

If the target is reduced to a 'real 20 per cent', the ACIL Allen modelling estimates that cumulative emissions would be higher by 39 Mt CO_2-e over the period 2015 to 2020, and 190 Mt CO_2-e over the period 2015 to 2030, compared with the current policy.

6.1.3 Target representing a '50 per cent share of new growth' in electricity demand

If the forecasts of electricity demand adopted by ACIL Allen for this review eventuate, adjusting the target to a 'real 20 per cent' would result in generation from renewables increasing by roughly 10,000 GWh by 2020 over current levels, which is equal to around a 50 per cent share of growth in electricity demand over the period. However, there are risks that this demand forecast will not eventuate. ACIL Allen modelled a 'low electricity demand' sensitivity where demand remains roughly constant between now and 2020. In this situation, a 'real 20 per cent' target would lead to the deployment of renewable generation capacity that is not required, adding costs to the economy and reducing the output of incumbent generators. A fixed gigawatt hour target effectively shields renewable generators from fluctuations in demand (as they can be certain of receiving revenue from the sale of certificates), leaving incumbent fossil fuel generators exposed to most of the risk.

A 'floating' real 20 per cent target was discussed in Section 6.1.2 as a means of providing flexibility in the target. This provides some protection against low demand outcomes, but a risk remains that meeting a 20 per cent target would lead to additional surplus generation capacity if electricity demand is flat or falling.

Another scenario considered by the Panel for addressing the problem of uncertain demand forecasts, is to adopt an approach whereby targets are set annually by the CER that correspond to the previous year's target plus a share of expected growth in national electricity demand over the next year (for example, 50 per cent). If demand is forecast to decline, the target would be maintained at the previous year's level and would only increase when demand is forecast to exceed its previous highest level. The submission from the Australian Industry Greenhouse Network suggested such an approach could be considered:

> *Under this option, expected future demand growth would be explicitly considered in determining expansion in the RET target. If demand growth is expected to be low, then expansion would be low or zero. Where demand growth is expected to be higher, the target could be increased. The practical upshot of this is that there would likely be no expansion of the target in the near term, but it would remain an option over the longer term. (Australian Industry Greenhouse Network, p.14)*

This option links the RET to market needs as it would only support the deployment of additional renewable generation capacity when electricity demand is growing. It also means that renewable investors are subject to more of the risk of uncertain demand outcomes that investors in fossil fuel generators face.

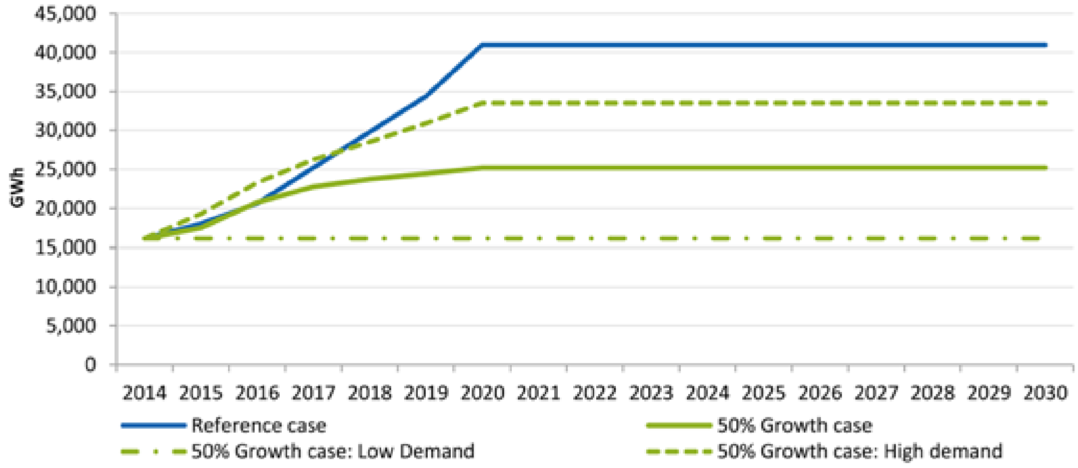
Under the share of growth option, targets would not be mandated for future years. Uncertainty over future targets could make finance harder and more expensive for renewable energy developers to secure, potentially increasing the price of certificates and the overall compliance costs of the scheme. This risk could be partially mitigated by the CER publishing indicative, non-binding targets for future years similar to current practice under the SRES.

Implementation of this option would need to consider approaches for calculating targets and whether additional mechanisms would be required to ensure a stable certificate price in situations of flat or declining demand and hence where there is no growth in the target. These issues are further discussed in Chapter 10.

Generation mix

Based on ACIL Allen's central assumptions for electricity demand, a target that represents a 50 per cent of growth in demand over the period to 2020 would result in a similar level of renewable generation in 2020 to a 'real 20 per cent' scenario with approximately 10,000 GWh of new large-scale renewable generation entering the market. However, the total amount of renewable generation and the percentage share of renewable generation will depend on actual electricity demand each year. Figure 30 shows the profile of renewable generation that would be achieved under high, low and central demand assumptions in the ACIL Allen modelling.

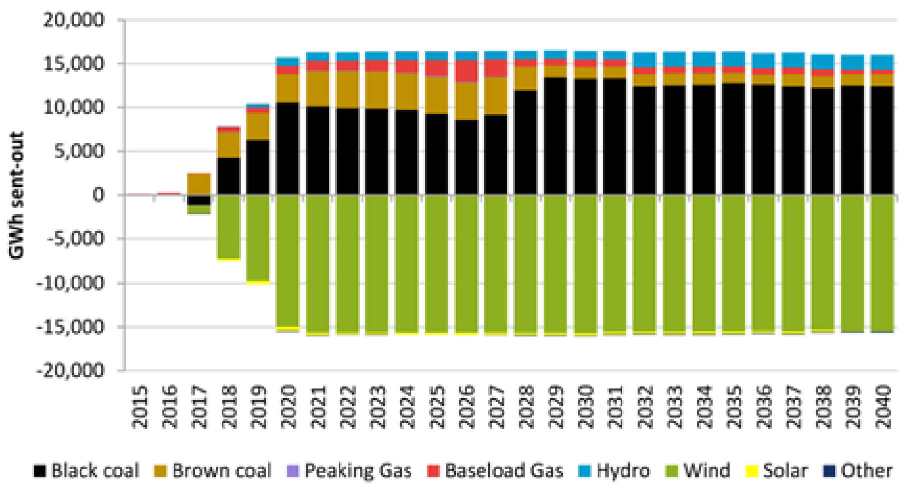
Figure 30 LRET Target profiles: '50 per cent share of new growth', 2014 - 2030



Source: ACIL Allen

Based on the central forecast for electricity demand, the ACIL Allen modelling suggests that scheduled and semi-scheduled wind capacity would more than double on electricity grids from around 2,370 MW in 2014 to 5,400 MW in 2020. This is around 4,900 MW less than modelled under the current policy. The reduction in renewable generation compared to the current target is offset by increased generation from existing coal and baseload gas generators (Figure 31). Fossil fuel generators maintain their current level of output, improving the financial position of incumbent fossil fuel generators.

Figure 31 Change in generation mix: '50 per cent share of new growth' – Reference case, 2015 - 2040



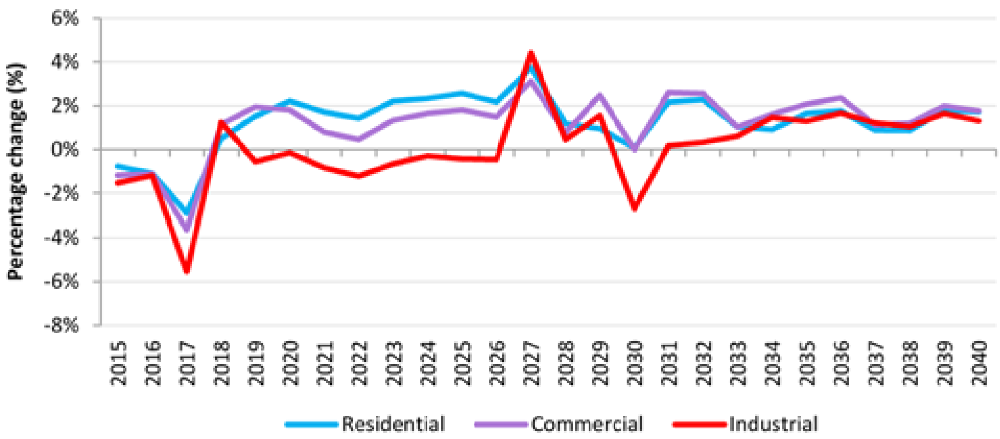
Source: ACIL Allen

Electricity prices

Figure 32 shows that the impacts on electricity prices in this scenario are similar to the 'real 20 per cent' scenario. The ACIL Allen modelling estimates that altering the target to a '50 per cent share of new growth' will initially result in lower retail electricity prices as the costs of purchasing LGCs and STCs is reduced and wholesale prices remain low due to excess capacity in the market. The modelling forecasts average retail prices to remain fairly constant out to 2040 for all electricity consumers. Industrial customers can expect no change in retail prices, while residential, and commercial customers can expect an increase in retail price of around one per cent.

The average cumulative household electricity bill would be $20 lower between 2015 and 2020 in NPV terms. By 2018, these initial savings are outweighed by a subsequent rise in wholesale electricity prices due to less renewable generation in the market. The cumulative increase in average household bills from 2015 to 2030 would be $119 in NPV terms.

Figure 32 Change in average retail electricity prices: '50 per cent share of new growth' – Reference case, 2015 - 2040



Source: ACIL Allen

Resource costs

Reducing the RET to represent a 50 per cent share of growth in demand would reduce the NPV of resource costs by around $6 billion between 2015 to 2030 compared with the current scheme.

Certificate costs

The total cross-subsidy provided to large-scale renewable generation would be around $6 billion by 2020 and $12 billion by 2030 in NPV terms, which is approximately $2 billion and $8 billion lower than continuing with the current policy, respectively.

CO_2-e emissions

The level of emissions abatement achieved under a '50 per cent share of new growth' scenario is similar to the 'real 20 per cent scenario,' assuming the forecast for electricity demand adopted by ACIL Allen eventuates. If the target is adjusted to a '50 per cent share of new growth', the modelling shows that emissions would be higher by 36 Mt CO_2-e over the period 2015 to 2020, and would be higher by 189 Mt CO_2-e over the period 2015 to 2030 compared to the current policy.

Box 2: Implementing a Share of Growth Approach

A share of growth approach would involve the LRET being set on an annual basis. By December each year the CER would announce the target to apply for the following calendar year. The mechanism by which it would do so would follow a published formula such as:

$$T_n = \mathrm{MAX}\left(T_0 + \tfrac{1}{2}\left(E_n - E_0\right), T_{n-1}\right)$$

Where:

T_0 = Base year target

E_0 = Electricity demand in the base year

T_n, E_n = Target and forecast electricity demand in year n

As electricity demand increases above the level of demand in the base year, the target increases by one half of this growth. Should electricity demand be forecast to fall or to remain flat in any year, the target would not change – and would only increase further when electricity demand exceeded its previous highest level.

The table shows how the target would change if electricity demand follows the most recent forecasts, which form the core demand projection used in the modelling. Over the period to 2020 electricity demand is projected to increase by 17,800 GWh and the target increases by 8,900 GWh.

Year	Year (n)	Electricity demand (GWh)	Change in demand (GWh)	Change in Target (GWh)	Target (GWh)
2014	0	227,500			16,100
2015	1	230,100	2,600	1,300	17,400
2016	2	236,600	6,500	3,300	20,700
2017	3	240,500	3,900	1,900	22,600
2018	4	242,300	1,800	900	23,500
2019	5	243,800	1,500	800	24,300
2020	6	245,300	1,500	700	25,000

Excludes waste coal mine gas and small-scale solar PV

The CER would draw on publicly-available electricity forecasts in calculating the target, including the market operators' most recent forecasts of electricity demand in the major markets.

While the formal targets would be set annually one year at a time, publication of the formula and the CER's use of publicly-available electricity forecasts would allow businesses to make their own projections of the targets for future years to assist in their investment planning and decision making.

6.1.4 Repeal of the LRET

If the RET was repealed entirely, LGCs and STCs would no longer be created and there would be no obligation on liable parties to purchase and surrender these certificates. This would have the effect of immediately removing the costs associated with the RET on electricity prices. A small number of stakeholders advocated this approach. For example, Stanwell Corporation stated:

> *Stanwell's primary concern with the RET is the impact of the RET on electricity prices and the flow on effects of high electricity prices for Australia's productivity and economic growth.*
>
> *Stanwell supports completely removing the RET in order to reduce the impact on electricity prices. (Stanwell Corporation, p.3)*

LGCs make up the difference between the spot price for electricity and the price that renewable generation projects require to be financially viable. Some renewable generators have entered into PPAs with electricity retailers that cover both the cost of electricity and certificates. The effect of abolishing the RET on these contracts is not clear, in some cases electricity retailers may be obliged to continue covering the cost of LGCs even though renewable generators will no longer create these certificates. Contracts could also contain clauses allowing them to be amended in the event of a significant policy change such as abolishing the RET.

Without LGCs or PPAs, the only source of revenue for existing large-scale renewable generators would be the spot market for electricity. These generators would not be competitive with non-renewable generators and there is a strong possibility that the owners of these projects would not remain solvent. As renewable generators typically have high capital costs and low operating costs, it is likely that these assets would be sold at a loss but would then continue to operate under new financing and ownership structures.

Many stakeholders have suggested that repealing or significantly reducing the RET would raise sovereign risk concerns. Sovereign risk traditionally refers to the risk of a government defaulting on loan obligations (sovereign credit risk), though the term is now used more broadly to refer to the effect of changes to government policy on both existing and future private investment. However, the Panel considers that these factors are more correctly characterised as regulatory risk.

Not all stakeholders considered that significant change to the RET should be dismissed on the grounds that it would represent an inappropriate level of risk for investors. For example, the submission from the Australian Chamber of Commerce and Industry stated:

> *The issue of investment risk has been raised by supporters of the RET as a reason for opposing any change to the scheme. Such an approach to economic policy, if applied across the economy, would make it virtually impossible to remedy policy failures or deliver productivity enhancing reform. ACCI believes this proposition should be rejected by the Review Panel. Investors should have been well aware of the risks of ongoing changes to the RET given the legislative requirement that the scheme be reviewed every two years. (Australian Chamber of Commerce and Industry, p.5)*

However, renewable energy project owners point out that they invested in good faith and in accordance with a government policy that had bipartisan support. If the RET legislation is repealed, they argue compensation should be provided for existing investments. For example, Pacific Hydro stated:

> *Of most concern to Pacific Hydro is that a material change to the RET will lead to potential sovereign risk and value destruction that would impact existing projects…. Sovereign risk will affect contracts in place now for operating projects and could see substantial compensation and/or transitional arrangements drawing on government funds for 15 years. (Pacific Hydro, p.34)*

> *There are strong risks to our reputation as an investment destination in the energy sector and in other sectors from materially altering a policy in such a vital sector of the economy. The RET policy uncertainty appears to be damaging Australia's reputation as a stable and safe investment market. (Pacific Hydro, p.36)*

Infigen Energy noted concerns expressed by its global investors:

> *Infigen has over 20,000 security holders of which 99% by number are small retail investors, many of whom have been security holders since the initial public offering in 2005. Infigen also has many large global infrastructure investors that have expressed concern to us about the potential sovereign risk aspects of possible regulatory change and have added their support to Infigen's submission. These investors cite their experience of adverse regulatory change in the renewable energy sector in Europe, noting how this has caused much higher return hurdles to be required for all infrastructure investments in those countries. (Infigen, p.3-4)*

The Australian Industry Group raised concerns about the impact on future investments:

> *Ai Group members have expressed concern that such an about-turn by the Commonwealth would have major implications for international investment in Australia due to perceptions of increased sovereign risk. These negative perceptions would have a lasting impact that might be as significant as any claims for compensation that arise from those who have invested in renewable energy. (Australian Industry Group, p.4)*

The Panel does not consider these arguments to be strong. Certainty of regulatory settings is an important facilitator of investment in long-term infrastructure, but this does not imply that regulations should be set in stone. While it is reasonable for investors to expect that they will not be exposed to arbitrary or capricious regulatory changes, they can have no expectation of government abstaining from regulatory change, even significant change, when circumstances warrant. Any regulatory setting involves a consideration of the balance of its impacts on groups in the community. When circumstances change significantly it is incumbent on governments to reconsider whether the balance of those impacts remains appropriate and to act if necessary.

Generation mix

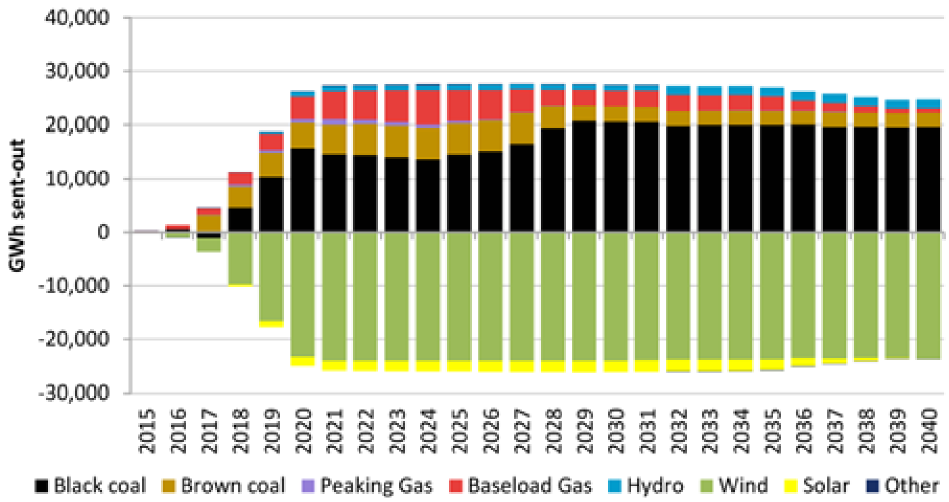
If the LRET were repealed, it is likely that all existing and committed renewable generators would continue to operate although ownership of these assets may change. The share of renewables would remain at around 16 per cent of the generation mix.

ACIL Allen forecasts that very little new generation capacity growth would be required before 2025. Conventional fossil-fuel capacity may enter markets from around 2025 with capacity largely being gas-fired. A small amount of new coal capacity is projected to be developed in the SWIS, the only region in which new coal power stations are likely to be developed if the RET is repealed.

There is likely to be no new wind farm development out to 2040, but some utility-scale solar is forecast to be deployed in regional markets from around 2034, bringing installed capacity to around 1,600 MW by 2040.

Comparing the 'repeal' scenario to current RET policy, there would be a 75 per cent drop in wind generation in 2040. The reduction in renewable generation is offset by increased generation from existing black and brown coal generators (Figure 33). Fossil fuel generators increase their level of output to meet the load growth over the period to 2040, which improves their financial position. In this scenario there is less mothballed fossil fuel capacity than under current settings with some currently mothballed capacity brought back online sooner than would otherwise have been the case.

Figure 33 Change in generation mix: 'Repeal' – Reference case, 2015 - 2040



Source: ACIL Allen

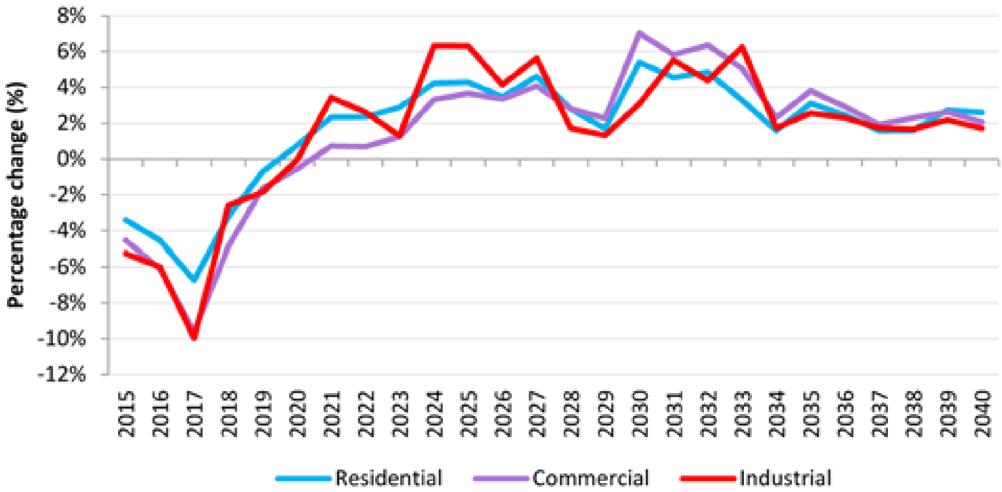
Electricity prices

The impact of repealing the LRET on electricity prices was discussed in Chapter 5, which explained that the ACIL Allen modelling estimates that removing the RET would result in an initial retail price reduction before wholesale prices rise with less renewable generation in the electricity mix.

Figure 34 illustrates the modelled retail electricity prices in a 'Repeal' scenario out to 2040 compared with the current policy. The ACIL Allen modelling estimates that repealing the RET would initially result in lower retail electricity prices, however from around 2021 retail prices would be on average 3.1 per cent higher for residential, commercial and industrial customers.

In the Repeal scenario, the NPV of cumulative average household electricity bills would be $247 lower over the period 2015 to 2020. This reduction is due to lower certificate costs and a lower wholesale price resulting from the return of some mothballed coal-fired generation capacity. However, repeal of the RET eventually leads to higher wholesale electricity prices because of the absence of additional (low marginal cost) renewable generation and less over-supply of generation capacity in the market. The NPV of retail electricity prices over the period 2015 to 2030 is roughly the same as if the RET was left in place. By 2040, under the 'Repeal' scenario, the average cumulative residential bill increases by $115 compared to current policy. It was noted in Chapter 5 that other modelling produced different results, for example the Deloitte modelling estimated that retail electricity prices would be lower over the period to 2030 if the RET is repealed.

Figure 34 Change in average retail electricity prices: 'Repeal' – Reference case, 2015 - 2040



Source: ACIL Allen

Resource costs

Repealing the LRET would reduce the NPV of resource costs by around $9 billion by 2030 compared with the current policy.

Certificate costs

Repealing the LRET would eliminate the LGC costs incurred under the current scheme of $9 billion over the period 2015 to 2020 and $19 billion over the period 2015 to 2030, in NPV terms.

CO_2-e emissions

If the LRET is repealed, the modelling shows that cumulative emissions would be higher by 58 Mt CO_2-e over the period 2015 to 2020 and by 299 Mt CO_2-e over the period 2015 to 2030. By 2040 cumulative emissions would be 520 Mt CO_2-e higher, compared with the current policy.

6.1.5 Close the LRET to new entrants ('grandfathering')

Many submissions suggested transitioning away from the RET, but recognised a need to continue to support investments made on the basis of the current RET legislation in order to address the issues concerning regulatory risk. For example, Alinta Energy proposed that the LRET be capped at the current level and continue to 2020:

> *Alinta Energy is of the view that generators that have committed finance to projects, whether completed or under development, on the basis of the current RET scheme should continue to receive a subsidy. This is important to ensure the risk of policy change does not disincentivise future investment in the market.*
>
> *Therefore, to take account of these considerations, Alinta Energy advocates that the RET continue until 2020, but that the target be capped at current capacity which has been achieved to date based on renewable generation that has already been built or committed to build. (Alinta Energy, p.8)*

The Australian Industry Group stated:

> *If, following this consultation, a recommendation was made that the LRET be abolished or substantially reduced, then industry would expect steps to smooth a transition to the amended policy. At the very least this would include forewarning to allow industry time to prepare for major scheme changes that are being seriously considered by the Government, and security for investments in renewable generation that have already been made. The costs of such security should be taken into account in considering net impacts on energy users and taxpayers. (Australian Industry Group, p.6)*

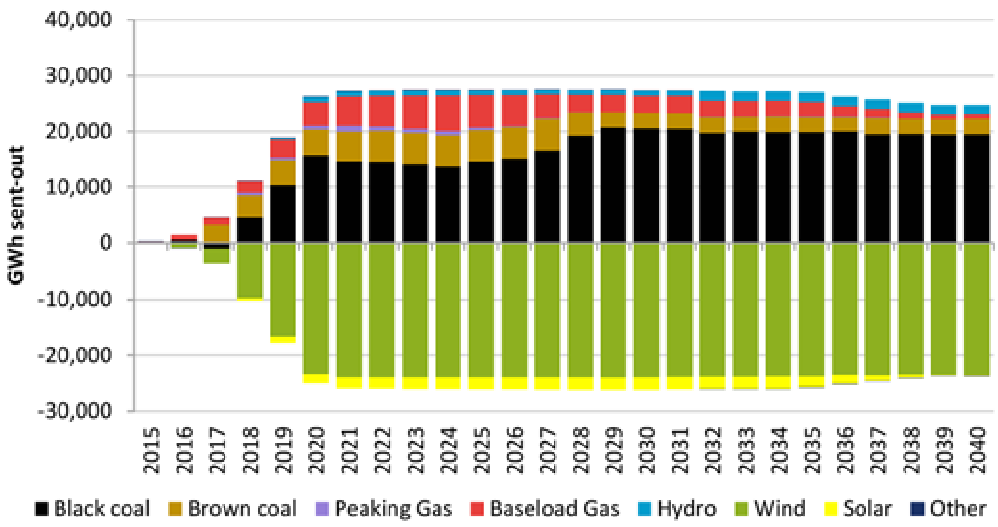
Closing the LRET to new entrants would entail setting targets in line with generation from existing and committed power stations and enabling these power stations to continue receiving revenue through the sale of LGCs. The scenario modelled by ACIL Allen assumes that renewable power stations that are already under construction or can demonstrate that they have reached full financial and contractual commitment (e.g., final investment decision, engineering and procurement contract) would also be entitled to create certificates and participate in the LRET.

Implementing this approach would involve consideration of an appropriate certificate price to support existing projects, and considering whether further mechanisms would be required to ensure price stability. Mechanisms that could be considered include price caps and price floors, or a clearing house that facilitates the sale of certificates at a fixed price similar to the STC Clearing House. These issues are discussed further in Chapter 10.

Generation mix

The modelling results for impact of closing the RET to new entrants on the generation mix (Figure 35) are the same as the results for repealing the RET, as both cases assume that all existing and committed renewable generators continue to operate, but there is no new renewable generation capacity installed between 2014 to 2040, aside from a small amount of solar in regional markets.

Figure 35 Change in generation mix: 'Closed to new entrants' – Reference case, 2015 - 2040



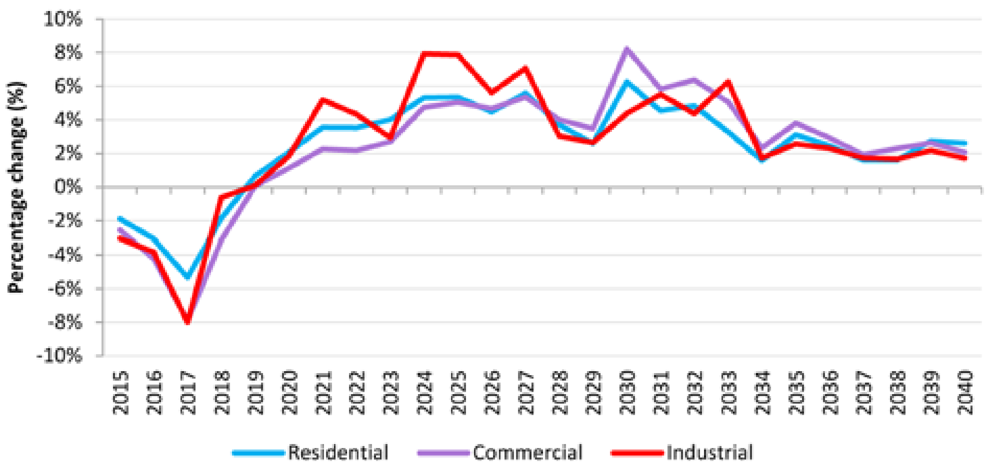
Source: ACIL Allen

Electricity prices

With less renewables in the electricity mix, the wholesale electricity price would initially drop, but would then increase from 2018 onwards and would outweigh the savings from avoided certificate costs by around 2020; causing retail electricity prices to be higher than if the RET remained.

Figure 36 illustrates the ACIL Allen modelled retail electricity prices in a 'closed to new entrants' scenario out to 2040, compared with the current policy. The modelling estimates that closing the RET to entrants would initially result in lower retail electricity prices, however retail electricity prices would be on average three to four per cent higher from 2019 for residential, commercial and industrial customers. The NPV of cumulative average household electricity bills would be $138 lower over the period 2015 to 2020, but $185 higher over the period 2015 to 2030.

Figure 36 Change in average retail electricity prices: 'Closed to new entrants' – Reference case, 2015 - 2040



Source: ACIL Allen

Resource costs

Closing the RET to new entrants would result in a similar reduction in resource costs associated with large-scale electricity generation as repealing the RET. The NPV of large-scale resource costs are expected to be around $9 billion lower by 2030 compared with the current policy.

Certificate costs

Closing the RET to new entrants would provide renewable generators with a cross-subsidy of $3 billion over the period 2015 to 2020 and $5 billion over the period 2015 to 2030 in NPV terms, which is approximately $6 billion and $14 billion lower than continuing with the current policy, respectively.

CO_2-emissions

Closing the RET to new entrants would have the same effect on CO_2-e emissions as repealing the RET. Emissions would be higher by 58 Mt CO_2-e over the period 2015 to 2020 and 299 Mt CO_2-e higher over the period 2015 to 2030, compared with current policy.

6.2 Reforming the LRET: Conclusions

The Panel concluded in Chapter 5 that the RET should not be continued in its current form because the cost of the cross-subsidy and its effects on Australia's national income are not justified by the emission reduction benefits. Adoption of a higher target and/or extension of the scheme beyond its current 2030 timeframe are inconsistent with reducing the cost of the scheme to Australians.

While the Panel does not consider that repeal of the RET constitutes 'sovereign risk', the Panel is of the view that an immediate end to the scheme would create significant adverse financial implications for existing investors in renewable generation. It could also deter future investment in the sector which may be required to meet higher greenhouse gas emission reduction targets in the future.

The Panel therefore recommends that the LRET should continue, but only in a significantly modified form that better balances the interests of existing investors with those of the nation as a whole.

This balance could be achieved by allowing the LRET to continue to operate until 2030 for existing renewable generators, but closing it to new entrants. This would provide investors in existing renewable generation with access to certificates, but importantly it would protect the broader community from the substantial costs of subsidising yet more surplus generation capacity.

This would retain the CO_2-e emissions reductions achieved to date by the LRET, and leave the remainder of Australia's CO_2-e emissions reduction task to other approaches including the ERF.

Alternatively, a suitable balance might also be achieved if the LRET were modified to increase in proportion with growth in electricity demand. This would protect investors in existing renewable generators and would support additional renewable generation when demand is growing. It exposes renewable investors to more of the risks that incumbent generators currently face in terms of uncertain demand forecasts, placing them on a more even footing. If the current forecasts of electricity demand prove accurate, this approach would result in renewables making up approximately a 20 per cent share of electricity demand in 2020, but the share may be different if demand is higher or lower than expected.

A key objective of both options is to support existing and committed investments made on the basis of the current RET policy. The Panel has identified that some additional mechanisms may be needed to ensure certificate prices trade in a range that will provide an appropriate level of support. These are further discussed in Chapter 10.

The Panel does not favour the option of adjusting the current 41,000 GWh target to a lower target that might deliver a 'real 20 per cent' share for renewables because that would risk locking in the cost of billions of dollars of unnecessary capital expenditure if electricity demand proved to be lower than forecast. If the Government wishes to adopt a 'real 20 per cent' target the Panel considers that a 'floating' target should be adopted, where targets are periodically updated in line with electricity demand projections rather than being fixed until 2020. While providing less certainty to renewable investors, it would reduce the risk of the RET forcing in excess generation capacity, but would not eliminate it.

The LRET provides an incentive for the deployment of the most commercial renewable technology and as such it does not promote a range of technologies. In its current form, the LRET is expected to be predominately met by wind generation, which is currently the most competitive form of renewable energy, but it may be that other technologies, such as large-scale solar, become cheaper in the future. A more efficient and lower cost outcome would be achieved if the market were able to select the lowest-cost, best performing options to meet demand when it is needed.

The Panel agrees with the views put by many stakeholders during the review that all parts of the electricity sector will be increasingly affected by innovation in coming years – traditional business and engineering models of energy generation, delivery and use are likely to undergo significant changes. The Panel notes that the combination of rising retail electricity prices, falling technology costs (including solar PV panels), the development of battery storage technologies, and new business models that allow consumers to become more active in managing their energy costs may be beginning to drive a long-term transformation of the electricity sector over coming decades in which renewables play a significant role.[45] Mandating the construction of significant quantities of large-scale renewable generation capacity reflects a 20th century approach to electricity and may hinder rather than assist the transformation of the sector in the first half of this century.

Recommendation 2: The Large-Scale Renewable Energy Target (LRET) should be amended in one of the following two ways:

Option 1 – Closed to new entrants ('grandfathering')

In order to reduce the cost of the LRET and its impact on electricity markets, the Panel recommends that the LRET should be closed to new entrants.

a. The LRET is closed to new renewable energy power stations (subject to limited exceptions described below). The Clean Energy Regulator (CER) should set targets annually based on estimated output from accredited power stations.

b. In addition to those renewable energy power stations already accredited under the scheme, eligibility would be extended to:

    i. Renewable energy power stations already under construction

    ii. Renewable energy power stations to be constructed where project proponents can demonstrate that there is full financial and contractual commitment to the project (e.g., final investment decision, engineering and procurement contract) within one month of the announcement of this approach

c. The last year of the operation of the LRET is 2030.

or

Option 2 – Share of growth in electricity demand

In order to provide support for new renewable power stations and contribute to Australia's emissions reduction target while achieving less reduction than Option 1 in the cost of the LRET, the Panel recommends that the target be set to allocate a share of growth in electricity demand to renewables in the following manner:

a. The target is set annually by the CER, increasing each year to 2020 by an amount equivalent to 50 per cent of projected growth in national electricity demand, ensuring that new renewable energy power stations are only supported under the RET where electricity demand is increasing.

b. Where national electricity demand is projected to remain flat or fall, the target is held at the previous year's level.

c. From 2021 onwards, the target is fixed at the 2020 level until 2030, the last year of the operation of the LRET.

Based on current electricity demand forecasts, this approach would achieve a 20 per cent share of renewables in the electricity generation mix by 2020.

[45] CSIRO *Change and Choice; The Future Grid Forum's analysis of Australia's potential electricity pathways to 2050*, December 2013.

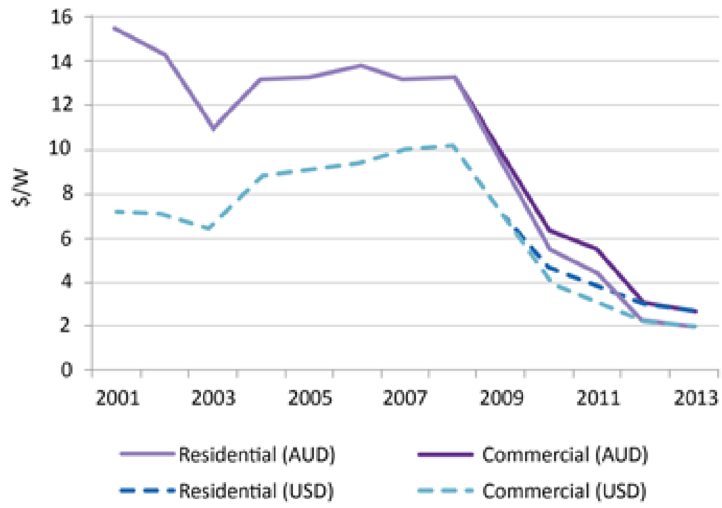
6.3 The current state of the small-scale market

The SRES has been highly successful in promoting small-scale renewable energy. Over 1.2 million rooftop PV systems and around 870,000 solar water heater units have been installed under the RET since 2001.[46] These systems produced the equivalent of around 6,400 GWh of generation in 2013, which is already above the original 4,000 GWh estimate for the SRES by 2020.[47] The sector has received a cross-subsidy of around $4 billion to install rooftop PV systems and solar water heaters since the RET was expanded in 2010.[48]

In the past, the costs of the SRES have been high (comprising 60 per cent of the costs of the RET in 2012-13)[49] and unpredictable, largely due to the high uptake of rooftop PV incentivised by state and territory feed-in-tariffs, the solar credits multiplier under the RET and falling system costs. In response, the scheme has been adjusted several times to bring forward the phase-out of the multiplier. As a result of these adjustments, and the removal of state and territory premium feed-in-tariff schemes, installations of residential solar PV systems have fallen by around 40 per cent in the past 18 months.[50]

System costs for rooftop solar PV installations have declined rapidly since 2009, reflecting the global decline in PV module costs and the strong Australian dollar. Figure 37 shows average solar PV system costs per watt since 2001.

Figure 37 Average solar PV system price

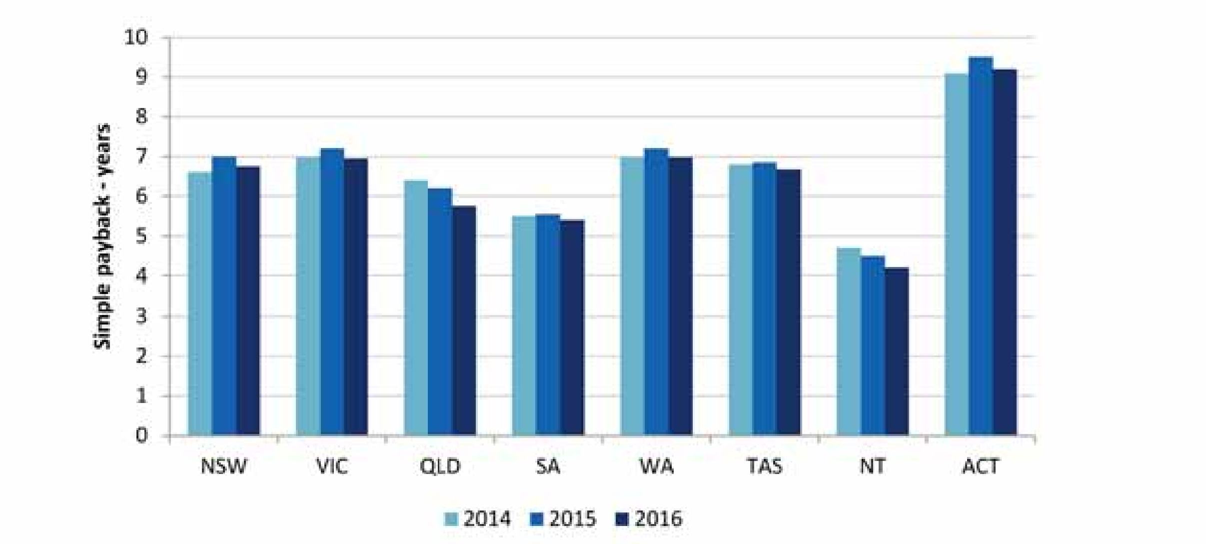


Source: Bloomberg New Energy Finance

[46] Clean Energy Regulator, *Small-scale installations by postcode*, July 2014.
[47] To ensure the overall 20 per cent target would be met, the lower bound estimate for the SRES (4,000 GWh) was deducted from the original (combined) 45,000 GWh 2020 target, giving the large-scale 2020 target of 41,000 GWh.
[48] Calculation by the RET Review Secretariat based on data provided by the Clean Energy Regulator.
[49] Australian Energy Market Commission, *Residential Electricity Price Trends, 2013*, p.12.
[50] Green Energy Markets, *Small-scale technology certificates data modelling for 2014 to 2016, Report to the Clean Energy Regulator*, 2014.

The average cost of installing a 3 kW solar PV system in 2014 is $7,670 and STCs contribute around 30 per cent of this cost.[51] With the RET in place the average payback period is reduced from around 10 years to nearly seven years. Figure 38 shows the simple payback period for a 3 kW solar PV system in the various states, after receiving certificates, as calculated by Green Energy Markets.

Figure 38 Simple payback period by state: 3 kW residential solar PV system



Source: Green Energy Markets, Small-scale technology certificates data modelling for 2014 to 2016

The decline in system costs and continued uptake has led many stakeholders to argue that rooftop PV systems no longer need support through the SRES, and the continuation of the SRES is unnecessarily adding to electricity bills. For example, Major Energy Users submitted:

> *The SRES has been extremely costly and inequitable in its impacts on consumers, such as businesses and those renting. The costs of the SRES have been difficult to control and the scheme has shown that it is vulnerable to distortion by state based policies.*
> *(Major Energy Users, p.4)*

[51] Secretariat calculation based on data in Green Energy Markets, *Small-scale technology certificates data modelling for 2014 to 2016.*

On the other hand, the solar industry points out that the SRES is providing the only remaining policy support for rooftop solar PV and solar water heaters now that premium state feed-in-tariffs have been removed, and the costs of the SRES are falling and will continue to fall through arrangements currently in place. For example, the Clean Energy Council submitted:

> *Costs are forecast to fall by 25 per cent in real terms in 2015-2016 and then stay low out to 2019-2020. In proportional terms the retail price contribution of SRES has already peaked at 3 per cent of the average retail bill in 2012-2013 and will continue to decline to between 0.9 and 1.0 per cent out to 2019-2020. (Clean Energy Council, p.14)*

Similarly, the REC Agents Association suggest that the cost of the SRES will amount to 0.4 cents per kWh in 2014, which is less than half the level in 2012, and that this cost will be offset by a greater reduction in wholesale electricity prices.

Other submissions pointed to potential cost benefits from reducing peak demand and reliance on gas. For example, the REC Agents Association submitted:

> *Solar PV contributed 600MW to meeting the combined South Australia and Victorian peak during the heat wave in January 2014. This amounted to 5 per cent of combined peak demand. Both South Australia and Victoria would have achieved record peak demand if it had not been for the contribution of solar PV. (REC Agents Association, p.8)*

6.4 Options for reforming the SRES

6.4.1 Abolishing the SRES

The Panel received numerous submissions suggesting the SRES should be abolished. Submissions in favour of abolition indicate that the generation supported by the SRES greatly exceeds the amount anticipated and system costs have fallen to the point where they are competitive without a subsidy, and are therefore unnecessarily increasing electricity bills. For example, the Energy Networks Association stated:

> [The] *SRES had already exceeded its aspirational target of 4000 GWh by 2020 in 2012. It is therefore hard to argue that solar water heaters, Photovoltaic (PV) systems and heat pump technologies should continue to require further subsidies at the expense of other electricity consumers. With over 2 million installations in a housing stock of around 9 million private residences in Australia, ENA considers that the market for these systems is mature and these technologies do not require any further support. (Energy Networks Association, p.1)*

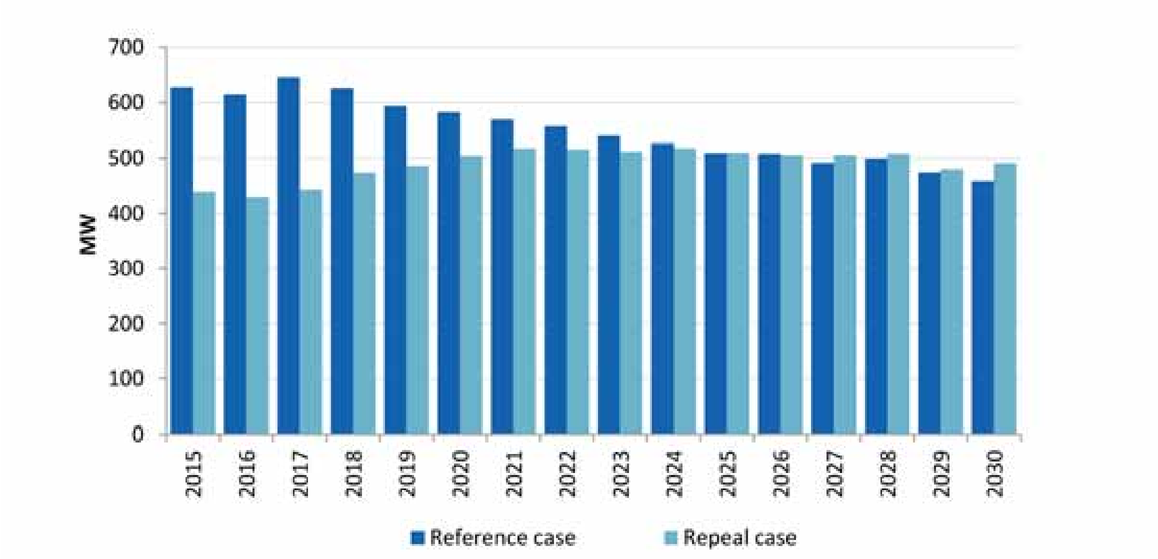
Similarly, the Business Council of Australia argued that:

> *It provides an unnecessary subsidy to rooftop solar, which is now at grid parity, meaning electricity produced by rooftop solar is commercially competitive with retail electricity prices in its own right. The RET… is no longer required to incentivise the uptake of rooftop solar. (Business Council of Australia, p.4)*

Immediate abolition would increase the costs faced by consumers to install solar PV and solar water heaters, subsequently lowering demand for these products and leading to a reduction in income and employment for the small-scale solar industry. If the SRES was removed, the typical payback period for rooftop PV systems would increase by nearly three years to around 10 years for residential systems and around nine years for commercial systems, although this would vary between jurisdictions

Modelling by ACIL Allen indicates that abolishing the SRES would have a short-term impact on the rate of small-scale installations of about 30 per cent compared to continuing with the current scheme. However, the impact falls from 2017 as support under the SRES would have started to decline through reductions in the deeming rate. Installation rates are estimated to recover by the early 2020s as illustrated in Figure 39. ACIL Allen estimates that the total avoided certificate costs from abolishing the SRES would represent $3 billion over 2015 to 2030 (in NPV terms).

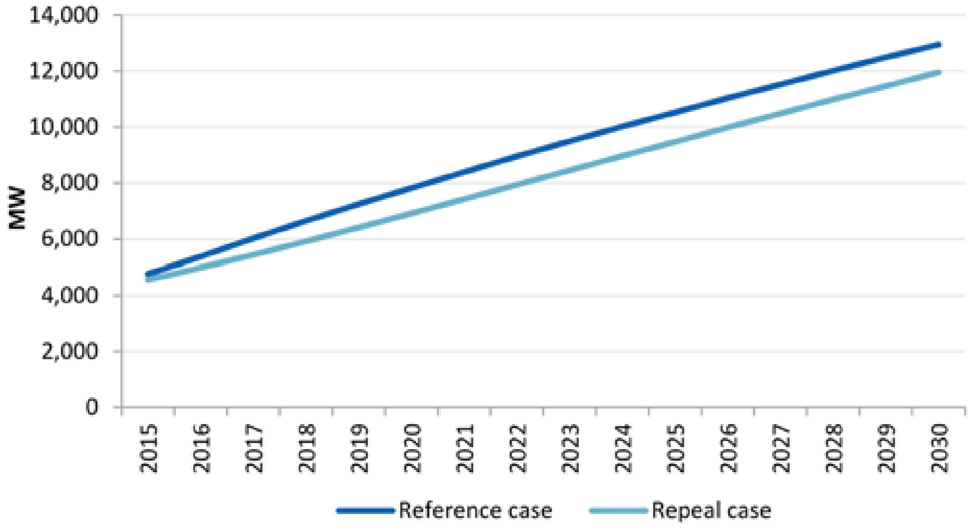
Figure 39 Annual additions to small-scale solar PV capacity: 'Repeal' and Reference case, 2015 - 2030



Source: ACIL Allen

Figure 40 shows the difference in total small-scale solar PV system capacity over time between repealing the SRES and maintaining the current settings.

Figure 40 Cumulative capacity of small-scale solar PV: 'Repeal' and Reference case, 2015 - 2030



Source: ACIL Allen

ACIL Allen also conducted a sensitivity analysis of the effect of high capital costs for solar PV. In this sensitivity it was assumed that the cost reductions projected in the central scenario are achieved up to 10 years later. The results indicate that higher capital costs lead to a lower uptake of small-scale PV, but growth is still robust even under repeal of the SRES. Compared with 4.1 GW of capacity in 2014, capacity in 2020 with higher capital costs is projected to be 7.4 GW under the reference case and 6.6 GW under repeal (compared with 7.8 GW and 6.9 GW under core assumptions).

Modelling by ROAM Consulting (submitted by the Clean Energy Council) includes an estimate from SunWiz that removing the SRES would cause a reduction in annual rooftop PV installations of 40 to 45 per cent by 2017-18, and by 2030 solar PV installations would be 30 per cent lower than under the current scheme.[52] The Clean Energy Council's submission also stated that abolishing the SRES would lead to 3,800 fewer jobs by 2020 in small-scale renewables, compared to continuing with current policy settings.[53]

Modelling of the RET by Bloomberg New Energy Finance suggested that the impact of abolishing the SRES would be less severe, resulting in a reduction in installation rates of 26 per cent over 2015 - 20 for residential systems and 10 per cent for commercial-scale systems.

Tindo Solar's submission highlighted the effects of abolition on its own operations.

> *Tindo Solar as a manufacturer and installer of solar systems nationally would be impacted significantly - which would certainly lead to job losses. This would happen right at a time when the future looks bright for Tindo with imminent expansion of our work force as we continue to win and create new business. (Tindo Solar, p.2)*

A number of submissions pointed out that SRES subsidies are paid upfront through conversion of the expected certificates into a capital subsidy. Abolishing the scheme would not have an impact on existing systems. For example, the Australian Industry Greenhouse Network submitted:

[52] ROAM Consulting report to Clean Energy Council, *RET Policy Analysis*, April 2014, p.23.
[53] Clean Energy Council, *Submission to the Renewable Energy Target Review Issues Paper*, 2014, p.4.

> *Small-scale investments under the SRES are typically provided with full credit in advance; this is substantially different to commercial investments that receive certificates through the LRET as energy is produced. Therefore, the SRES can be abolished at short notice without stranding investments or causing sovereign risk. (Australian Industry Greenhouse Network, p.15)*

Although households that have installed systems have received certificates upfront, businesses operating in the small-scale supply chain may face losses associated with stock-on-order or stranded investments if the SRES was abolished, for example in manufacturing or distribution facilities. As an example, Tindo Solar submitted:

> *…our automated production line in Mawson Lakes, South Australia… would not have been possible without the RET and any change to the RET will put the viability of manufacturing panels in Australia at serious risk. (Tindo Solar p.4)*

The impact of abolishing the SRES may be greater for the solar water heater industry. The Australian Solar Council's submission stated:

> *Solar hot water sales have shrunk by some 70 per cent since 2009, following the removal of a Federal Government rebate. The loss of the RET will completely destroy the market and end Australian manufacturing of solar hot water systems. (Australian Solar Council, p.7)*

Rheem Australia's submission discussed expansion activities undertaken by the company in both the solar hot water and PV business in support of their manufacturing operations and dealer network, and expressed concern over potential changes to the SRES:

> *Rheem is concerned that any change to the SRES component of the RET, that results in a serious reduction in demand for the technologies covered by the SRES, will result in factory closures and job losses amongst both larger manufacturers and the small business community. (Rheem Australia, p.2)*

Alternatively, some submissions argued that solar water heaters should not receive assistance on the basis that they displace rather than generate electricity. For example, the Energy Supply Association of Australia submitted:

> *There is also a strong case to reconsider arrangements for "displacement technologies" such as air-sourced heat pumps and solar water heaters. These technologies do not result in any renewable generation but rather reduce conventional generation. They have more in common with energy efficiency measures than renewable energy generation.*
> *(Energy Supply Association of Australia, p.5)*

Similarly, the Energy Networks Association argued that solar water heaters and heat pumps do not meet the objectives of the Act, stating:

> *Solar water heaters and electrically boosted heat pump water heaters do not generate renewable electrical energy. Rather they increase the efficiency with which fossil fuels are consumed by using solar inputs or ambient air temperature to contribute to water heating.*
> *(Energy Networks Association, p.3)*

A study by Energy Analysis Engineering, provided to the review by Apricus Australia, indicates that removing the SRES would increase the cost of a residential solar water heater system by

$500 to $1,500 (or 10 to 30 per cent) and the expected payback would increase from around seven years to nearly nine years.[54] Although this is similar to the impact on the cost and payback period for solar PV systems, the industry argues that it will result in a greater reduction in installations, as hot water systems are replaced at short notice and consumers tend to replace 'like with like', particularly if the cost of an alternative is significantly higher or involves a delay in re-establishing access to hot water.

ACIL Allen's modelling suggests that abolition of the SRES could result in around 36,000 fewer solar water heaters being installed between 2015 and 2020 (around 16 per cent less than the number of systems forecast to be installed if the current SRES were to continue), which would have been expected to have displaced around 110 GWh of electricity. It would save energy users approximately $390 million in SRES subsidies.

6.4.2 Accelerating the phase-out of the SRES

As an alternative to immediately abolishing the SRES, the costs of the scheme could be reduced by shortening the duration of the scheme and reducing the level of the cross-subsidy, therefore providing a period of transition for the small-scale renewable energy industry.

There are various ways to reduce the level of the subsidy. Under current settings, installers of small-scale solar PV systems are entitled to receive ('deem') 15 years worth of certificates at the time of installation, while installers of solar water heaters are entitled to receive 10 years worth of certificates. Under current arrangements, the period for which certificates may be created for solar PV systems (the deeming rate) will fall by one year each year from 2017 until the scheme ends on 31 December 2030, when the deeming rate would be one. Similarly, the deeming rate for solar water heaters (which is currently 10 years) falls by one year each year from 2022 to 2030.

The phase-out of the SRES could be accelerated through a faster decline in the deeming rates in combination with bringing forward the end-date of the SRES from 2030 to 2020.

A number of submissions considered that there was a case for winding back support under the SRES. For example, the National Generators Forum submitted:

> *The current deeming provisions provide a 15 year subsidy in an up-front payment to projects installed under the SRES provisions. Changing this provision would not impact on existing projects and would ensure consistent treatment of renewable projects regardless of the size of the facility.*
>
> *Within the context of the objective of the RET as an 'infant industry' subsidy it may be prudent to wind back some of the arrangements for SRES noting that PV units are continuing to fall in price, the PV industry is well established and installations are now price competitive without subsidies (National Generators Forum, p.4).*

The Australian Industry Group submission suggested implementing a formula, as opposed to a fixed timetable, to reflect the increasing competitiveness of solar PV technology that would take account of changes in the consumer cost of small-scale technologies and in retail electricity prices:

[54] Energy Analysis and Engineering, *Policy Impact Analysis: Removal of the RET on the Water Heater Industry*, For: Apricus Australia, May 2014.

> *This… would also be more likely to produce well-calibrated levels of support. This could be done through changes to the deeming period or certificate price, or by applying a discount factor to the number of certificates issued. (Australian Industry Group, p.7)*

A number of submissions suggested that ensuring distributed solar PV received a fair price and connection conditions could obviate the need for the SRES. For example, WestWind submitted:

> *In our view though it would be far preferable to wean off small scale renewable energy systems of any upfront payment support systems and ensure a fair treatment and valuation of their contribution to the overall energy supply instead. (West Wind Energy, p.3)*

Modelling from ACIL Allen suggests that phasing out the SRES by 2020 may provide savings while avoiding some of the adverse impacts that could result from abolition of the SRES. Reducing the deeming rate to 10 years in 2015, followed by further reductions from 2015 to 2020 would save approximately $2 billion (in NPV terms) in cross-subsidies which would have flowed to the sector from 2015 to 2030 under current settings.

Where the reduction in deeming rate is publically foreshadowed, it is likely to cause a surge in system installations followed by a rapid decline. This could be averted through small reductions in the deeming rate of one year at a time.

Similar to abolishing the SRES, the impact of bringing forward the phase-out of the SRES is likely to be greater for the solar water heater industry than the solar PV industry. However, considering solar water heaters represent high cost abatement and displace rather than generate electricity (and therefore are included in some energy efficiency measures), it is questionable whether providing greater assistance to solar water heaters under the SRES could be justified.

Additionally, the submission from Mr Alan Pears from RMIT University and Sustainable Solutions indicated that there may be a case to review the number of STCs allocated to solar hot water systems based on the scale of energy savings they achieve:

> *There is some evidence that average electricity savings for those who install solar hot water are smaller than is estimated by the regulator. For example, a 2011 IPART study suggested a typical solar HWS in NSW reduced electricity consumption by 1400-1500 kWh/year, which is around half of the number of STCs they now create. (Alan Pears, p.15)*

The solar PV industry is starting to develop new products such as solar leasing and battery storage with battery costs declining in recent years. An accelerated phase-out with a period of transition may provide sufficient time for the industry to innovate and develop alternative business models to engage new customers before SRES support is completely removed. It would also provide for a smoother transition to a size that is sustainable in the long term for the industry.

6.4.3 Recombine the SRES and LRET schemes

The RET was separated into the LRET and SRES in January 2011 in response to a large increase in the uptake of small-scale systems. This resulted in an oversupply of certificates which caused the price to fall dramatically to a level that was not sufficient to support large-scale projects, and investment stalled.

As many of these factors are no longer at play, some stakeholders suggest that the schemes should be re-combined. This would cap the total renewable generation supported through the RET, providing certainty to liable entities on the number of certificates required to meet obligations each year. It is also suggested that the cost of the RET would be lower as large-scale projects would be in direct competition with small-scale installations, which require a lower certificate price. The two schemes could be recombined with or without deeming.

Recombining the scheme was not an option supported by many stakeholders, although Origin Energy's submission suggests that recombining schemes without deeming could be considered:

> *We suggest that returning to one simple scheme, with no up-front deeming for any technologies, is the simplest and most equitable solution to retaining the RET. It avoids further messy policy interventions in the SRES and it also avoids the need to predict how much generation may come from small-scale technologies by 2020, which is a difficult task. (Origin Energy, p.11)*

In contrast, a large number of submissions recommended against recombining the schemes, arguing they serve two different markets. For example, the Australian Photovoltaic Institute submitted:

> *…the SRES and LRET schemes target very different types of investment and were separated after a few years of the market operating, due to this fact. Combining the two schemes risks one dominating the other which, regardless of the "winner", would have an overall negative effect, inhibiting the development of optimum solutions. Maintaining both schemes provides the optimum mix of supply and demand, with both large-scale and small-scale solutions. (Australian Photovoltaic Institute, p.8)*

The Energy Supply Association of Australia made a similar point and cautioned against recombining the schemes without considering the potential for up-front deeming to distort the market:

> *The concept of deeming itself is less of a problem; it is that it leads to the up-front provision of STCs equivalent to 15 years of electricity generation for all systems up to 100 kW that is problematic… In contrast, LGCs are allocated to renewable energy generators on a monthly, quarterly or annual basis by the Clean Energy Regulator. If small and large systems fell under the one scheme with up-front deeming provided to small systems, there is a high risk of distorting the market. This is what occurred prior to the split of the RET into the LRET and SRES. (Energy Supply Association of Australia, p.4)*

The Panel considers that there are risks with this approach. Recombining the schemes with deeming for small-scale installations would require adding an estimate of certificates expected to be created by small-scale installations to the annual LRET targets. If the level of installations were higher than predicted, it could oversupply the market and lead to a repeat of the conditions that led to the schemes being separated in the first place. If installations are lower than predicted, more large-scale generation would be required to meet the target, potentially at a higher cost.

The uncertainty over the amount of large-scale generation required in a combined scheme could mean that liable entities are reluctant to enter into PPAs and would meet their obligations by purchasing certificates on the spot market. This could add to the cost of financing projects and subsequently increase the price of certificates. A capped scheme may also create uncertainty for those wanting to install small-scale systems as to whether the cap will be reached early in the period, meaning that certificates would be unavailable.

Alternatively, the deeming arrangements could be ended so that small-scale systems would create certificates annually based on the amount of electricity generated. While this lessens the potential for recombined schemes to distort either the large or small-scale market, it would be less attractive to households, who require the RET to assist with the upfront cost of purchasing a system and the effect may be similar to terminating the scheme all together.

In addition, many residential electricity meters lack the functionality to accurately record total generation from a rooftop solar PV system. The rules governing the relationship between distribution businesses, the metering provider (which may be the same party) and the individual resident vary greatly, making a uniform approach to metering and LGC creation and/or data aggregation extremely difficult. The administrative burden associated with recombining the scheme may be extremely high for both the CER and householders.

6.4.4 Reduce the 100 kW threshold

Under the current arrangements, solar PV systems that have a capacity of up to 100 kW are eligible for the SRES. This compares with 10 kW for small-scale wind and 6.4 kW for small-scale hydro systems. Although average system sizes in Australia have increased, the vast majority of solar PV installations (which are for households) are no more than 10 kW.

According to Bloomberg New Energy Finance, the average system size of commercial installations in Australia in 2013 was 18.1 kW.[55] These larger solar PV units can be deployed on shopping centres, storage facilities, office blocks or farms. The cost and payback period for commercial PV systems has decreased over recent years.

The commercial market is growing in every state in Australia, though it is yet to take off to the extent of the residential sector. With commercial systems eligible under the SRES able to access a 15 year deeming period for STCs, there is a risk that strong growth in the deployment of larger installations on commercial buildings could add substantially to the costs of the scheme. If the threshold were lowered, say to 10 kW, system sizes above this would be included in the LRET without deeming (if the LRET is open to new entrants), reducing the impact on the cost of the SRES.

Commercial-scale systems (between 10-100 kW) made up 14 per cent of the solar PV capacity installed in 2013. The number of installations increased by 123 per cent between 2012 and 2013, representing an increase in installed capacity of 150 per cent. Most of this growth occurred in the 10-30 kW range. This rapid increase in installations was incentivised, in large part, by a number of government grants programs which have since closed. Although the commercial scale sector has experienced steady growth, overall, the uptake of commercial solar PV remains very low.[56]

There are still barriers to uptake which reduce the probability of a significant boom in commercial-scale installations. Generally, commercial and industrial businesses access lower electricity tariffs and frequently lease premises, reducing the incentive to install solar systems. Additionally, it can be difficult for commercial businesses to secure finance, and costs may be incurred to cover network improvements to ensure the new generation does not disrupt local grid voltage and frequency parameters. On the other hand, solar retailers are increasingly targeting this sector as a potential growth market with leasing arrangements likely to assist take-up in this sector.

[55] Bloomberg New Energy Finance, Australia Client Roundtable - RET Review and 20 GW solar future, 6 and 8 May 2014.
[56] Green Energy Markets, *Small-scale Technology Certificates data modelling for 2014 to 2016, Report to the Clean Energy Regulator*, January 2014, p.32-35.

Most market analysis predicts the sector to grow steadily. Green Energy Markets have forecast the installation of commercial-scale solar PV systems to grow by 20 per cent from 2014 to 2015, and by 25 per cent in 2016.[57] Bloomberg New Energy Finance projects that 19 per cent of commercial and industrial premises will have installed rooftop solar PV by 2020, rising to 33 per cent by 2030. This is lower than the penetration rate forecast for residential buildings (53 per cent by 2020), however it still represents a significant increase in capacity.[58]

The Energy Supply Association of Australia supports lowering the threshold, arguing deeming arrangements provide an advantage for larger solar PV systems not available to LRET projects:

> *Another option could be to reduce the 100 kW threshold for eligibility for the SRES to a lower level, providing that the threshold for up-front deeming was moved to the same level. The ESAA considers that this would provide better incentives. It would allow households and businesses installing small systems to continue to receive the benefits of deeming, while ensuring certificates for larger systems were allocated more accurately on actual generation. Moving medium size solar PV (or other) systems into the LRET would also create a more level playing field across the range of renewable technologies as they develop further. (Energy Supply Association of Australia, p.4)*

Origin Energy submitted:

> *We suggest the best solution is to roll the schemes back together into one. However, another plausible option is to reduce the threshold of the system size eligible under the SRES from the current level of 100 kW to about 5 kW. This would mean that larger systems would be part of the LRET, with no deeming. The SRES could then be phased out as panel costs for small-scale systems decrease over time. (Origin Energy, p.13)*

In contrast, the Property Council and Tindo Solar argued for increasing the SRES threshold to 250 kW and 500 kW respectively, to encourage commercial installations. Other businesses with interests in commercial-scale solar systems suggested that lower uptake in the commercial sector could stifle an emerging market that the industry is hoping will help to fill the gap created by lower demand for residential systems. For example, power and automation technology company ABB Australia, argued against reducing the threshold, submitting:

> *ABB's view is that there is no strong economic justification for a reduction in the SRES upper threshold of 100 kW or deeming arrangements, which could negatively affect the adoption of solar PV solutions within the commercial sector. (ABB Australia, p.4)*

Similarly Yingli Solar argued:

> *Lowering the 100 kW threshold for access [to] SRES support would reduce the ability of small and medium businesses to invest in solar – and their ability to take control of their own power bills in the future. (Yingli Solar, p.4)*

Lowering the threshold introduces the compliance costs of the LRET to medium-scale solar PV systems, where generation must be metered and certificates claimed annually rather than upfront.

[57] Green Energy Markets, *Small-scale Technology Certificates data modelling for 2014 to 2016, Report to the Clean Energy Regulator*, January 2014, p.35.
[58] Bloomberg New Energy Finance, *Australia Insight - Solar - Research note: Australia's 20 GW small-scale solar future*, June 2014, p.7.

The Panel considers that a suitable threshold would be around 10 kW, consistent with the threshold for small-scale wind systems. This would mitigate the risk that a potential boom in commercial-scale installations could add substantial costs to the SRES, while enabling households to access deeming arrangements that reduce the upfront cost of a system and avoid administrative costs associated with claiming certificates annually.

6.5 Reforming the SRES: Conclusions

The SRES has already exceeded the original expectation of achieving a minimum of 4,000 GWh of annual generation.[59] System costs for rooftop solar PV installations and out-of-pocket costs for consumers have declined rapidly since 2009 and although the number of new installations has fallen from its peak, installations have continued at high levels despite significant reductions in support.

The cost of reductions in CO_2-e emissions achieved by the SRES is very high, in the order of $100 - $200 per tonne. On this basis its role as an emission reduction tool cannot be justified when other CO_2-e emissions reduction policies are available at much lower cost.

The combination of significant cost reductions and the increase in retail electricity prices means that the industry is becoming commercially viable. Even in the situation where capital costs do not decline as quickly as expected, the modelling suggests that the uptake of small-scale solar PV remains reasonably strong. Given its high abatement costs, and the fact that it adds proportionally higher costs to households and businesses than the LRET, the Panel considers that the SRES should be wound back.

Under the SRES subsidies are provided at the time a unit is installed, unlike under the LRET where the cross-subsidy continues to be paid until 2030. As a consequence repealing the SRES gives rise to no adverse effect on existing owners of small-scale systems.

The ACIL Allen modelling indicates that while repealing the SRES would have an immediate effect on the sector by reducing the annual amount of PV generation capacity being installed by around a third, and the number of solar hot water systems by around 16 per cent, these reductions would be only short-lived. The amount of generation capacity and solar hot water systems being installed each year would recover by the early 2020s. The modelling found that growth in small-scale systems would continue under all scenarios modelled and total investment in small-scale systems over the period to 2040 would not vary by more than 16 per cent under any scenario.

However, the immediate effects of repeal of the SRES on the industry could be significant, including job losses and the possible stranding of investments made by the small-scale industry in manufacturing facilities.

An alternative to immediately ending the SRES would be to adopt an earlier phase-out. This could soften the impact on the industry, allowing it to transition to its long-term sustainable level. While this would delay some of the benefits to the broader community of removing the full cost of the cross-subsidy, it would mitigate the impact of a severe contraction on the interests of those who have invested in parts of the small-scale supply chain (as distinct from those who have invested in the systems themselves). An appropriate transitional approach would be to accelerate the

[59] The Clean Energy Regulator estimates that small-scale generation units supported by the RET generated or displaced the equivalent of 6,400 GWh of electricity in 2013.

currently legislated phase-out of the SRES by bringing forward the end date of the SRES from 2030 to 2020, and reducing the deeming period.

This provides the industry with time to adapt and innovate, developing products to target new customers. It also provides a predictable, smoother transition, and may allow time for energy market reforms to deliver more efficient signals for investment in distributed generation.

There is a risk that the uptake of solar PV in the commercial sector could increase rapidly before 2020. This would reduce the cost savings achieved from the accelerated phasing out of the scheme. To safeguard against this the Panel considers that, if the SRES is to continue, the threshold should be reduced from 100 kW to 10 kW.

Recommendation 3: The Small-scale Renewable Energy Scheme (SRES) should be amended in one of the following two ways:

Option 1 – Abolition

In order to address the cost of the SRES (and its effect on electricity markets), the Panel recommends that it be closed immediately in the following manner:

a. The SRES should terminate upon announcement.

b. Those who contracted before the announcement for the installation of a small-scale system should receive the certificates they would have done.

or

Option 2 – Bring forward the phase-out of the SRES

To reduce the cost of the SRES while providing some support for new small-scale renewable systems, the Panel recommends that the phase-out of the SRES be brought forward in the following manner, to take effect immediately:

a. Bring forward the last year of operation of the SRES from 2030 to 2020.

b. Reduce the period for which certificates may be created for rooftop solar PV systems from 15 years to 10 years, and in each year from 2016 onwards further reduce the period for which certificates may be created, as set out below:

Rooftop solar PV: period certificates may be created

Year installed	Period
Prior to announcement	15 years
From announcement	10 years
2016	9 years
2017	8 years
2018	7 years
2019	6 years
2020	5 years
2021	Scheme closed

c. Reduce system size eligibility threshold for rooftop solar PV systems from no more than 100 kilowatts to no more than 10 kilowatts.

d. Reduce the period for which certificates may be created for solar and heat pump water heaters by one year each year, commencing in 2016, as set out below:

Rooftop solar PV: period certificates may be created

Year installed	Period
Prior to 2016	10 years
2016	9 years
2017	8 years
2018	7 years
2019	6 years
2020	5 years
2021	Scheme closed

7 OTHER ISSUES FOR THE REVIEW

7.1 Exemptions

The RET scheme contains two types of exemptions. The first is a partial exemption for electricity used by businesses conducting EITE activities. The second is a full exemption from liability under the scheme for entities producing and consuming their own electricity, provided certain conditions are met.

The number of certificates required to be surrendered under the LRET and SRES each year is not adjusted for the exemptions granted under the scheme. Consequently, the exemptions have no impact on the level of renewable energy generation supported by the RET. However, this means the exemptions have the effect of increasing the costs of the scheme for non-exempt electricity consumers as certificate costs are borne by a smaller number of electricity consumers than would be the case in the absence of the exemptions.

7.1.1 Emissions-intensive and trade-exposed activities

With the expansion of the RET in 2010, businesses conducting EITE activities were granted a partial exemption from liability on a similar basis to arrangements being developed under the proposed Carbon Pollution Reduction Scheme (CPRS). The Government considered that a partial exemption should be provided in recognition of the combined impact of the higher RET targets and the CPRS on emissions-intensive businesses that are price-takers in a global market.

The exemption is only applicable to the portion of RET liability above the original MRET liability, EITE businesses face the cost of the RET that relates to the original 9,500 GWh of liability under the MRET. At the time the RET was expanded, the Australian Government considered whether the partial exemption should be extended to the MRET component, ultimately deciding to retain the original approach on the grounds that businesses had incorporated MRET costs into their operations and had not faced carbon related costs to that point in time. The Government at the time considered it reasonable to require all businesses to contribute towards the cost of deploying renewable energy.

The exemption is provided through a PEC issued by the CER to EITE businesses. Each PEC represents a volume of electricity, in MWh, to which RET costs will not apply for a given year. EITE businesses exchange the PECs with their electricity suppliers in return for lower electricity costs. The suppliers then surrender these PECs to the CER to reduce the total number of STCs and LGCs that they must surrender to meet their liabilities under the scheme. Where an EITE business is directly liable under the RET, the PEC is deducted from the amount of electricity that would otherwise attract a RET liability.

Highly emissions-intensive businesses are eligible to receive a 90 per cent exemption of their RET liabilities above the MRET amount, while moderately emissions-intensive activities are eligible for a 60 per cent exemption above the MRET amount. Accounting for the MRET component, in 2013 this translated to an exemption rate of around 75 per cent for highly emissions-intensive activities and around 50 per cent for moderately emissions-intensive activities.[60]

[60] Information provided by the Clean Energy Regulator to the RET Review Secretariat.

However, many large energy users argue that the cost of the RET remains significant, with some indicating they have not benefited from any reduction in wholesale prices which may be attributed to the RET due to the nature and duration of their electricity supply contracts.

Stakeholders suggested a number of ways in which the EITE exemption may be increased to reduce or remove the cost of the RET for EITE businesses. A number of stakeholders including Rio Tinto, Alcoa and the Australian Aluminium Council, Australia Pacific LNG, the Cement Industry Federation, the Australian Industry Greenhouse Network, the Business Council of Australia, the Australian Petroleum Production and Exploration Association, the Chamber of Minerals and Energy of Western Australia and the Tasmanian and Queensland State Governments support increasing the exemption for EITE businesses, with some suggesting a 100 per cent exemption. For example the Queensland Government stated:

> *The Queensland Government supports amendment of the application of the RET to assist in alleviating some of the cost burdens being experienced by emissions intensive businesses across Australia. If the Commonwealth decides to retain the RET, Queensland recommends that highly Emissions-Intensive Trade-Exposed businesses be given a 100% exemption from liability. (Queensland Government, p.5)*

As an alternative, some stakeholders suggested that the exemption could be extended to cover the MRET component. This would result in an exemption of 90 per cent for highly emissions-intensive businesses and 60 per cent for moderately emissions-intensive businesses from the full RET liability.

Nyrstar commented that:

> *Nyrstar would also encourage the Expert Panel and the Government to consider extending the PECs to cover the initial 9,500 GWh target on the basis that international competitiveness has significantly eroded through the appreciation of the Australian dollar since the inception of the RET in 2001.(Nyrstar, p.2)*

Additionally, specific industries raised issues relating to the definition of their activities under the regulations. The LNG and cement industries requested the respective definitions be expanded to cover additional aspects of their operations (in addition to increasing the level of partial exemption from 60 to 100 per cent). For example, Australia Pacific LNG submitted:

> *APLNG supports the APPEA submission which recommends that effective assistance be provided for the LNG industry by:*
>
> - *Providing a headline assistance rate of 100%*
> - *Refining the definition of the LNG industry so that it incorporates the full LNG process (both upstream and downstream) and applying it so that it takes into account new projects. (Australia Pacific LNG, p.2)*

Extending the assistance provided to EITE businesses increases the volume of liable electricity covered by the exemption. In turn, this transfers a greater share of the cost of the RET to all other electricity consumers. For example, the Independent Pricing and Regulatory Tribunal noted:

> *As the overall RET target is kept constant, these exemptions raise the costs of complying with the scheme for all other electricity customers, particularly as the exempted industries can be large users of electricity and account for a significant proportion of electricity use in Australia. (Independent Pricing and Regulatory Tribunal, p.5)*

These views were supported by the renewable energy industry and consumers groups. For example, Acciona submitted:

> *Any exemption arrangement spreads the cost of compliance over a smaller pool of liable entities. Based on the Review's interest in ensuring the lowest cost outcome for consumers, it seems counterproductive that the Review would consider further increasing the exemptions from the RET. (Acciona, p.18)*

The Australian Aluminium Council noted that recalibrating the LRET to a 'real 20 per cent' with a 100 per cent exemption for EITE businesses could result in reduced costs to both industry and households:

> *This provides the flexibility to reduce RET costs for the aluminium industry and for all other electricity users – other EITE industries, non-EITE industry, commercial users and households. Furthermore, it would not leave existing renewables investments stranded and even achieve 20% renewable electricity generation, if that is desired. (Australian Aluminium Council, p.10)*

Alternatively, some submitters suggested that the portion of electricity covered by the EITE exemption could be removed from the calculation of electricity demand used to establish the targets in order to avoid increasing costs to other electricity users. For example, the Australian Chamber of Commerce and Industry stated:

> *On balance, we would support a continuation of EITE assistance under the RET but recommend that the target be adjusted downwards to exclude the EITE component so that costs to non-EITE consumers are at least contained to a target that matches their electricity consumption. We note that if the RET were to be abolished, no EITE arrangements would be needed. (Australian Chamber of Commerce and Industry, p.18)*

Currently, the portion of electricity that falls under the EITE exemption accounts for around 13 per cent of liable electricity. Extending the exemption to cover the MRET component would increase the portion of electricity covered by the exemption to an estimated 18 per cent and to an estimated 20 per cent if a 100 per cent exemption was provided to all EITE businesses.[61]

It is further estimated that extending the exemption to cover the MRET component would add a further $2 per year and $13 cumulative to 2020 to household bills. Providing a 100 per cent exemption would add $4 in 2015 and $26 cumulative to 2020.[62]

If the LRET was closed to new entrants from 2015, extending the EITE exemption to cover the MRET component is estimated to increase household bills by an extra $2 in 2015 and by around $11 cumulative to 2020. Providing a 100 per cent exemption is estimated to add an extra $2.50 in 2015 and around $15 cumulative to 2020.[63]

[61] Calculations based on ACIL Allen forecast EITE electricity prices, assuming 90 per cent of EITEs are eligible for a 90 per cent assistance rate with average residential consumers using 6,800 kWh per annum.
[62] Ibid.
[63] Ibid.

Other businesses, ranging from small and medium enterprises to large manufacturers, not conducting EITE activities would also face higher electricity costs. These higher costs would vary greatly according to electricity use, but for many the increase in costs would be larger than for households both in dollar and percentage terms. Some of these businesses, in particular in the manufacturing sector, also face international competition even though they fall outside the definition of 'emissions intensive' and currently receive no relief from the RET costs.

The Panel notes the concerns raised by EITE businesses about the cost of the RET. However the rationale for providing the exemption was to reduce the combined impact that a carbon tax and higher RET costs would have on EITE businesses. The repeal of the carbon tax will lower electricity prices for all consumers. If adopted, the Panel's recommendations on both the LRET and the SRES would reduce the costs of the RET faced by EITE businesses in the future compared with current settings. The Panel also notes that changes to exemption arrangements for EITE businesses are likely to have a much smaller impact than factors such as exchange rate movements and global supply and demand conditions for goods produced by EITE businesses, which are likely to be far more important determinants of profitability. Given these factors, it is difficult to justify extending the exemption arrangements for EITE businesses considering the additional cost this would impose on other electricity consumers.

Recommendation 4: The current partial exemption arrangements for emissions-intensive trade-exposed businesses should be maintained.

7.1.2 Self-generation exemption

Self-generators that consume the electricity they produce within one kilometre of the point of generation or via a dedicated line are exempt from liability under the RET. This exemption has been in place since the commencement of the scheme in 2001.

The Panel heard from a number of stakeholders that the operation of the self-generation exemption is arbitrary and poorly aligned with the original intent. Broadly, these concerns fit into two categories:

- The ownership, distance and dedicated line requirements restrict resource projects from qualifying for the exemption.
- The REE Act creates unintended consequences for remote resource projects that provide small amounts of electricity from an otherwise dedicated line to remote communities and for the purpose of supporting public infrastructure such as mobile phone towers that are crucial in providing support to emergency services in remote areas.

A number of stakeholders including the Australian Petroleum Production and Exploration Association, the Chamber of Minerals and Energy of Western Australia, the Australian Industry Greenhouse Network and Rio Tinto requested substantial changes to the exemption arrangements on the basis that the current eligibility requirements unduly restrict self-generators from accessing the exemption. For example the Australian Industry Greenhouse Network submitted:

> *The one kilometre radius restriction for the self-generator exemption is unnecessarily prescriptive and does not take into account the operation of large industrial industries, such as steel manufacturing. For example, a significant amount of Port Kembla Steelworks' manufacturing activities lie outside the one kilometre radius from point of generation used in the self-generator exemption. It is also not always possible for the transmission line from the*

> *self-generated electricity to be used solely for transmission between the point of generation and point of use. These restrictions are unnecessarily prohibitive for large industries. (Australian Industry Greenhouse Network, p.17)*

Rio Tinto suggests amending the self-generation exemption to enable resource projects to expand without penalty, by removing the requirement for a dedicated line and/or removing the one kilometre limit between generation and consumption. Rio Tinto also suggest increasing the 100 MW grid capacity threshold for attracting liability under the RET. The Australian Petroleum Production and Exploration Association broadly supports this position and raised the possibility of resource projects combining to share generation and network infrastructure to avoid duplication if the criteria around the self-generation exemption was relaxed:

> *A number of contemporary or planned projects may not meet the strict eligibility criteria outlined above. Project proponents may then be forced to make development decisions that are non economic, purely to meet the requirements of the Act. (Australian Petroleum Production and Exploration Association, p.13)*

However, not all submissions supported changes to the self-generation exemption. For example, West Wind Energy submitted:

> *With the low cost of renewable energy options available today for self-generators we do not see the merit in exempting self-generators from the RET. In fact, these generators are most likely to benefit financially from incorporating renewable electricity generation systems. Taking away the current exemption would most likely further encourage them to review their power generation options and help reduce emissions. This would be in line with the objectives of the RET whereas exempting these parties is not. In fact, it raises the question whether self generators using renewable energy sources could on one hand sell LGCs and benefit from the RET whereas on the other hand they are exempt from the obligations under the RET. (West Wind Energy, p.7)*

The Panel heard from a number of stakeholders including Alcoa, Telstra and the Australian Industry Group that the dedicated line restriction has created unintended consequences by preventing the supply of small amounts of electricity to third parties who provide essential services. For example, Alcoa supplies self-generated electricity to its refining facilities at Wagerup and Pinjarra but also provides small amounts of electricity to remote community services including a police station and a community radio station. As a result, Alcoa faces a RET liability for the electricity it consumes along these otherwise dedicated lines. Alcoa submitted:

> *To retain the self-generation exemption, including a dedicated line, the Act requires that the line be used 'solely' for the purposes of transmitting electricity between the two sites. When Alcoa declared this situation to the Clean Energy Regulator, it was advised the exemption no longer applied and Alcoa would need to purchase Renewable Energy Certificates for the relevant usage. The unintended consequence added over $800,000 cost in additional REC purchases in 2013 alone. Options to avoid this high cost include disconnecting the incidental users or seeking amendment to the Act. (Alcoa, p.2)*

The Australian Industry Group's submission stated:

> *These off-takes enable valuable services to be provided to the local communities in which they are based. Those services may otherwise not be provided as the cost of investing in new infrastructure to secure their own, often very small requirement for electricity, would be prohibitively high. (Australian Industry Group, p.9)*

Amendments to the self-generation exemption need to balance accommodating the circumstances of different resource projects with the potential for increasing costs to non-exempt parties, including households. Additionally, the EITE and self-generator exemptions interact to the extent that a large energy user may qualify for partial exemption for the portion of electricity that is not covered by the self-generation exemption.

Expanding the self-generation exemption reduces the volume of liable electricity covered by the RET and proportionally increases RET costs faced by all other electricity consumers. However, the Panel considers the current self-generation exemption criteria to be too restrictive and not well aligned to the nature and geographical spread of remote resource projects. To the extent that the application of the strict eligibility criteria has resulted in genuine self-generators facing RET costs through project expansions beyond the one kilometre restriction, amendment to the exemption arrangement is warranted.

The Panel considers that criteria for a dedicated line between the point of generation and the point of consumption (where consumption is outside the distance boundary) should remain in place. Removing this rule and allowing electricity supplied and used by the same legal entity to be exempt, while placing a liability on electricity supplied to third parties potentially creates complicated measurement and reporting arrangements to determine the amount that would be liable. However, the Panel recommends that self-generators should be permitted to supply incidental amounts of electricity to third parties for community services on an otherwise dedicated line while still being eligible for the exemption. Implementation arrangements for the recommendations concerning the self-generation exemption are further discussed in Section 10.3.

Recommendation 5: The self-generation exemption should be amended to extend the one kilometre radius restriction and to permit self-generators to supply incidental amounts of electricity (below a set threshold) to third parties without attracting a RET liability. The Government should consult with affected parties to determine an appropriate distance limit and threshold for incidental off-takes.

7.2 Native forest wood waste

The Terms of Reference for the Review require the Panel to consider the Government's election commitment to reinstate native forest wood waste as an eligible renewable energy source under the RET scheme.

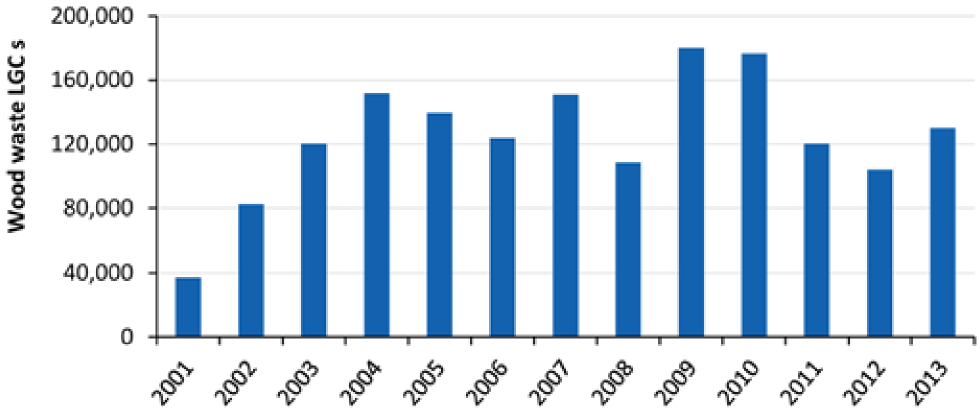
Native forest wood waste was included as an eligible source of renewable energy when the MRET was established in 2001. Eligibility was conditional upon the wood waste being harvested under a Regional Forestry Agreement and complying with relevant government planning and approvals processes. Generators also needed to demonstrate that the wood waste was a genuine by-product of higher value logging activities. The use of native forest wood for the sole or primary purpose of generating renewable electricity has never been eligible to create certificates under the scheme.

Native forest wood waste was eligible for certificates under four of the five wood waste sub-categories, but only had to be specified as native forest wood waste when classified under the sub-category of 'biomass from native forest waste'. The other eligible sub-categories of native forest wood waste were: manufactured wood product; waste products from construction or furniture; and sawmill residue. Eligibility under these sub-categories did not require the source (non-native or native forest) to be specified.[64] Between 2001 and 2013, wood waste electricity generation (including native forest waste) created over 1.6 million certificates under the RET scheme.[65]

In November 2011, eligibility for native forest wood waste under the four eligible sub-categories of wood waste was removed from the RET. Transitional measures were introduced for the 22 power stations that listed wood waste as an eligible energy source and are effective until 2020. The transitional measures allow these power stations to create certificates under the superseded regulations for eligible electricity generation from wood waste (including native forest waste), below a contingent annual cap. Generation above the annual cap is considered under the current regulations; meaning it is only eligible if it comes from non native wood waste sources.

The amount of LGCs created from wood waste is illustrated in Figure 41. Except for the years 2009 and 2010, the long-term trend in the number of LGCs from wood waste has remained relatively stable despite the removal of native forest wood waste in 2011. LGCs created from wood waste often trade at a discount compared to certificates created from other renewable energy sources. Fluctuations in the number of certificates created from wood waste are more likely to be dependent on specific industry trends (like domestic and international demand for forestry products) as the wood waste is a by-product of higher value forestry activities.

Figure 41 LGCs created for wood waste generation, 2001 - 2013



Source: Clean Energy Regulator Register of Large-scale Generation Certificates.

As part of its election commitments, the Government announced that it would reverse the exclusion of native forest sourced wood waste as an eligible source of energy for RECs.[66] The Panel's *Call for Submissions* paper asked stakeholders to comment on the administrative and regulatory arrangements that should be in place to ensure that the reinstatement of native forest wood waste is consistent with the sustainable management of native forests.

There were 46 submissions in response to this question. In general, these submissions focussed on the framework for the sustainable management of forests and whether native forest wood waste should be considered an "ecologically sustainable" renewable energy source in the RET, rather than the regulatory arrangements that could be in place to support its reintroduction.

[64] The fifth category, "non-native environmental weeds harvested for control or eradication", has never included native forest wood waste.
[65] This includes wood waste from both native and non-native sources. Of the four eligible categories for native forest wood waste; only one certificate was created from the category "biomass from native forest wood waste" between 2001 to 2011.
[66] The Coalition's Policy for a Strong and Sustainable Forestry Industry, September 2013.

Forestry bodies, the Australian Sugar Milling Council, and state governments (New South Wales, Victoria, and Tasmania) supported reinstatement for a number of reasons. The Australian Forest Products Association noted that the:

> *Existing high standards and regulatory arrangements operating in Australia more than adequately deal with:*
>
> - *the sustainable environmental management of wood waste used for renewable energy; and*
> - *the use of wood waste as a by-product of existing logging practices rather than as an additional primary activity. (Australian Forest Products Association, p.7)*

The Australian Sugar Milling Council noted that:

> *Given that the product is wood waste, that is currently incinerated or decomposed, it is unclear why the handling or inclusion of the resource has been considered problematic. (Australian Sugar Milling Council, p.14)*

The regulation of logging activity is managed by state and territory governments through forestry plans, such as Regional Forestry Agreements, and requires harvesting to be conducted in accordance with ecological sustainability requirements. The Tasmanian Government noted in its submission:

> *Tasmania considers that there is a strong case for the reinstatement of renewable energy derived from native forest wood. Approval under a Regional Forest Agreement (RFA) should be accepted as sufficient evidence of sustainable management. (Tasmanian Government, p.3)*

The New South Wales Government submitted that:

> *It is considered that concerns regarding forest biomass utilisation are best addressed through alignment of State-based regulations. There is agreement between State and Commonwealth Governments in relation to forest operations (especially with respect to sustainability) through processes such as the Regional Forest Agreements. (New South Wales Government, p.20)*

In contrast, environmental and community groups raised concerns about the potential impacts of reinstatement on native forests. The Conservation Council of South Australia argued that:

> *There is a real danger that the move by the Federal Government to reinstate biomass from non-plantation native forests to be eligible under the RET, will again drive unsustainable practices, and prolong unsustainable forestry practices. (Conservation Council of South Australia, p.18)*

The WA Renewable Energy Alliance stated in its submission:

> *We believe that such a reinstatement would be an unnecessary distraction to the RET. It would also risk the loss of the significant mainstream community support for and confidence in renewable energy as a whole. (WA Renewable Energy Alliance, p.34)*

Other interested parties, such as the Clean Energy Council, Keppel Prince Engineering and Acciona were impartial to reinstatement of native forest wood-waste provided that implementation arrangements are consistent with the sustainable management of native forests.

The Panel has not been presented with any evidence that, under the previous arrangements, eligibility of native forest wood waste promoted unsustainable logging activities. Concerns about sustainable logging of native forests more broadly are outside of the scope of this review. In contrast to disposing of native forest wood waste by either incineration or allowing the waste to decompose, utilising the wood waste in a power station may be a more efficient use of resources and lead to lower CO_2-e emissions by reducing the use of gas or coal.

State and territory governments have responsibility for ecologically sustainable management of forests and control the amount of logging activity that can occur in native forests. This acts as a safeguard to limit the amount of eligible wood waste that is available for electricity generation. If states or territories change the regulations regarding harvesting native forests, the wastes from native forests could increase and be subsequently burned for electricity generation. However, no evidence has been provided to the Panel that demonstrates eligibility under the RET would create an incentive for ecologically unsustainable logging practices in native forests. Reintroducing an appropriate accreditation mechanism, as was in place between 2001 and 2011, would provide a further safeguard for potential unintended consequences.

In conclusion, the Panel supports the reinstatement of native forest wood waste as an eligible renewable energy source under the RET and considers that this should be based upon the regulations that previously governed its eligibility. As mentioned above, the previous regulations provided eligibility on the condition that native forest wood waste was being harvested under a Regional Forestry Agreement, complied with relevant government planning and approvals processes, and were demonstrated to be genuine waste. The superseded regulations would also provide for consistent accreditation rules between existing accredited wood waste generators and newly accredited generators.

Recommendation 6: The Government's commitment to the reinstatement of native forest wood waste as a renewable energy source under the LRET should be implemented through the reintroduction of the relevant regulations in force prior to 2011.

7.3 Frequency of reviews

Section 162 of the REE Act requires that the Climate Change Authority (CCA) review the scheme every two years. The Government is committed to abolishing the CCA and a CCA abolition bill is currently before the Parliament. This bill would amend the REE Act so that the biennial reviews are conducted by a body or person nominated by the Minister for the Environment.

The Panel heard evidence from a wide range of stakeholders across the energy sector that frequent statutory reviews undermine investor certainty and hinder the achievement of the scheme's objectives, For example, IFM Investors stated:

> *Consistent with our views around the importance of taking a long term view in an environment of investment certainty, the potential for changes to the scheme every two years is counter-productive as it introduces uncertainty and increases risk. Investment in Australian infrastructure is a long term investment, and it is not possible to make long term decisions if the rules change every two years. (IFM Investors, p.4)*

A common suggestion from stakeholders was that reviews should be no more frequent than four or five years. However, others recognised that simply reducing the frequency of reviews would not remove the risk that a statutory review would lead to significant changes to the scheme and suggested that the scope of such reviews also needs to be constrained. Hydro Tasmania stated:

> *We believe that the RET should be reviewed no more frequently than every four years and ideally less frequently than that. Further, for investor certainty to return to the RET, it is essential that future reviews can only increase annual targets and not recommend significant negative changes to the measure.(Hydro Tasmania, p.14)*

The broad nature of the statutory reviews and the possibility that they may lead to significant change to the scheme also leads participants to divert attention and resources to engaging with the reviewer to ensure that their interests are taken into consideration. The Victorian Department of State Development, Business and Innovation considered the two yearly review cycle burdensome on participants and suggested the review period be extended or removed.

A number of other stakeholders, including the Clean Energy Council, also favoured disposing of statutory reviews altogether. Vestas Wind argued:

> *It is utterly counterproductive to review a policy every two years when that very same policy is aimed at attracting investment in power stations with effective lives of more than 20 years.*
>
> *While we understand and accept that any government can review any of its policies any time it likes, the existence of a legislative requirement to review the RET every two years is a cumbersome and counterproductive provision and it should be removed.*
>
> *We believe the RET should not have statutory reviews in the interest of providing certainty to both renewable and conventional energy markets and reducing the cost of capital for both. The existence of statutory reviews merely prevents all players in the industry from getting on with the job in front of them and the current review process has effectively a form of paralysis by analysis, and has made the achievement of the annual LRET targets more difficult. (Vestas Wind, p.19)*

The legislated requirement for biennial reviews was not present in the original 2001 legislation, but was introduced with other changes in 2010. In practice the institution of biennial reviews has resulted in the scheme operating under the shadow of constant review since 2010. The ongoing speculation that the next review could lead to significant or material change to the scheme has had a detrimental effect on investors' willingness to make binding investment decisions and is likely to have led to higher financing costs because of heightened perceptions of increased regulatory risk. Any feature that generates such uncertainty undermines the scheme's primary purpose of encouraging investment in long-life assets.

Moreover, the provision is redundant as it is always open to the Government to initiate a review at any time when it considers that circumstances warrant one. As the Clean Energy Council acknowledged, this point in time is very difficult to predict and therefore legislate in advance.[67]

Recommendation 7: The requirement for statutory reviews of the scheme should be removed from the *Renewable Energy (Electricity) Act 2000.*

[67] Clean Energy Council Submission to RET Review Issues Paper, p.26.

8 INTERACTION WITH OTHER POLICIES AND MEASURES

The Terms of Reference require the review to consider the interaction of the RET scheme with other Commonwealth and state/territory policies and regulations, including the Direct Action policies under development.

A range of national and state based climate change and energy policies affect the renewable energy sector and potentially have an impact on the operation and effectiveness of the RET. This chapter focusses on the following Commonwealth and state/territory policies:

- The Government's Direct Action Plan, specifically the ERF
- State, territory and local government renewable energy targets
- State and territory feed-in-tariffs, and energy efficiency and GreenPower schemes
- State and territory general planning regulations
- Reforms to energy markets and electricity pricing

8.1 Direct Action and the Emissions Reduction Fund (ERF)

The ERF is central to the Government's Direct Action Plan, which aims to meet Australia's CO_2-e emissions reduction target of five per cent below 2000 levels by 2020.

Through the ERF, the Government intends to purchase CO_2-e emissions reductions at the lowest available cost and has allocated $2.55 billion over four years from 1 July 2014. A reverse auction process will be established whereby confidential bids will be submitted to the CER, specifying emission reductions at a nominated price, with auction rounds beginning in late 2014 and running quarterly.[68]

The ERF will be designed to link the existing Carbon Farming Initiative, supporting emission reductions from agricultural and forestry activities, with new projects such as industrial and commercial energy efficiency and emissions avoidance projects. The Government will only pay for emission reductions after they have been delivered and measured and that are genuine, additional reductions.

The ERF will also include a CO_2-e emissions safeguard mechanism. This mechanism will apply to a small number of large facilities and will be designed to ensure that CO_2-e emissions reductions paid for by the ERF are not displaced by significant increases in CO_2-e emissions elsewhere in the economy.[69] The safeguard mechanism is scheduled to begin in July 2015. Details of its design, operation, and how it might affect the electricity sector are still to be determined. Given the significance of electricity to Australia's CO_2-e emissions profile the Government has committed to consulting with the sector on the specific application of the safeguard mechanism and its interaction with the RET.[70]

[68] Commonwealth of Australia, *Emission Reduction Fund White Paper*, 2014, p.11.
[69] Ibid, p.12.
[70] Ibid, p.57.

8.1.1 The relationship between the ERF and the RET

Both the RET and the ERF have the potential to contribute towards meeting the Government's stated CO_2-e emissions target following the abolition of the carbon tax.

The ERF White Paper states:

> [The] *ERF will operate alongside existing programs that are already working towards reducing Australia's emissions growth, such as the Renewable Energy Target and energy efficiency standards on appliances, equipment and buildings.*
> *(Commonwealth of Australia, Emission Reduction Fund White Paper, p.7)*

Many in the renewable energy industry, such as the Clean Energy Council and Hydro Tasmania, consider that the two schemes can work in parallel. For example, Hydro Tasmania considers that:

> *In particular, the long-term design of the RET makes it an appropriate mechanism to support energy sector investments which may not be supported under Direct Action's Emissions Reduction Fund, due to its shorter five-year abatement contracting window. (Hydro Tasmania, p.2)*

A number of stakeholders have further argued that in the absence of a specific price on carbon, both the RET and the ERF are needed to meet the Government's CO_2-e emissions reduction target. These stakeholders generally argue that reducing or removing the RET would mean more emissions reductions are needed through the ERF which may require additional funding.

The Grattan Institute, for instance has argued that:

> *Under the Direct Action Plan, there is a target for emissions reduction, but no binding cap. Therefore the two primary mechanisms, the Emissions Reduction Fund (ERF) and the RET will both contribute to emissions reduction. Other things being equal, changes to the RET change the emissions reduction load that would have to be delivered by the ERF.*
> *(The Grattan Institute, p.5)*

On the other hand some stakeholders such as the Business Council of Australia suggest that the ERF should be the primary mechanism to reduce emissions:

> *The government's stated objective in the Emissions Reduction Fund Terms of Reference is to "invest in technologies that will reduce our emissions at lowest cost". Given that the RET is an expensive form of abatement, the government should seek to meet the bipartisan commitment to reduce Australia's emissions by five per cent by 2020 on 2000 levels through its primary mechanism the Emissions Reduction Fund. (Business Council of Australia, p.14)*

This view is supported by the Australian Industry Greenhouse Network:

> *The new policy environment poses some serious questions as to how the RET can be reconciled with broader climate policy. The cost of abatement under the RET will be considerably higher than under the Emissions Reduction Fund. On this basis, it is very hard to maintain a case for the continued existence of the RET, given that it will impose much higher abatement costs on one sector of the economy than are acceptable elsewhere.*
> *(Australian Industry Greenhouse Network, p.12)*

8.1.2 Eligibility of projects

It seems clear that the ERF and the RET could both contribute toward the Government's CO_2-e emissions reductions targets and there is some potential for duplication between the two schemes. The Panel is of the view that projects should not be eligible for funding under the ERF if they are eligible for support under the RET.

Recommendation 8: Projects, or components of projects, receiving support under the RET should be excluded from participating in Emissions Reduction Fund auction processes.

8.2 Other Commonwealth policies that support renewable energy

8.2.1 The Australian Renewable Energy Agency (ARENA) and the Clean Energy Finance Corporation (CEFC)

ARENA was established to support the research, development and demonstration of renewable energy technologies. ARENA has two broad objectives: to improve the competitiveness of renewable energy technologies; and to increase the supply of renewable energy in Australia. ARENA is supporting more than 190 projects, worth close to $2.5 billion, with around $1 billion of funding from ARENA.[71] These projects span the innovation chain, but most are at the research and development stage and have a value under $10 million. At the point of writing, the Government has introduced legislation to transfer ARENA's commitments to the Department of Industry. Support for projects with funding agreements in place will continue.

The CEFC was established to help overcome capital market barriers that hinder the financing, development and commercialisation of renewable energy, low emission technologies and energy efficiency. The CEFC generally finances projects and technologies at the later stages of development that have a positive expected rate of return and the capacity to service and repay capital. Its focus is on improving the risk understanding of co-financiers and using financial aggregation to attract investment in clean energy.[72] It is funded through the provision of $2 billion per annum in investment funds provided by the Australian Government. The Australian Government has introduced legislation to abolish the CEFC.

Ultimately, the future of ARENA and the CEFC is a matter for the Australian Government and the Parliament to determine. The Panel notes that ARENA and the CEFC are directed at increasing the range of technologies that could become competitive with already established renewable energy technologies, and to this extent these programs serve a different purpose to the RET.

However, the Panel notes that the CEFC has also provided support for established renewable energy technologies – specifically wind farms – through debt financing or re-financing contributions. Should the CEFC continue to operate, the Panel is of the view that projects that have received support under the RET should not receive further assistance from the CEFC. In addition,

[71] Australia Renewable Energy Agency at a glance infographic http://arena.gov.au/about-arena/.
[72] Clean Energy Finance Corporation *Submission to the Review of the Renewable Energy Target*, May 2014, p.2.

the provision of non-commercial finance creates a risk of undermining investments based solely on support through the RET.

Similarly, ARENA is also able to provide support to a wide range of renewable projects, some of which may also receive support under the RET. The Panel is of the view that ARENA should focus on funding research and development and demonstration projects and should not fund proven technologies. Therefore, projects eligible to receive support under the RET should not receive further assistance from ARENA.

Recommendation 9: Projects that receive support under the RET should not be eligible to receive further assistance from the Clean Energy Finance Corporation or the Australian Renewable Energy Agency.

8.2.2 Solar Towns program

As part of the 2014-15 Budget, the Government committed to establish the Solar Towns program which will provide $2.1 million over three years to community groups to support the uptake of solar technologies.[73] The program will provide grants to support the installation of solar PV and solar water heater systems and reduce energy costs. It is likely that systems receiving assistance under the program would also be eligible to receive assistance under the RET. The Panel suggests that the Government consider the level of assistance available under the RET when designing the rules for the Solar Towns program to ensure that installations under the program are additional to what would have otherwise been achieved.

8.3 State, territory and local government policies

Most jurisdictions have at various times introduced polices that support the development and deployment of renewable energy. These policies have taken many forms including: state or local government renewable energy targets; direct subsidies or capital grants to deploy renewable energy; solar feed-in-tariff arrangements; regulations mandating particular technologies; and funding for research and development. In recent years most of these programs have been wound back as a result of concerns about their impacts on electricity prices, budgetary impacts and the introduction of national climate change policies. However some significant polices still remain in place as described below.

8.3.1 State and territory renewable energy targets

South Australia

The Government of South Australia has a number of commitments in relation to renewable energy including:[74]

- South Australia's Strategic Plan target of 33 per cent of the State's electricity production to be from renewable energy sources by 2020.
- South Australia's Strategic Plan target to limit the carbon intensity of total South Australian electricity generation to 0.5 tonnes of CO_2/MWh by 2020.
- An investment target of $10 billion in low carbon generation by 2025.

[73] Commonwealth of Australia, *Budget Measures Budget Paper No.2 2014-15*, p.130.
[74] The Government of South Australia, *Submission to the RET review*, p.1.

In 2012-13, renewables accounted for around 31 per cent of South Australia's energy production. The Panel notes that the targets stated by the South Australian Government largely rely on the RET in order to be met, rather than specific South Australian Government policies.

The Government of South Australia noted in its submission that there is a need for complementary jurisdictional policy in the area of renewable energy to ensure that the RET is achieved and considers that its renewable energy targets have also provided investors with assurance that renewable energy investment will be supported.

The Australian Capital Territory (ACT)

The ACT Government has established a target of 90 per cent of all electricity consumed in the ACT to be from renewable sources by 2020.[75] The ACT Government estimates that around 490 MW of additional large-scale generation capacity will be required to achieve this target, which it intends will be made up of 91 MW of solar, 382 MW of wind and 17 MW of energy from waste to energy projects. This is additional to capacity that will be installed under the RET.

In order to meet the target the ACT Government will issue large-scale feed-in-tariffs through a reverse auction process. Under this process the large-scale feed-in-tariffs will guarantee revenue for a maximum of 20 years through contract for difference based payments (i.e. the difference between the wholesale electricity prices and the agreed feed-in-tariff). As a condition of receiving the feed-in-tariff, any LGCs awarded will be surrendered to the ACT Government who will in turn surrender these to the CER under the GreenPower scheme, to ensure that the renewable energy generated is additional to the RET. Under the first solar auction the average feed-in-tariff price was $183/MWh, with the net cost to ACT electricity consumers being the difference between the feed-in-tariff and the wholesale electricity price. The first auctions for wind feed-in-tariffs are expected to be held in late 2014 and will result in additional wind capacity being constructed in the surrounding regions. The cost of meeting the ACT target will be passed on to ACT consumers through their electricity bills with total costs per household expected to peak in 2020 at around $5 per household per week.[76]

New South Wales (NSW)

In September 2013, the NSW Government released its Renewable Energy Action Plan. This Plan supports the achievement of the national goal for 20 per cent renewable energy by 2020.

The Plan has three overarching goals, namely to:

- attract renewable energy investment;
- build community support; and
- attract and grow renewable energy expertise.

[75] Minister for the Environment and Sustainable Development (ACT), *ACT Sets 90% Renewable Energy Target In Law*, 4 November 2013). http://www.cmd.act.gov.au/open_government/inform/act_government_media_releases/corbell/2013/act-sets-90-renewable-energy-target-in-law7.
[76] ibid.

The NSW Government has established a working group (chaired by the NSW Renewable Energy Advocate) to deliver 24 actions outlined in the plan. The plan will operate alongside the Energy Efficiency Action Plan, the Regional Clean Energy Program and the Energy Savings Scheme. The NSW Department of Planning and Environment is in the process of finalising planning guidelines to give greater certainty and consistency to the renewable energy wind industry, communities and investors.

The NSW Government has announced it will supplement ARENA funding for the deployment of large-scale solar in Broken Hill and Nyngan, and will provide continued support for small-scale renewable technology including rooftop solar PV. The NSW Government has requested IPART determine a fair and reasonable solar feed-in-tariff each year to ensure the resulting uptake of residential PV does not increase electricity prices and lead to a boom and bust cycle for the industry.

8.3.2 Local government targets

A number of local governments have set targets for renewable energy for their respective areas, for example:

- The City of Sydney has set a target of 70 per cent reduction in CO_2-e emissions by 2030 compared to 2006.[77] This target includes:
  - No reliance on coal fired generation.
  - 30 per cent of electricity from renewables by 2030.
- Marrickville Council (in inner Sydney) has a 25 per cent CO_2-e emissions reduction target by 2025. Five solar PV installations are planned to assist in achieving this objective.[78]
- The City of Melbourne has a target to obtain 25 per cent of the municipality's electricity from renewable sources by 2018
  - In its submission the City of Melbourne noted that a reduction in the RET will reduce its ability to meet community expectations and risks the achievement of their renewable energy and zero net CO_2-e emissions targets.[79]

8.3.3 State and territory feed-in-tariffs

Feed-in-tariffs were introduced by state and territory governments between 2008 and 2010 to support consumers in installing solar PV. In most jurisdictions these tariffs were set considerably higher than the wholesale price of electricity. Some jurisdictions also operated generous gross feed-in-tariff schemes for each kWh produced by a solar power system regardless of how much surplus power was exported to the grid. These factors along with the RET Solar Credits multiplier led to much higher solar PV installations than anticipated and significant costs for other consumers without solar PV. In recent years, governments have opted to wind back support and close premium feed-in-tariff schemes to new entrants. Nevertheless, there are still significant numbers of households receiving legacy tariffs, the costs of which are passed through to all electricity users as higher tariffs.

[77] City of Sydney, Submission to Review of the RET, May 2014.
[78] Marrickville Council, Submission to Review of the RET, May 2014.
[79] City of Melbourne, Submission to Review of the RET, May 2014.

For most jurisdictions feed-in-tariffs for new or upgraded solar PV are now much lower and operate as solar buy-back schemes generally reflecting the value of the avoided cost of wholesale electricity and value to the retailer of avoided costs at peak periods. In some states it is compulsory for retailers to offer a feed-in-tariff, based on a value, or range of values, determined by state regulators, while other jurisdictions leave it to the discretion of individual retailers.

Table 4 below provides an indicative guide for the current feed-in-tariffs available in states and territories. Actual rates may vary subject to retailer policies and reviews by jurisdictional price setting authorities.

Table 4 Overview of current state feed-in-tariff or solar buy back schemes

Jurisdiction	Scheme Name	Rates c/kWh	Details of operation or scheduled changes
ACT	Solar buyback scheme	7.5	ActewAGL tariff. A very small number of customers may be with other retailers.
NSW	Feed-in-tariffs for surplus generation	4.9 – 9.3 (2014-15)	The benchmark range, determined by IPART, is a guide to retailers and customers on the likely value of electricity exported to the grid by customers from their solar PV and is not compulsory. Electricity retailers in NSW have the flexibility to set their own feed-in-tariffs.
NT	Gross feed-in-tariff	27.13	Maximum connection size is 4.5 kW.
QLD	Feed-in-tariff	8	Mandated feed-in-tariff for customers in regional Queensland (outside the Energex supply network) set by the Queensland Competition Authority based on the market value of the electricity exported. For South East Queensland (covering the Energex supply network), electricity retailers can set and pay their own feed-in-tariffs.
SA	Minimum retailer payment	7.6	All residential and small business PV customers can receive a minimum retailer-paid feed-in-tariff from their retailer for the calendar year 2014. Rate will decrease to 6 c/kWh upon the repeal of the carbon tax.
TAS	Feed-in-tariff	6.1	This rate is from 1 July 2014 and is set by the Tasmanian Economic Regulator.
VIC	Feed-in-tariff	8	Must be offered as a minimum tariff by all retailers with more than 5,000 customers. The rate will decrease to 7.4 c/kWh upon the repeal of the carbon tax, and to 6.2 c/kWh from 1 January 2015. The tariff is available to solar and other eligible forms of renewable energy, such as wind, hydro or biomass, with a system size less than 100 kW. The tariff will also be open to other low emission technologies, but at the time of writing these technologies have not been announced.
WA	Renewable Energy buy back scheme	8.85	Mandated scheme for customers in the SWIS.

8.3.4 State and territory planning regulations

Planning regulations imposed by jurisdictions that apply to the development of particular renewable energy technologies such as wind farms are summarised in Table 5 below. Victoria has implemented strong restrictions on the siting of wind farms which ban development in certain areas and give residents power to veto developments within two kilometres of their homes. Other states, such as NSW and Queensland have proposed changes to their planning codes or guidelines, which strengthen the rights of local communities to challenge wind farm developments or impose stronger assessment conditions.

Table 5 Overview of planning requirements affecting wind farms[80]

State	Minimum distance from existing dwelling	Consent of all residents required within minimum distance	Restrictions for areas of potential population growth	Noise monitoring requirements – decibels (db)
NSW	0.8-1.5km (current)	Yes (proposed)	No	35db proposed or max of 5db above background noise
VIC	2km	Yes	Yes	Yes, 40db
QLD	N/A	No	No	Yes, 35db
WA	No fixed rule but WA Planning commission suggests distance should be 1km (based on guidelines released in 2004)	No	No	35db proposed or max of 5db above background noise
SA	1km dwellings, 2km townships	No	No	Yes, 40db

[80] Specific planning requirements for wind farms in Tasmania, the Northern Territory and the ACT were not identified.

The NSW Department of Planning and Infrastructure released Draft Guidelines for wind farms in December 2011. At the time of writing these guidelines have not been adopted. Adoption of these guidelines would impose additional requirements for wind farm developments.

Under the proposed guidelines wind farms with a capital cost of more than $30 million (or $10 million in an environmentally sensitive area) will be considered as State Significant Development and assessed in most cases by the independent Planning Assessment Commission (PAC) rather than local councils.

Specific *NSW Wind Farm Noise Guidelines* are currently under development. For a new development, the predicted equivalent noise level should not exceed 35 decibels or exceed the background noise by more than five decibels, whichever is greater. According to the draft guidelines, these criteria are the most stringent in Australia and amongst the most stringent in the world and also include some ongoing noise monitoring requirements.

In Victoria, there is a ban on wind turbines within two kilometres of residences unless there is a written agreement with the relevant landowners. For NSW, where there is no written agreement from the relevant landowners within two kilometres, the development can still be assessed via a 'gateway' process. This process allows the state department to assess the proposal, undertake public consultations, and make a recommendation to a Joint Regional Planning Panel.

The effect of planning restrictions on wind farms in particular jurisdictions is to reduce the potential number of sites available for development. This could lead to developments in less desirable locations with lower output or higher costs, potentially making it more costly to meet the RET targets.

8.3.5 State-based energy efficiency schemes and rebates

Energy efficiency schemes operate in NSW, SA, Victoria and the ACT. These schemes support projects in the household, industrial, commercial and small business sectors. They place obligations on energy retailers to find and implement energy savings or to purchase certificates that have been created by accredited agents who have implemented approved energy efficiency projects.

The Victorian Energy Efficiency Target (VEET) scheme

The VEET commenced on 1 January 2009 and was legislated to continue until 2030. The purpose of the VEET scheme is to reduce CO_2-e emissions, encourage the efficient use of electricity and gas, and to encourage investment, employment and technology development in industries that supply goods and services, which reduce the use of electricity and gas by energy consumers.

The scheme places a liability on large energy retailers in Victoria to surrender energy efficiency certificates, each representing a tonne of greenhouse gas abated, every year.

Certificates are created when accredited persons under the scheme assist consumers to make selected energy efficiency improvements to their homes or businesses. Revenue generated through the sale of certificates is used to reduce the cost of undertaking these energy efficiency improvements.

Activities covered under the scheme include the installation of high efficiency hot water systems, air heaters and coolers, lighting, draught proofing and window treatments and the purchase of high efficiency appliances like refrigerators and televisions.

The Victorian Government has recently announced that it will close its energy efficiency scheme at the end of 2015.[81]

[81] Minister for Energy and Resources Victoria, *Energy Saver Incentive (ESI) Review 2013/2014*, 7 July 2014.

The South Australia Residential Energy Efficiency Scheme (REES)

The REES requires larger energy providers to help households to save energy by offering energy audits and energy efficiency activities such as installing energy efficient light globes and stand-by power controllers to consumers. Each year the government sets a target for the number of energy audits and energy efficiency activities each energy provider must offer and it is up to the provider to decide how they will meet that target.

On 29 November 2013, the SA Government announced that the scheme will be extended to 2020 and expanded to include small businesses.

Activities included under the scheme include replacing or upgrading water heaters, installing draught proofing, window upgrades, installing efficient air conditioning, replacing inefficient pool pumps, and installing energy efficient lighting.

The NSW Energy Savings Scheme

The Energy Savings Scheme aims to reduce electricity consumption in NSW by creating financial incentives for organisations to invest in energy savings projects. Energy savings are achieved by installing, improving or replacing energy savings equipment. The scheme places a mandatory obligation on electricity retailers to obtain and surrender energy savings certificates, which represent energy savings.

Activities included under the scheme include draught-proofing, window upgrades, installing efficient air conditioning, replacing inefficient pool pumps, and installing energy efficient lighting.

ACT Energy Efficiency Improvement Scheme (EEIS)

The EEIS commenced on 1 January 2013 and will run until 31 December 2015. Energy retailers are required to provide incentives for ACT households to achieve greenhouse gas reductions. Twenty five per cent of retailers' obligations must be met through activities in priority low-income households.

Activities eligible under the scheme include upgrades to appliances and lighting, replacement of energy intensive water and space heaters, weather sealing, installation of thermally efficient windows, and installation of standby power controllers. The scheme is paid for through electricity bills.

8.3.6 GreenPower

GreenPower operates nationally as a voluntary program for consumers to support the generation of renewable power. It is a joint initiative of the governments of NSW, Victoria, Queensland, South Australia and the ACT.

GreenPower is a government accreditation program that facilitates energy retailers to purchase renewable energy on behalf of their customers. Consumers pay a premium of 5-8 c/kWh on their electricity bills, which retailers then use to purchase LGCs to demonstrate compliance with the scheme.

Annual GreenPower purchases increased rapidly from 2005 to 2011, peaking at 2,094 GWh in 2011. However, sales have since declined to around 1,800 GWh in 2012 due to a number of factors including increased uptake of solar panels by households, and consumer responses to the introduction of the carbon tax and higher electricity prices. Annual sales of GreenPower accredited electricity remain at less than one per cent of the demand in the NEM.

Although GreenPower providers purchase and surrender LGCs for each megawatt hour of generation sold as part of a GreenPower product, these LGCs are not able to be used by energy suppliers to meet their RET obligations. This ensures that the renewable generation under GreenPower is additional to the RET.

The Panel notes that as the GreenPower program currently utilises LGCs as a basis for compliance, the Australian Government and relevant state and territory governments may need to consider the potential interactions between the RET and GreenPower in light of the Australian Government's preferred approach to the LRET. Should either of the Panel's recommended options for the LRET be adopted, it may be appropriate to include some allowance for GreenPower LGC purchases in the setting of targets under the LRET. The Panel considers that the market for voluntary renewable energy programs is mature and other options, if required, for the measurement and verification of renewable energy under the GreenPower scheme could be developed.

8.4 Electricity market reform

The RET operates in a very different environment to that which prevailed when it was first introduced. The Government is developing an Energy White Paper outlining its overall approach to energy policy and there is an ongoing process of electricity market reform. Both of these have the potential to interact with the RET.

Priorities arising from the Council of Australian Governments (COAG) energy reform agenda and being progressed through AEMC rule change and other processes include:

- Strengthening electricity network regulation to ensure network expenditure is efficient, including the setting of network prices.
- Improved demand side participation to assist in minimising peak demand and associated infrastructure investment.
- The promotion of retail competition and retail price deregulation.
- Strengthening regulatory arrangements, including access arrangements for renewable generators and small-scale solar PV.

8.4.1 Strengthening network regulation

Reforms to the economic regulatory framework were introduced in November 2012. These reforms strengthen the ability of the Australian Energy Regulator (AER) to achieve efficient outcomes in setting revenues and prices for consumers in a number of areas, including how the regulated rate of return is set, and changes to the limited merits review arrangements which reduce the power of network companies to appeal against regulatory determinations. These changes are now being used by the AER as part of its regulatory processes.

The AEMC is considering a rule change which would alter the way in which network prices are determined. This change aims to provide better price signals to consumers by making prices more cost reflective, particularly around peak usage times. Although this rule change may not immediately reduce the overall cost of the network to consumers, it should reduce cross subsidies between different consumers inherent in flat pricing arrangements that favour users who place high demand on networks at peak times.

8.4.2 Retail competition and National Energy Customer Framework

State and territory governments retain responsibility for retail energy pricing. All jurisdictions have committed to remove retail energy price regulation where effective competition can be demonstrated. Effective competition in retail energy markets promotes customer choice. As has been demonstrated in jurisdictions with effective competition and price deregulation, competition has provided benefits for consumers through greater innovation in retail pricing and choice for consumers in their energy services and prices, and leads to more efficient decisions on future network expenditures.

Victoria, South Australia and NSW have already deregulated retail electricity prices and the Queensland Government intends to remove electricity price regulation in the South East Queensland electricity market and replace it with price monitoring by 1 July 2015, subject to certain preconditions. All other jurisdictions continue to regulate retail electricity prices for small customers on standing offer contracts. In Queensland, Tasmania and the ACT, prices are regulated by independent regulators. In the Northern Territory and Western Australia regulated electricity prices are set by the respective governments.

There are a series of customer protection measures that remain in place to provide support to small customers in jurisdictions where price regulation is removed. These include jurisdictional and national protection measures. In particular, the National Energy Customer Framework (NECF) is a national regime for retail customers of electricity and gas. The NECF deals primarily with the relationship between retailers, customers and distributors and the associated rights, obligations and consumer protection measures.

The NECF facilitates an increase in retail competition by reducing regulatory complexity and lowering barriers for energy retailers to enter into the market across participating states and territories.

8.4.3 Power of choice reforms and demand side participation

In March 2011 the then Ministerial Council on Energy directed the AEMC to identify market and regulatory arrangements that would enable the participation of both supply and demand side options in achieving an economically efficient demand/supply balance in the electricity market. The AEMC's report, titled *Power of Choice*, was considered by Ministers in November 2012. Significant progress has been made on recommendations made in the Power of Choice reforms including consumer protection. These changes encourage more efficient use of generators and electricity networks and services and manage costs in the long term. Key rule changes include support for the business-led competitive roll out of smart meters, formalising consumer access to their own metering data, improved incentives for networks to engage with consumers, and allowing innovative tariffs to be offered to provide incentives for more efficient electricity use.

Some of the reforms that are under consideration include:

- Changes to promote competition in metering to promote greater opportunities for demand response at times of network peaks.
- Allowing customers to have more than one electricity retailer for different services at the same site (for example one retailer for normal electricity supply and a different retailer for solar PV or electric vehicle charging).
- Reforms to improve competition and remove barriers to the provision of energy related services by parties other than retailers or distributors.

8.4.4 National distribution connections contestability framework

Energy Council officials are currently considering the benefits of the development and implementation of an opt-in national contestability framework for electricity and gas distribution connections.

Identified benefits include greater competition in connection service provision, particularly through the possibility of inter-state trade, which is expected to lead to lower costs, improved timeframes for connection and more customer-focused services.

An Energy Council rule change proposal is expected to be submitted to the AEMC for consideration in mid-2015.

8.4.5 Embedded generation and other reforms

In April 2014, the AEMC completed a rule change, proposed by industry stakeholders, which will improve the processes for connecting larger-scale embedded generators, including renewables, to distribution networks. The AEMC is currently considering a similar proposal regarding the connection process for smaller scale embedded generators in the NEM.

Recent reforms in the Northern Territory, which have resulted in the breakup of the Government owned Power and Water Corporation, could lead to changes in arrangements for embedded generators.

Similarly in Western Australia the Government has announced a review of the SWIS electricity market. The first phase of this review will assess the strengths and weaknesses of the current industry structure, market institutions and regulatory arrangements, including arrangements for embedded generators and will examine options for reform. The first phase is due to report at the end of October 2014.

8.5 Findings: Interaction with other policies and measures

The Panel is supportive of the continuing development of a nationally consistent energy market framework. This framework should minimise differences between jurisdictions and eliminate excess regulation and duplication. The Panel urges jurisdictions to speed up the process of reform that would be to the long-term benefit of consumers.

The Panel also supports reforming network regulation to better reflect the costs of providing electricity to different consumers and at different times. This will minimise cross subsidies between different customers and lead to more efficient investment and energy choices, including whether to invest in solar PV systems.

The Panel also notes that some projects that receive support under the RET may also be eligible for assistance from the CEFC and ARENA. The Panel considers that projects or components of projects that receive support under the RET should not be eligible for additional funding from either the CEFC or ARENA.

In relation to state and territory measures and policies, the Panel considers that in general these should not overlap with the RET. The Panel makes the following additional observations in terms of state and territory measures:

- Although premium state based feed-in-tariffs are now largely closed to new entrants there is still a considerable, though declining, cost to consumers from legacy schemes. Feed-in-tariffs in most jurisdictions are now much lower and generally reflect the value of the avoided cost of wholesale energy and value to the retailer of avoided costs at peak periods.

- Jurisdictions operating schemes which support solar water heaters should consider the level of assistance available under the SRES to ensure that installations are additional to what would have otherwise been achieved under the SRES.

State and territory governments should adopt a consistent set of planning principles that minimise regulatory burden and apply to all forms of electricity generation, while recognising that different generation technologies have varying degrees of environmental, economic and social impacts.

The Panel notes that the GreenPower program currently utilises LGCs as a basis for compliance. Should the Panel's recommendations on the LRET be adopted, it may be appropriate to include some allowance for GreenPower LGC purchases in the setting of targets under the LRET. The Panel considers that the market for voluntary renewable energy programs is mature and other options, if required, for the measurement and verification of renewable energy under the GreenPower scheme could be developed.

9 REDUCING THE REGULATORY BURDEN OF THE RET

The Terms of Reference ask the Panel to consider the Australian Government's commitment to reduce red and green tape. The Panel has investigated opportunities to reduce administration and compliance costs of the RET scheme while allowing it to meet its objectives. The majority of the submissions to the review indicate satisfaction with the administration of the scheme with only a few proposals for improving administrative arrangements.

9.1 Reducing reporting requirements and improving data availability

The CER requires stakeholders to complete a number of forms and activities to demonstrate compliance with requirements in the Act. Power and Water Corporation, Stanwell Corporation and LMS Energy requested that forms and assessments be simplified and available online. For example, Power and Water Corporation stated that:

> *The introduction of registering, completing and submitting returns online with the option to revise the returns up until the return date would be helpful. (Power and Water Corporation, p.4)*

The Energy Retailers Association of Australia requested more functionality with the information that is available in the REC Registry:

> *The CER's REC Registry (the Registry) creates issues for retailers as information on STCs in the Registry may differ and not reconcile with internal systems. Therefore, unclear data on the availability of STCs in the Registry, creates issues for retailer's purchase and surrender decisions. Improving the accuracy of the publication of data in the Registry will improve the operational efficiency of retailers. (Energy Retailers Association of Australia, p.3)*

The CER has advised the Panel that these concerns will be addressed when the CER releases its redesigned REC Registry in August 2014. The REC Registry is a secure web-based application that facilitates the creation, trade and surrender of LGCs and STCs. It also provides access to a number of public registers containing data about the RET.

The redesigned REC Registry will have an improved user interface and enhanced functionality for scheme participants and the CER. Stakeholders will be able to access a number of simplified forms online and have more options for managing their certificate activities. Data analysts will also have the ability to download bulk data from public registers. A number of the CER's assessments will move online, which will allow more efficient processing times and visibility for stakeholders.

9.2 Setting the Renewable Power Percentage and the Small-scale Technology Percentage

The LRET places a legal requirement on liable entities to purchase LGCs equivalent to a proportion of wholesale electricity acquisitions, called the Renewable Power Percentage (RPP). Similarly, the SRES places a requirement on liable entities to purchase an amount of STCs each year, calculated using the Small-scale Technology Percentage (STP). The STP is based on modelled estimates of the number of STCs expected to be created in that year, adjusted for any surplus or deficit of certificates from the previous year. The STP and RPP are published annually by the CER by 1 March of each compliance year.

Five stakeholders suggested bringing forward the date of setting the STP and RPP to the December prior to the compliance year to which they relate. This would provide liable entities with greater certainty over their RET liability, allowing them to manage it with a greater degree of accuracy. For example, Hydro Tasmania stated:

> *This is an important change which could be easily made that would ensure that retailers can pass through costs at an appropriate rate to consumers and are not left out of pocket. This has the potential to reduce the costs of the measure for some consumers. (Hydro Tasmania, p.13)*

The STP is more complicated to calculate than the RPP and bringing forward the publication of the STP involves a trade-off between timeliness and accuracy of the estimate. However, the small-scale market has been relatively stable and predictable over the past two years and the CER has been estimating the uptake of small-scale installations with a reasonable degree of accuracy. The Panel considers that the benefits of publishing these figures prior to the commencement of the compliance year would outweigh the possible loss of accuracy.

9.3 Opt-in for large energy users

The RET places a legal requirement on liable entities (typically electricity retailers) to purchase and surrender LGCs and STCs to comply with obligations under the Act. The cost of purchasing LGCs and STCs are passed on to electricity consumers. This approach minimises the number of entities subject to RET liabilities, compared to a scheme in which all electricity consumers are directly liable, thereby reducing compliance and administrative costs.

A small number of respondents proposed amending the RET legislation to allow large electricity users to opt-in and manage liability under the RET for the electricity they consume. This is to reduce costs and improve flexibility for electricity users and provide greater market liquidity by increasing the number of buyers in the RET. For example, Pacific Hydro stated:

> *Historically most energy users have managed the RET cost through their retail electricity supply agreements. More recently, we have seen an increasing number of large energy users choosing to include the option to "self-source" Large Generation Certificates (LGCs) into their retail tender documents. This process sees energy consumers purchase LGCs from a third party and then transfer them to the retailer to surrender on their behalf.*
>
> *Self-sourcing has seen larger volumes of LGCs sold directly from LGC generators to energy users – and gives flexibility and choice to energy users to manage their costs in the manner of best fit for their individual business. For example some businesses may wish to fix a long-term LGC price as part of a strategy to fix their long-term input costs – this is best enacted with a direct contract between the energy user and the LGC generator.*
>
> *The further extension to this process is allowing energy users to "opt-in" themselves and self-manage their RET liability end to end. (Pacific Hydro, p.23)*

The Australian Sugar Milling Council supports allowing liable parties to acquit their own liability in cases where they are able to generate renewable electricity:

> *Sugar mills import electricity during mill start up, and outside of the crushing season, when electricity is not being generated at the mill. Consequently, all mills encounter a liability. Currently, unless a mill is in a direct wholesale relationship (a quasi-retailer), it has no capacity to acquit its liability against its own certificates, and is therefore locked into the price passed forward by its electricity retailer.*

ASMC suggests that these arrangements could be simplified by enabling an opt-in process that enables significant liable parties to acquit their own liability, whether through stored certificates or purchase from the market. (Australian Sugar Milling Council, p.12)

However, such an arrangement is likely to be complex to implement and could significantly increase the cost of administering the RET scheme. The complexity of opt-in arrangements for liquid fuels under the previous carbon tax is instructive in this regard. The Panel's broader recommendations for reforming the LRET and the SRES will lower the cost of the RET for electricity users compared to continuing with the current scheme, and therefore the Panel does not consider that the likely costs associated with implementing opt-in are justified.

The Panel notes the potential for an opt-in arrangement to improve the efficiency of the LGC market. Section 10.1 addresses implementation issues relating to the Panel's recommendations for reforming the LRET, including mechanisms to support the stable and efficient functioning of certificate markets. Such mechanisms may reduce the need for an opt-in arrangement to improve market efficiency.

The Panel also notes the submission from Pacific Hydro quoted above, stating that in some instances electricity customers have entered into voluntary agreements with their retailer to buy certificates in return for a reduction in the RET costs that would otherwise be passed through. The Panel encourages stakeholders interested in an opt-in mechanism to pursue opportunities for voluntary arrangements.

9.4 Aligning LRET and SRES acquittal obligations and shortfall carry-over provisions

Stakeholders raised two issues concerning the alignment of obligations and liability under the SRES and LRET schemes. These relate to the frequency of acquittal of LRET and SRES obligations and allowing liable entities to carry-over a shortfall of STCs to the following year, consistent with provisions under the LRET.

Liability is currently acquitted (that is, certificates are surrendered to the CER) on an annual basis for the LRET and on a quarterly basis for the SRES. Quarterly acquittal for the SRES was introduced to improve the cash flow for small to medium sized businesses in the solar PV and solar water heater industries. However, some stakeholders suggested that this may no longer be necessary as the STC market and the businesses operating in it are now mature and proposed that STCs be surrendered annually to reduce administrative costs. For example the Energy Retailers Association of Australia stated:

Surrendering certificates quarterly is administratively onerous on retailers and creates additional financial risks each quarter if the required number of STCs is not surrendered. This pattern of surrender is unique to SRES as no other environmental scheme has this imposition. As the SRES has matured as a component of the RET scheme, the participants sophistication should also have increased. The moving to a uniform approach with all other environmental schemes warrants further exploration.
(Energy Retailers Association of Australia, p.3)

Alternatively, some stakeholders in the large-scale renewable industry proposed that the LRET liability be acquitted quarterly, in order to improve the market liquidity of LGCs. For example, Powershop Meridian submitted:

> *Currently, LGCs can be traded at any point after their creation up until they are surrendered. Liable entities only need to surrender LGCs once a year, in February. Given the high cost of cash for many liable entities, this acts to suppress demand for LGCs immediately after the surrender date, with demand rising in the period immediately preceding the surrender date.*
>
> *More importantly, liquidity tends to follow demand, so that liquidity in LGCs for most of the year is negligible, apart from the short window coinciding with LGC surrender dates (Powershop Meridian, p.46).*

The LRET allows liable entities to carry forward a 10 per cent shortfall in liability to the following year without incurring a penalty, however there is no corresponding provision in the SRES. Two respondents (EnergyAustralia and the Energy Retailers Association of Australia) suggest that this provision should also apply to the SRES in order to provide liable entities with more flexibility in managing RET costs and prevent them from incurring a penalty for minor errors in SRES liability calculations. The Panel considers that this proposal has merit, however it would need to be implemented in a way that prevents the quarterly surrender periods from allowing a shortfall of greater than 10 per cent to be carried forward in one calendar year.

The Panel recognises the potential for greater alignment in acquittal provisions to provide efficiencies to liable entities and renewable generators. The Panel considers that biannual surrender of LGCs and STCs may provide an appropriate balance between reducing compliance costs and ensuring liquidity in LGC and STC markets and recommends that the Government give this further consideration.

9.5 Arrangements for Partial Exemption Certificates (PECs)

Section 7.1 explained the function of PECs provided to EITE businesses. EITE businesses that receive a PEC can only negotiate its value with the retailer that supplies their electricity. Theoretically, the reduction in RET costs passed on to the EITE should be equal to the reduction in the retailer's liability from receiving the PEC. However, stakeholders claim that this may not necessarily be the case as the value of the PEC is negotiated as part of an electricity contract and may be influenced by other factors in the negotiation. A small number of stakeholders including the Chamber of Minerals and Energy of Western Australia and the Australian Industry Group propose allowing PECs to be 'tradeable' (able to be sold to any liable entity) as a method for dealing with this issue. For example, the Australian Industry Group stated:

> *PECs are not tradeable certificates and can only be used at present by liable entities. Problems have been created for both EITE businesses and retailers as a consequence of the negotiation process. These problems arise because there is an information asymmetry between retailers and customers on gross costs of the RET. The current approach also makes it more difficult for an EITE business to change energy retailer during a calendar year as PECs are issued in the current retailer's name for the whole of the year. PEC tradability would streamline the application process for EITE assistance under the RET by reducing the need for EITE businesses to negotiate the value of their PECs with their energy retailers. (Australian Industry Group, p.7).*

While such an arrangement would provide greater flexibility to EITE businesses there would be administrative costs associated with implementation and administration. The Panel does not consider that the additional flexibility would justify the increased administrative complexity and cost.

EnergyAustralia raised an additional concern regarding notifying liable entities of PECs issued to EITE businesses:

> *Currently, when a PEC is issued to an Emissions-Intensive Trade-Exposed (EITE) company, notification is only provided to the EITE and not the liable entity. However, it is the liable entity's responsibility to ensure that it has obtained all the relevant PECs from its customers for the annual RET return and liability calculation.*
>
> *Obtaining a PEC relies on the EITE providing it. To ensure that all PECs are obtained the liable entity must contact all customers that have potentially been issued a PEC. There is a risk, despite best efforts, that a liable entity may not obtain all the PECs issued in its name. (EnergyAustralia, p.9)*

Legislation stipulates that the name of the prescribed person to whom a PEC is issued and the EITE activity that the PEC relates to is published. The Australian Government may wish to consider amending legislation to include the publication of the RET liable entity with whom the EITE business will negotiate the provision of the PEC.

9.6 Bringing forward the date of registering LGCs

Accredited renewable power stations have until 31 December of the year following the year that generation occurs to create LGCs, which can allow up to two years for LGC creation. Infigen Energy submitted that LGC registration be required to occur within 12 months:

> *This extended registration period (up to 23 months) has the potential to distort the market view of supply and demand, which can result in less efficient investment decisions. (Infigen Energy, p.33)*

However, it is difficult from an administrative perspective to have LGCs created and registered within one year from the generation to which they relate. Power stations may generate at different times of the year and generation data may be updated or amended. For this reason, accredited power stations provide finalised annual generation data by 14 February in the year following generation. The CER requires at least six months to conduct assessments of these returns to ensure all accredited power stations create their LGC entitlement based on eligible generation.

9.7 Small-scale generation unit safety inspection program

The CER is required to conduct inspections of a sample of small-scale solar panel, wind and hydro installations that have had STCs created against them in the REC Registry. The inspections ensure that selected installations meet the legislated requirements for the creation of STCs. These include applicable Australian standards and industry guidelines in force at the time the unit was installed and state and territory and local government requirements.

The inspection program provides some reassurance, beyond that provided by state and territory regulations, that the extra demand for small-scale installations that results from the RET does not lead to any lessening of safety standards.

Keppel Prince Engineering raised a concern about the cost associated with ensuring compliance of small-scale generation units and considers that this function should be undertaken by relevant state and territory authorities:

> *It is our understanding that largest resource demand at the CER is required to oversight the regulatory compliance of the 500,000 new Small Generation Units that are being installed in Australia each year~a task that KPE believes could, and should, be accomplished at a*

significantly reduced cost within the existing inspection and compliance systems operated and/or administered by the relevant "Energy Safe" agencies operated by State Governments and Territories. It should be possible to include the relevant compliance statements for all relevant legislation into a SGU specific version of the electrical safety certificates required by every state before a system can be registered. (Keppel Prince Engineering, p.19)

Alternatively, the Solar Energy Industries Association Inc. considers that the inspection program should be increased:

If a strong regime of auditing is not in place then the chances of poor quality and unsafe installation is increased and the potential for fatal accidents could result. SEIA would like to see an increase in funding for system inspections to ensure that quality is maintained throughout the industry. (Solar Energy Industries Association Inc., p.5)

The CER has now conducted the inspection program for four years. Inspection data show a slight decline over time in the number of unsafe systems being installed and of unsafe installations consistent with the overall rate of safety issues with electrical work. The data also show a significant decrease in substandard installations owing to the installation industry responding to feedback from the program after it was first rolled out.

The Panel has recommended either abolishing the SRES or bringing forward the close of the SRES from 31 December 2030 to 31 December 2020. The Panel considers that it would be prudent for the Australian Government to discuss safety and installation standards for both solar PV and solar water heaters with the relevant state and territory authorities to ensure appropriate arrangements are in place, if necessary, before the SRES ends.

9.8 Update eligibility guidelines for Municipal Solid Waste (MSW)

The combustion of MSW is listed in the Act as being eligible as a renewable energy source. Waste streams contain both renewable and non-renewable components, and therefore, eligible components need to be determined. The CER has guidelines in place for determining the eligible renewable components of municipal and commercial wastes for use by electricity generation plants that are utilising waste as a fuel source and want to create certificates.

Phoenix Energy (an Energy from Waste (EfW) company) stated in its submission:

Under the Guidelines, EfW generators are required to carry out sampling of the waste stream to determine the renewable component of their waste stream, and therefore the fraction of the waste stream that is an eligible source. This is a costly and time-consuming process, involving the engagement of professional external auditors to sample and audit the waste stream every six months.

The complexity and cost of sampling requirements acts as a deterrent for municipal councils considering whether to make the transition from landfilling to alternative waste treatment. The proposal to remove the sampling requirement, and to replace it with a qualitative test around recycling processes, would be a more efficient way of measuring the success of community recycling efforts and would reduce the administrative and cost burden on councils and facility operators. (Phoenix Energy, p.12)

Phoenix Energy has suggested that the Act should be amended to include all components of MSW and similar mixed waste streams as an eligible fuel source subject to meeting recycling standards. This would reduce the administrative burden for proponents of EfW facilities. Phoenix Energy has also suggested:

> *To implement this regulatory change the CER Guidelines would need to be replaced with a set of recycling standards that must be met in order for RECs to be issued for MSW. These standards could be updated as recycling technology improves over time. (Phoenix Energy, p.14).*

The legislation stipulates that the fuel source must be a renewable energy fuel source. Components that are non-renewable are not eligible for certificates. The Panel recognises the complexity in determining the eligible renewable components of municipal and commercial wastes and recommends that the Government consider updating the guidelines in order to reduce the administrative burden for stakeholders.

Recommendation 10: To further reduce the costs of the RET the Government should consider the following proposals to improve the operation of the scheme:

a. Bring forward the dates for setting the Small-scale Technology Percentage and the Renewable Power Percentage from 31 March in the compliance year to a date prior to the commencement of the compliance year (e.g, 1 December).

b. Align the acquittal of LRET and SRES obligations so that both are acquitted six monthly, and allow liable entities to carryover a shortfall of STCs (as is currently the case for LGCs).

c. Publish the RET liable entity with whom an EITE business will negotiate the provision of the Partial Exemption Certificate.

d. Update guidelines for determining the renewable components in waste for electricity generation.

10 IMPLEMENTATION OF RECOMMENDATIONS

10.1 Implementation of LRET Recommendations

10.1.1 Ensuring a stable and functioning certificate market

The Panel has recommended that the Government consider two options for reforming the LRET. The first is to close the LRET to new entrants, otherwise known as 'grandfathering', and the second is to implement a target that increases each year by half of the projected growth in electricity demand.

A key objective in implementing either option is to ensure that the RET continues to support projects already established under the scheme in a sustainable and orderly manner.

The options favoured by the Panel for the LRET both entail lower targets than are currently in place. There are several factors that are more likely to contribute to volatility in the LGC market under a scheme with reduced targets. These include:

- The current pool of excess LGCs, equivalent to roughly one and a half times the LRET target in 2014. These excess certificates resulted from the large uptake of small-scale generation units prior to the split of the RET into the LRET and SRES schemes.
- The high concentration of ownership of the surplus of certificates.
- Variability in the generation of electricity from hydro power stations, and to a lesser extent wind farms.

Ideally, the market would deliver an appropriate LGC price to support investments. However, the factors above may drive significant price volatility in the spot market for LGCs. Market participants could face either an excess or a shortage of LGCs, depending on the circumstances that prevail, and hence the LGC price could fall below a level that would sustain renewable energy businesses or rise so high it reaches the level of the LRET shortfall charge. If such conditions were to persist, achieving the key objective of supporting existing projects would be put at risk.

Identifying options for addressing potentially extreme LGC price outcomes involves giving some consideration to the LGC price, or range of LGC prices, that would be appropriate to support renewable generators accredited under the RET. Renewable generators argue for a return equivalent to what would have been achieved under the current trajectory of LRET targets, which formed the basis of their investment decision. For example, Infigen Energy submitted:

> *These arrangements should replicate the expected trajectory of LGC prices based on the original LRET target. This could be achieved by setting a regulated floor price for LGCs to be paid by the liable parties. In such an event Infigen would welcome an expert independent economic and corporate finance analysis of a suitable "compensating" floor price for this purpose. (Infigen Energy, p.3)*

On the other hand, some electricity users and energy market incumbents consider there are grounds for a lower level of support as investments were not made in a risk-free environment and financial contracts may provide project owners with some protection from downside LGC price risk. For example, CS Energy stated:

> *Existing renewable investments should be grandfathered and provided with a price equivalent to that traded today. (CS Energy, p.16)*

Options the Government could explore for ensuring price stability (once an appropriate price or range of prices is determined) include:

- Increasing the LRET targets for immediate years to absorb an appropriate amount of the prevailing surplus of certificates, noting this could place some upward pressure on electricity prices in the short term. (Some surplus level of certificates is desirable to ensure there is sufficient liquidity in the LGC market).
- Setting a fixed LGC price for the remainder of the scheme (this is most relevant to the option of closing the RET to new entrants, where it is not necessary to establish a price or price range to support new investments).
- Setting a price cap and a price floor within which certificates could trade.
    - A price cap could be implemented by establishing a clearing house or "central broker" function to help match certificate buyers and sellers by trading LGCs at a fixed price, as is currently the case under the SRES.

In order to improve market liquidity, the Government could also consider introducing an auction process, where all certificates required to meet the legislated LRET target for that year are traded through a central agency. Parties holding certificates (renewable energy generators, retailers, traders, etc.) could bid in any volume of LGCs that they own or expect to be able to deliver and liable parties would be required to purchase LGCs to meet its obligation from the central agency. This would establish a market clearing price for the entire supply volume required for that year.

The most appropriate mechanism will depend on if, and how the Government decides to amend the LRET. The Panel recommends that the Government consult further with stakeholders and the CER to determine an approach to implementation that will ensure the objectives of the preferred option for the LRET are met.

10.1.2 Setting targets

Closing the RET to new entrants

There are two broad methods available for setting targets in an LRET that is closed to new entrants. Targets could be set in advance for the duration of the scheme, based on expected generation from existing and committed power stations, plus an additional component to clear the market of excess certificates.

Alternatively, targets could be set annually, in an approach similar to the current SRES. Each annual LRET target would be set at the beginning of the year based on a modelled estimate of certificates to be created for the year and adjusted to offset the error in the previous year's estimate.

Target representing a share of new growth

Box 2 in Section 6.1.3 explains how a target could be set that allocates a 50 per cent share of growth in demand for electricity to renewable generators.

The target would be set by the CER each year (for example, by September) to apply to the following calendar year. A formula for calculating targets could be set out in legislation along the lines of the example contained in Box 2, and a legislative or regulatory framework would be established to guide the CER. Should electricity demand be forecast to fall or to remain flat in any year, the target would not change and would only increase further when demand exceeds its previous maximum level.

10.2 Implementation of SRES recommendations

The Panel recommended two options for reforming the SRES: abolishing it immediately or phasing it out by 2020.

If the recommendation to abolish the SRES is implemented, some transitional arrangements may be required to cater for people holding certificates at the time of abolition. This would include investors, banks and people holding certificates in the STC Clearing House. Likewise, those in the process of installing systems, or who have signed a contract to do so, may have a reasonable claim to certificates. Therefore the Government may wish to continue SRES obligations for liable entities for a period after the scheme is closed in order to provide a market for certificates from these systems.

If the Panel's option for phasing-out the SRES is implemented, the Panel considers that the reduction in the deeming from 15 years to 10 years for solar PV systems and the reduction in the size eligibility threshold from 100 kW to 10 kW should take effect from the date of announcement. This is to eliminate the potential for a foreshadowed change to create a spike in system installations, and a corresponding increase in the cost of the SRES, between the date of announcement and the date that the changes take effect. However, the Panel acknowledges that there will be some contracts for the installation of systems that were entered into on the basis of the current policy and for which certificates have not yet been created. It is reasonable that these installations receive 15 years of certificates as allowed for under current arrangements.

The Panel's recommendation to reduce the deeming for solar and heat pump water heaters would not take effect until 1 January 2016, where the deeming would change from 10 to 9 years. Systems installed on or after this date would be subject to the new arrangements.

10.3 Implementation of recommendations regarding the self-generation exemption

The Panel has recommended that the self-generation exemption be expanded to accommodate a broader range of circumstances. This would involve relaxing the one kilometre boundary for supplying and using self-generated electricity and allowing incidental off-takes of electricity for community purposes in a remote location on an otherwise dedicated line.

In terms of the one kilometre boundary, submissions to the Review indicated that it should be relaxed, but did not suggest what would be an appropriate restriction.

A boundary could be set as a defined distance, or in the form of some definition of a 'site' similar to the definition of a single site used in the National Greenhouse and Energy Reporting (NGER) scheme legislation. A boundary defined by distance, while arbitrary to an extent, has the advantage of being easily measured and would provide less ambiguity over the electricity that would fall under the exemption. A site boundary would be more complex to administer as other legal entities could be operating on the same site and determining the self-generated electricity could involve complicated calculations of electricity imports and exports. The Panel considers that the Government should consult with affected parties to determine an appropriate kilometre restriction for the self-generation exemption.

For electricity consumed outside the kilometre boundary by the same legal entity that generated it, the criteria for a dedicated line between supply and use would remain. However, the Panel recommends that incidental amounts of electricity should be able to be supplied to third parties for community services without disqualifying all the electricity supplied on that line from the exemption. Implementing this change involves defining the community benefits for which an off-take would be permitted and defining what amount constitutes an incidental off-take.

The definition of community services should be limited to entities that provide essential community services and to not-for-profit organisations. Essential community services could be defined to include:

- Health and safety operations (e.g., hospitals, ambulance).
- Municipal services (e.g., water, and sewerage).
- Fire services.
- Emergency services.
- Police stations.
- Ongoing maintenance of key infrastructure.
- Community radio and telecommunication services.

Not-for-profit organisations could be defined using the Australian Taxation Office definition.

Incidental supply would mean that supplying a third party is not the primary purpose of generating electricity, and that the amount supplied is not a significant proportion of total generation. To define incidental supply to third parties, a threshold could be set either as a percentage of total electricity generated, or as a fixed GWh amount. Given that some self-generators produce very large amounts of electricity, a limit set as a percentage of total generation would need to be quite small (possibly around one per cent) in order to avoid substantially increasing the amount of electricity that could be exempt. This may disadvantage some of the smaller generators. Alternatively, a fixed GWh amount limit could be set, placing a cap on the amount of electricity able to be supplied. The Government should consult further to determine an appropriate threshold.

Recommendation 11: The Government should consult with affected parties on implementation of the Panel's recommendations for the RET including:

a. Measures for ensuring that large-scale generation certificates trade in a suitable price range that provides an appropriate level of support for accredited power stations.

b. Methods for setting targets.

c. Setting the distance limit and threshold for third party off-takes for the self-generation exemption.

Recommendation 12: The Panel's recommendations for progressively reducing the deeming rate for solar PV installations and reducing the size eligibility threshold from 100 kW to 10 kW should take effect from the date of announcement. Transitional arrangements should be provided for parties that have entered into contracts on the basis of the current policy at the date of announcement.

APPENDIX A: TERMS OF REFERENCE

Renewable Energy Target Review

Background

The Renewable Energy Target (RET) scheme, comprised of the large-scale and small-scale schemes, is aimed at increasing renewable energy generation and reducing greenhouse gas emissions from the electricity sector. It is designed to deliver the equivalent of 20 per cent of Australia's electricity from renewable sources by 2020.

Scope of the review

The review is to examine the operation and costs and benefits of the *Renewable Energy (Electricity) Act 2000* ('the Act') and related legislation and regulations, and the RET scheme constituted by these instruments. This includes considering:

1. the economic, environmental and social impacts of the RET scheme, in particular the impacts on electricity prices, energy markets, the renewable energy sector, the manufacturing sector and Australian households;
2. the extent to which the formal objects of the Act are being met; and
3. the interaction of the RET scheme with other Commonwealth and State/Territory policies and regulations, including the Commonwealth Government's commitment to reduce business costs and cost of living pressures and cut red and green tape, and the Direct Action policies under development.

The review should provide advice on:

1. whether the objective of the RET scheme, to deliver 41,000 gigawatt hours (GWh) and small-scale solar generation by 2020, is still appropriate;
2. the extent of the RET's impact on electricity prices, and the range of options available to reduce any impact while managing sovereign risk;
3. the operation of the small-scale and large-scale components of the RET and their interaction;
4. implications of projected electricity demand for the 41,000 (GWh) target; and
5. implementation arrangements for any proposed reforms to the RET, including how to manage transition issues, risks and any adjustment costs that may arise from policy changes to the RET.

The review is also to consider the Government's election commitment to reinstate native forest wood waste as an eligible renewable energy source.

Process

The review is to be led by a panel of experts appointed by the Ministers for Industry and the Environment, supported by a secretariat in the Department of the Prime Minister and Cabinet.

The panel is to undertake public consultations, seek submissions and provide a report to the Prime Minister, the Treasurer and the Ministers for Industry and the Environment by mid-2014.

APPENDIX B: STAKEHOLDER CONSULTATION

Throughout the review, the Panel has consulted with a wide range of stakeholders representing a diverse range of views. This included energy users, electricity retailers, environmental groups, consumer groups, the renewable energy industry and state and territory ministers and officials.

On 5 April 2014, the Panel called for submissions on issues relevant to the review and released a paper to assist the preparation of submissions. The submissions can be found on the published submissions page <https://retreview.dpmc.gov.au/published-submissions>, unless a submission was marked as confidential or an author specifically requested otherwise.

The Panel also organised over 100 meetings in state capitals which were collectively attended by over 200 participants. In addition to this, the Panel conducted a number of site visits to energy facilities including hydroelectric power stations in Tasmania, a community wind farm in Victoria, a wind farm in New South Wales, a solar PV manufacturer in South Australia and a solar power installation in the Australian Capital Territory.

APPENDIX C: EXECUTIVE SUMMARY FROM ACIL ALLEN MODELLING REPORT

The Commonwealth Government has appointed an Expert Panel to conduct the 2014 review of the Renewable Energy Target (RET). The Expert Panel is supported by a secretariat in the Department of the Prime Minister and Cabinet (the Secretariat).

The RET is comprised of two separate, but related schemes, namely: the Large-scale Renewable Energy Target (LRET) and the Small-scale Renewable Energy Scheme (SRES).

ACIL Allen Consulting (ACIL Allen) has been engaged to undertake detailed electricity market modelling of the RET impacts on Australia's electricity markets and emissions from electricity generation. The modelling and analysis is designed to support the Expert Panel's deliberations and inform the Government's response to the Review.

Case and sensitivities

ACIL Allen has been tasked with modelling a range of policy scenarios and sensitivities as required by the Expert Panel. These are:

Reference case: This case provides projections for the status quo where legislation underpinning the LRET and SRES schemes remains unchanged and the market develops in accordance with baseline assumptions in terms of demand and supply. All subsequent policy scenarios are compared against this Reference case.

Repeal case: This case assumes that the SRES and LRET schemes cease to operate from 1 January 2015 with 2014 being the last compliance year. This scenario assumes that any mechanism introduced to compensate investments made under the RET (if any) does not affect wholesale or retail price outcomes.

Closed to New Entrants: This scenario assumes that the LRET scheme continues to operate, but is closed to new installations from 1 January 2015. The SRES, which operates under a deeming arrangement whereby installations receive certificates upfront, does not continue to operate and is closed from 1 January 2015. Under the LRET, installations receive certificates annually based on generation. Closure of the scheme to new entrants (new accredited generators) means that creation of LGCs is limited to existing or committed generators.

Real 20% case: The Real 20% scenario involves two significant changes to the current policy: Reducing the LRET 2020 target to 25,500 GWh (a level which, when evaluated using the Panel's methodology, represents a 'Real 20%' of expected demand in 2020); Closing the SRES after 2020 and reducing the period of deeming for solar PV from 15 years down to 10 years from 1 January 2015 (deeming period is constant at 10 years through to the end of 2020).

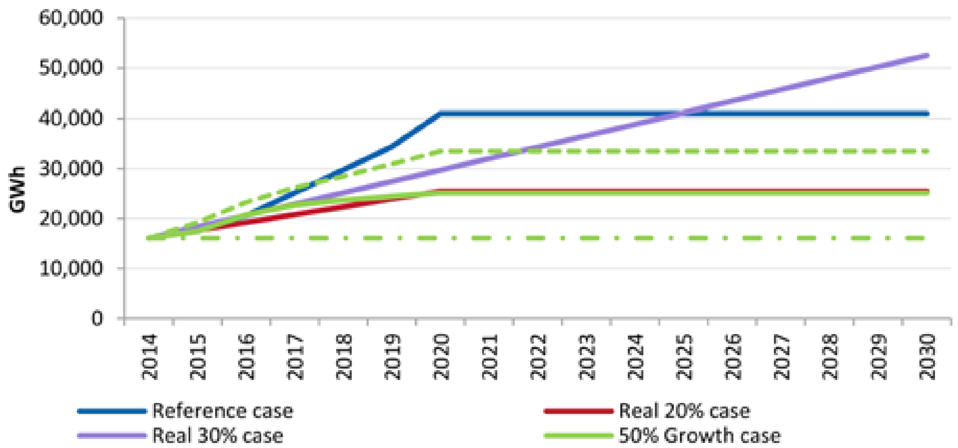
Real 30% case: This scenario involves modifying the LRET target level to 30% of anticipated demand in 2030 and extension of the scheme to 2040. Annual targets from 2015 to 2030 follow a linear trajectory, reaching 52,500 GWh and are held constant at this level until 2040. There is no change to the current SRES, with the scheme terminating in 2030.

50% Growth case: This scenario was undertaken after the stakeholder workshop in late June where preliminary modelling results were presented. It involves moving the LRET away from fixed annual targets to floating targets with each year reset based on forecast demand growth for the year ahead. The LRET target would be increased each year based on 50% of the anticipated growth in market-facing demand; i.e. demand growth net of that absorbed by behind the meter solar PV. The scenario assumes SRES modifications as follows:

- A reduction in deeming for Small Generating Units (SGUs) to 10 years from 1 January 2015, with the deeming period for both SGUs and Solar Water Heaters (SWHs) declining by one year each year and the scheme terminating at the end of 2020.
- A reduction in the maximum size eligibility of small generating units for inclusion under SRES down from the current 100 kW to 20 kW (systems above 20 kW would be eligible for the LRET).

Figure ES 1 summarises the LRET annual targets across the policy cases. In the 50% Growth case, the LRET annual targets are a function of demand growth and therefore vary across the demand sensitivities examined. The Real 30% case also includes an extension of the scheme to 2040 with targets held constant at the 2030 level until 2040 (not shown in the figure). Table ES 1 summarises the SRES settings under each policy scenario.

Figure ES 1 LRET annual targets under the various policy scenarios



Note: Under all scenarios the LRET terminates in 2030 except for the Real 30% which extends out to 2040.
Source: ACIL Allen based on input settings provided by the Expert Panel

Table ES 1 SRES settings under the various policy scenarios

Policy scenario	Scheme end	Treatment of SGU	Treatment of SWH
Reference case	End of calendar year 2030	15 years upfront, with deeming period declining by 1 year each year from 2017	10 years deeming upfront, with deeming period declining by 1 year each year from 2022
Repeal case	2014 last compliance year	No further subsidies	No further subsidies
Closed to new entrants case	2014 last compliance year	No further subsidies	No further subsidies
Real 20% case	End of calendar year 2020	10 years deeming from 1 January 2015 (10 years available until scheme end)	No change to Reference case
Real 30% case	End of calendar year 2030	No change to Reference case	No change to Reference case
50% Growth case	End of calendar year 2020	10 years from 1 January 2015, with the deeming period declining by one year each year	10 years from 1 January 2015, with the deeming period declining by one year each year

Source: ACIL Allen based on input settings provided by the Expert Panel

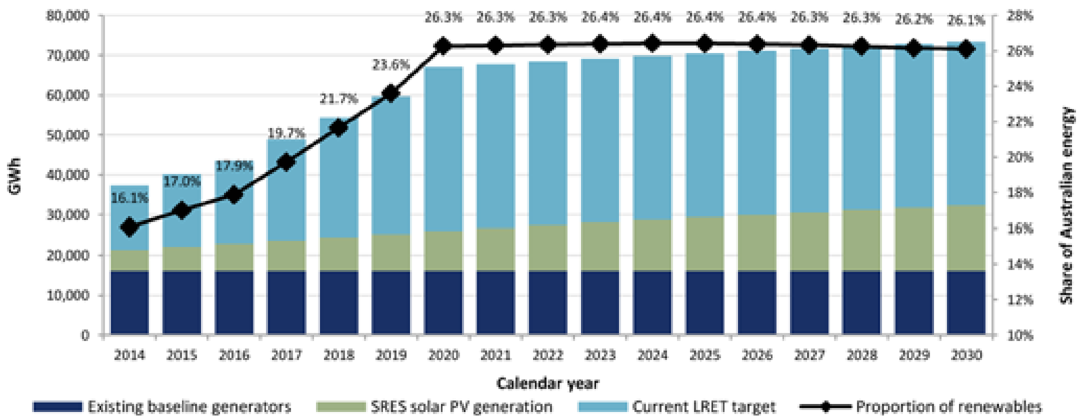
Input assumptions for the modelling have been sourced from a range of publicly available sources including AEMO and the Independent Market Operator for demand and BREE for capital costs and learning rates. These have been supplemented by ACIL Allen's own in-house assumptions for other key inputs. Sensitivities have also been completed to test the effects of changes for a number of the key input assumptions where they are subject to considerable uncertainty. These include high and low demand growth; the potential introduction of other abatement policies modelled through a shadow carbon price from 2021; high capital costs for renewable energy technologies; and permanent retirements for incumbent generators which mothball capacity.

Analysis and findings

Currently renewable generation accounts for an estimated 16.1% of generation (at the end of calendar year 2014). Under the Reference case where the RET remains unchanged, renewable energy is projected to reach 26.3% by 2020 as shown in Figure ES 2.[82]

Under the Reference case assumptions, ACIL Allen's modelling projects the renewable energy target can be met by new renewable developments with the LRET fully subscribed throughout the period to 2030. Much of the anticipated large-scale renewable development occurs over the period 2016 to 2021, with around 7,650 MW of wind developed throughout the NEM and SWIS regions and around 1,400 MW of utility-scale solar PV developed in the regional grids of the North-west Interconnected System (NWIS), the Darwin-Katherine Interconnected System (DKIS) and Mt Isa. Owing to the subdued demand conditions in electricity markets, the introduction of large volumes of renewable capacity results in a mothballing of generating plant by incumbent operators, with much of this capacity returning to service over time as demand grows.

Figure ES 2 Proportion of renewables in Australia's energy mix: Reference case



Note: Proportion of estimated total Australian electricity demand
Source: ACIL Allen

Across Australia, a total of $26.8 billion (real 2014 dollars) or $15.9 billion (in present value terms) in capital expenditure on new generating capacity is projected to occur over the period to 2040. Wind investment is projected to account for around 62% ($16.4 billion in real 2014 dollars or $12.1 billion in present value terms) of new large-scale generation investment in the period to 2040.

[82] This assessment has been undertaken using a formula provided by the Expert Panel and excludes the displacement from solar water heaters (SWH). If displacement from SWH was to be added to both the renewable energy component (the numerator), and to aggregate electricity demand (the denominator), aggregate renewables would be around one percentage point higher at 27.3% by 2020.

Gas-fired peaking plant and utility-scale solar PV each account for around 11% of the total ($3 billion in real 2014 dollars). In present value terms, solar accounts for $1.8 billion compared with $0.7 billion for peaking gas as adoption times differ. Several categories of fossil fuel generation collectively account for the remaining 16% ($4.3 billion in real 2014 dollars or $1.3 billion in present value terms).

Small-scale systems (solar PV and solar water heaters) under the SRES are projected to see strong growth with solar PV capacity rising from 4,133 MW at the end of 2014 to just under 13,000 MW by 2030. Cumulative SWH installations are projected to increase from an estimated 915,000 at the end of calendar year 2014 to over 1.5 million systems by 2030. A total of $30.4 billion (real 2014 dollars) or $18 billion (present value terms) of new investment is projected to occur in relation to solar PV and SWHs over the period to 2030. The majority of this is solar PV ($20.6 billion in real 2014 dollars or $12.6 billion in present value terms).

However, the subsidies paid to the renewable energy industry through the RET to bring about this investment are high. Over the period to 2030, the projected total direct RET cost (projected number of certificates multiplied by price) is $37.8 billion (real 2014 dollars) or $22.4 billion in present value terms, of which over 80% is associated with the LRET.

The modelling also shows that much of this additional capacity developed under the LRET is surplus to market needs. Under the Repeal scenario, the modelling projects a net reduction in the development of generating capacity of around 8,500 MW. Given the current levels of oversupply in most electricity grids and muted demand growth, the existing generation fleet is almost sufficient to meet expected demand for the foreseeable future.

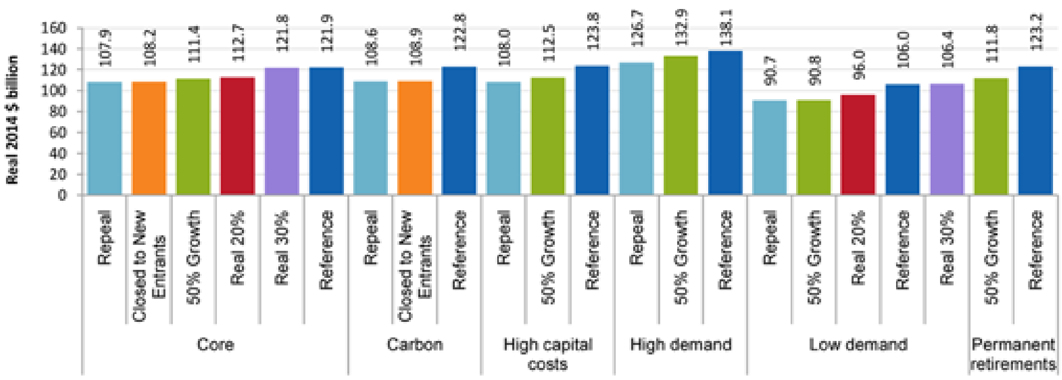
Generation sector resource costs

Figure ES 3 below presents a summary of the present value of aggregate generation sector resource costs over the period 2015-40 across each of the scenarios and sensitivities modelled. This measure can be interpreted as the cost to society of generating electricity for consumption by consumers and provides an indication of the sector's labour and capital productivity under each scenario and sensitivity when viewed on a per MWh basis.

For the Reference case (under core assumptions) costs total $121.9 billion in present value terms over the period to 2040 using a discount rate of 7% pre-tax real. Under the core assumptions, all of the policy variants examined resulted in a reduction in sector resource costs, indicating capital and/or labour productivity gains for the economy. The Real 30% scenario has almost the same aggregate cost as the Reference case because the deferral of wind development early is offset by an overall larger amount of renewable development in the longer-term.

The Repeal case has the lowest projected resource costs, as expected, as there are no RET subsidies distorting supply costs and competitive wholesale electricity markets are left to determine the most efficient, least cost plant mix to meet demand. This was one of the fundamental intentions in the establishment of the NEM, with its rules and principles being deliberately technology agnostic. Another reason for the development of the NEM was to impose competitive disciplines on participants in order to avoid the large oversupply in generation that had occurred through state governments using electricity supply to support other industries and policies. In a market with little or no demand growth, the RET is creating the same oversupply in generation that the NEM was designed to correct. In the absence of the RET policy, the market determines the optimal level of generation investment, rather than having arbitrary targets imposed upon it. In a market environment where capacity is already oversupplied and demand may continue to decline, it is desirable (and efficient) for no new investment in capacity to occur.

Figure ES 3 Aggregate generation sector resource costs (NPV 2015-2040): All scenarios/sensitivities

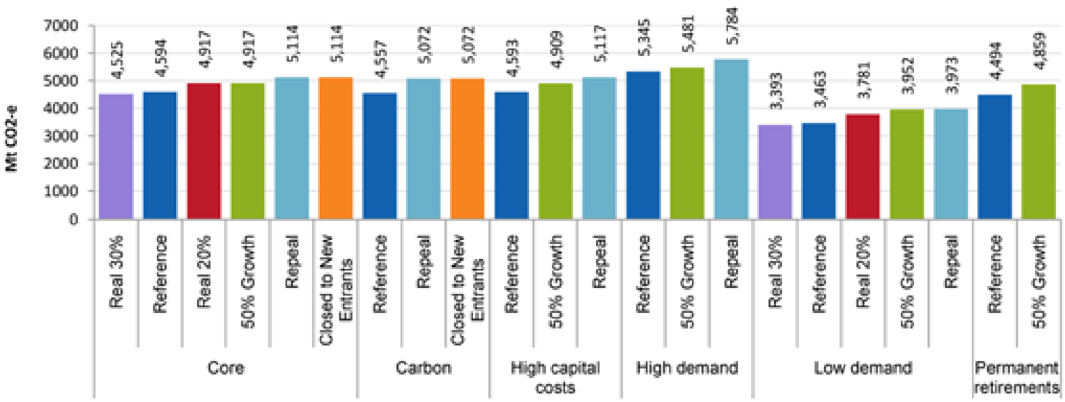


Note: Measure includes capital expenditure (on both generating capacity and any interconnector expansions/augmentations); refurbishment of existing and new generators for life extension beyond initial economic life; fixed operating costs (fixed costs associated with normal operation and stay in business capital expenditure associated with existing and new generating capacity); variable operating costs (fuel costs and variable O&M costs for existing and new generation) and unserved energy. NPV calculated using a 7% real discount rate.
Source: ACIL Allen

Emissions and cost of abatement

The RET policy delivers emissions abatement through displacing fossil fuel based generation with renewable generation. The level of abatement achieved is projected to be higher under the current market conditions relative to previous assessments because of the reduced role of gas-fired plant (increasing gas prices) and the repeal of the carbon price, both of which increase the competitiveness of coal fired plant within the generation mix. Figure ES 4 below shows that the policy scenarios which include the RET or an expansion to the RET (the Real 30% case) consistently result in the lowest emissions outcomes across assumption sets. Conversely the Repeal of the RET is projected to lead to higher emissions; between 8% and 14% relative to the Reference case over the period to 2040.

Figure ES 4 Aggregate emissions from electricity generation: 2015-2040: All scenarios/sensitivities



Note: Excludes non-scheduled generation in NEM regions, own-generation in the SWIS and off-grid generation 'Other' category includes cogeneration, liquid fuels, CCS-equipped technologies, biomass and geothermal.
Source: ACIL Allen

As with any Government expenditure or program, an important consideration is whether the policy offers value for money relative to alternatives. Two methods for calculating the cost of abatement from the policy have been used. Method 1 calculates abatement costs as the present value of the change in resource costs divided by the discounted change in abatement. Method 2 is the same, except the emissions in the denominator are not discounted.[83] Using method 1, estimated abatement costs for the RET range from $59/tonne under the 50% growth case (core assumptions) to $77/tonne (Reference case High capital costs).[84] Under method 2, these costs are lower, ranging from $30/tonne to $40/tonne under the same scenarios. Whilst the policy is somewhat effective in the abatement of emissions, it is at high cost compared to current global pricing and is therefore not the most efficient means of emissions abatement. There is also a large difference between calculated abatement costs for the LRET and SRES components, with the abatement costs for the SRES being at least 2 to 3 times higher than the LRET. Therefore policy scenarios which tend to reduce subsidies provided for solar PV will tend to lower the overall RET abatement cost.

Impacts on retail prices

The public analysis of the costs and benefits of the RET scheme has been dominated by views on the net benefits that the RET scheme provides to electricity consumers. These net electricity consumer benefits are generally calculated by assessing wholesale electricity price (pool) and RET certificate price changes for the market with and without the RET scheme (i.e. the modelled impact of the subsidised renewable generation on wholesale electricity market prices). Assessing the net consumer benefits limited to a specific economic sector cannot be considered to be either a social cost benefit analysis or an economy wide assessment of the RET scheme. Considering only the benefits that flow to consumers ignores the opportunity costs of the capital and labour involved and the other welfare effects of the policy.

Figure ES 5 below shows the projected aggregate cost for an average Australian household on electricity over the period 2015-40 in NPV terms. In most cases, moving from the Reference case to the Repeal case (the most extreme policy variant) results in projected household electricity costs rising in net terms (the reduction in direct compliance costs is outweighed by increases in wholesale electricity prices). This indicates that wealth transfers are occurring from existing generators to both new renewable energy projects and consumers.

Interestingly, this pattern of price changes does not hold under low demand conditions. This is because new renewable generation is incapable of supressing wholesale prices below levels which are sustainable for incumbent generators to keep operating. Under these conditions, removal of the direct compliance costs is not offset by any increases in wholesale prices and consumers are better off under a Repeal scenario.

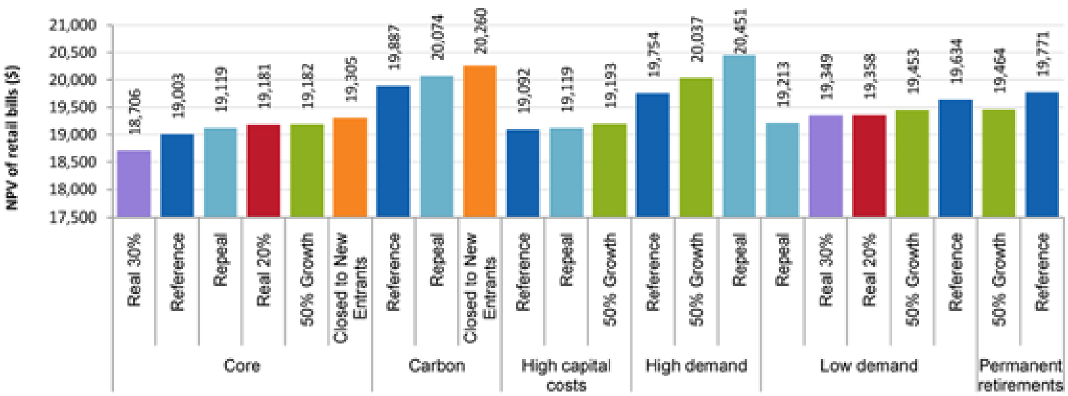
The impact on retail electricity prices is subject to uncertainty in the modelled components. Pool prices are inherently uncertain. This is because many of the drivers of pool prices are uncertain, such as:

- Weather driving demand is unpredictable and highly variable
- Plant performance (outages) is also stochastic (random)
- Fuel prices may vary over time although most fossil fuel fired plant tend to contract over several years and so these prices tend to be reasonably certain on an annual basis
- Participant behaviour (mothballing, plant retirement, strategic bidding, etc.) may swamp other effects over time.

[83] ACIL Allen has used the second method to calculate abatement costs at the request of the Expert Panel. However, ACIL Allen considers that the second method does not appropriately reflect the costs of emissions abatement on an inter-temporal basis.
[84] This range excludes the 50% Growth low demand case which is an outlier with a much higher cost of $164/tonne.

A key factor in the uncertainty around future electricity prices is participant behaviour. As electricity demand has fallen in recent years, an increasing willingness of participants to mothball or close generation plant has been observed. Closing or mothballing plant can cause a significant rebound in pool prices and may fully offset any downward pressure from renewable plant. While we have incorporated some mothballing of plant in the analysis, participants may have different objectives and take quite different views to mothballing and plant closure than we have taken. This could substantially change the net benefit to electricity consumers through net changes in retail prices. The Permanent retirement sensitivity, which includes a larger amount of incumbent capacity withdrawal, demonstrates that the impact on retail electricity prices can easily be reversed, with consumers benefiting from moving from the Reference case policy to a 50% Growth scenario. Directionally, the same outcome would also be seen if the scheme was closed to new entrants or fully repealed.

Figure ES 5 NPV of average household total expenditure on electricity (2015-2040): All scenarios/ sensitivities



Note: NPV of annual residential bills for average household over the period 2015-40. Uses a 7% real discount rate
Source: ACIL Allen

Regardless of direction, the impact on retail electricity prices is small, even when considered over the period to 2040. Under the core assumptions, moving from the Reference case to a complete repeal of the scheme is projected to increase a typical household's expenditure on electricity over the period to 2040 by 0.6% in present value terms. By comparison, moving from the Reference case to a Repeal case under low demand conditions is projected to reduce a typical household's expenditure on electricity (over the same period) by 2.1% in present value terms. In all cases examined, the benefits or costs are a very small percentage of the total electricity bill and could easily be swamped by the range of uncertainties in pool prices, especially the changes in the behaviour of generation participants.

Assessing the RET's impacts on retail electricity prices in isolation does not provide a solid basis for economically evaluating the RET policy. That the RET may lower electricity prices for consumers does not mean that its benefits outweigh its costs when considered in society wide terms. The diversion of capital and labour from other productive activities to the electricity sector imposes real costs on other sectors of the economy. Other policies such as subsidising fossil fuels or fossil fuel generators would also likely have the effect of lowering costs to electricity consumers and probably at significantly lower resource costs, yet few would advocate these as being good policy positions. An economic evaluation of the policy would not normally include wealth transfers where either producers or consumers benefit at the expense of each other. This makes projected changes to retail electricity prices mostly irrelevant in any economic assessment of the policy.

In ACIL Allen's view, the main focus of any evaluation should be on the cost of abatement achieved through the policy and whether this represents an efficient means of achieving abatement objectives.

APPENDIX D: CALCULATING THE PERCENTAGE SHARE OF RENEWABLE ENERGY

Calculating the percentage share of electricity generation attributable to renewables, for example in 2020, serves two purposes:

- It informs the evaluation of the effectiveness of the RET in achieving the previously stated policy goal for 2020 of a 20 per cent share; and
- It is used to calculate possible LRET target profiles to deliver a particular target share of renewables – for example a policy option to achieve a real 20 per cent in 2020 based on current energy forecasts.

The percentage calculation is made by adding estimates of the various components of renewable energy (the numerator) and dividing by an estimate of total Australia wide electricity (the denominator). While straightforward in concept, in practice methodological issues arise as to how components of these two numbers are defined and measured.

For consistency, measurements or estimates should refer to the same point in the electricity supply chain. For example, generation from rooftop PV should be adjusted upwards to account for distribution and transmission losses in order to be consistent with large-scale generation which is reported as 'sent-out' energy (that is, the energy that leaves the power station).

More broadly, forecasting the various components of renewable generation and overall national electricity is inherently uncertain, and can vary between forecasters/modellers and over time depending on methodologies and underpinning assumptions. This uncertainty increases with the time horizon.

Components of the calculation

There are four key components of the renewable energy estimate (the numerator) that need to be accounted for:

$RE_{\text{LRET eligible}}$	Generation from LRET-accredited power stations – (for power stations in operation prior to the MRET (the precursor to the RET) only generation above their annual baselines is included here).
$RE_{\text{Pre-RET}}$	'Below-baseline' generation from pre existing (i.e. pre-MRET, mainly hydro) renewable power stations, which is not eligible to create certificates under the RET.
RE_{SRES}	Generation from SRES-eligible small-scale renewables installations (mainly rooftop solar PV). As small-scale solar water heaters (SWH) are also eligible under the RET, the energy (mainly electricity and gas) they displace in heating water is often counted as well.
$RE_{\text{Other non-RET}}$	Additional generation supported by voluntary schemes (e.g. GreenPower), which is ineligible under the RET.
$E_{\text{Total electricity}}$	The national electricity figure used in the denominator combines amounts for large-scale and small-scale electricity generation, whether supplied on regional transmission networks, embedded in local distribution networks, self-generated or generated and used off-grid.

For future years, these amounts are based on annual forecasts by the operators of the main NEM and SWIS grids, as well as estimates by BREE and other expert analysts for the smaller grids and off-grid.

The formula below shows the various components of the calculation:

$$\%\ RE\ (year) = \frac{(RE_{LRET\ eligible} + RE_{SRES} + RE_{Pre\text{-}RET} + RE_{Other\ non\text{-}RET}) * 100}{E_{Total\ electricity}}$$

The formula can be rearranged to calculate the LRET target that would achieve a particular share in a particular year (for example, a 20 per cent share in 2020):

$$RE_{LRET\ eligible}\ (2020) = (0.2 * E_{Total\ electricity}) - (RE_{SRES} + RE_{Pre\text{-}RET} + RE_{Other\ non\text{-}RET})$$

In addition to the uncertainty inherent in forecasting the components, three key issues need to be considered when calculating the percentage share and setting an LRET target to achieve a particular percentage share. These issues and their potential impacts are outlined below.

Treatment of the output from solar water heaters (SWH)

While the RET scheme is mainly focused on raising the share of renewables-based electricity, certificates may be created under the SRES component for the renewable energy produced by SWH.

Inclusion of this heat energy as part of the RE_{SRES} component in the calculations has been justified on the grounds that while not generating electricity, the heat produced by SWHs displaces electricity – which assumes SWH buyers would otherwise have bought an electric water heater.

The energy displaced by SWH has been eligible to contribute towards the annual targets legislated under the old MRET scheme and under the expanded RET as legislated in 2009. It was also included in analysis undertaken to inform the 2012 RET review.

However, some in the renewable energy industry argue this energy is not consistent with the electricity focus of the RET and its inclusion in setting targets would reduce investment in large-scale renewable projects encouraged under the LRET.

It can also be argued that householders buying SWH may otherwise have bought gas water heaters rather than electric ones. If the uptake of renewables (the numerator) is extended to the renewable energy produced in domestic water heating, then for consistency the denominator should be extended to include the total energy used nationally in domestic water heating.

Consequently, there are several ways of treating the renewable heat from SWH in calculating the renewables percentage. The following approach separates out the generation ($RE_{Small\ gen}$) and displacement (RE_{SWH}) components of the SRES term in the numerator, and adds a term for the non-electric energy used in domestic water heating ($E_{Hot\ water}$) to the denominator, to address a range of viewpoints:

$$\%\ RE\ (year) = \frac{(RE_{LRET\ eligible} + RE_{Small\ gen} + RE_{Pre\text{-}RET} + RE_{Other\ non\text{-}RET} + [RE_{SWH}]) * 100}{E_{Total\ electricity} + [E_{Hot\ water}]}$$

$RE_{Small\ gen}$	The small-scale renewable electricity component (predominantly solar PV) of the SRES.
[RE_{SWH}]	Energy produced by solar water heaters. If included, this energy could be total SWH production or some proportion of that, which can be taken as displacing electricity.
[$E_{Hot\ water}$]	The non-electric energy used to heat water. If included, this could be focused narrowly on SWH or more broadly on domestic water heating.

ACIL Allen estimates that under the current settings, around 3,500 GWh of energy will be displaced by SWH in 2020, which is around 600 GWh above the level in 2014.

The ACIL Allen modelling indicates that if the energy displaced by SWH is added to the numerator of the calculation (and depending on how energy used in heating water is treated in the denominator), its inclusion could:

- raise the calculated share for renewables in 2020 by up to around 1.4 percentage points or reduce the calculated share by around 0.2 percentage points); and/or
- reduce the size of an LRET target calibrated to achieve a particular renewables share in 2020 by around 3,500 GWh. This would:
  - reduce the potential wind energy capacity stimulated by the LRET by around 1,200 MW; and
  - for a 20 per cent share, reduce the RET cost in 2020 of the additional certificates to households and businesses by around $200 million based on ACIL Allen's modelling.

Treatment of generation from voluntary schemes

Renewable energy is also generated by LRET accredited generators for use under voluntary schemes, the main one being GreenPower. The energy from these schemes is intended to be additional renewable energy beyond that encouraged through the RET.

Including renewable electricity supplied under such schemes would more accurately represent the share of renewables in Australian electricity. However, its inclusion in setting a 2020 LRET target to achieve a particular percentage share for renewables would undermine the 'additionality' objective of these schemes.

Generation from voluntary schemes was not included in setting the annual RET targets in 2009 or in analysis by the 2012 RET review.

ACIL Allen has estimated generation through these schemes to be in the order of 1,700 GWh in 2020. If added to the numerator, this would raise the calculated renewables share for 2020 by around 0.7 percentage points. If used in setting an LRET target for 2020 it would have around half the impact of including the energy displaced by SWH.

Below-baseline generation from pre-existing power stations

The variable and unpredictable nature of the hydro resource makes it difficult to forecast accurately the total below-baseline generation in any future year by pre-existing power stations.

Each pre-existing power station is able to create certificates for annual generation above its historical baseline set by the CER. However, for a variety of operational and resource-related reasons, not all power stations achieve their baselines in a particular year. Therefore, the sum of the baselines (around 16,600 GWh) is an upper limit for total below-baseline generation.

A range of estimates have been made for this component of total renewables in 2020. For example, in setting the annual targets for the expanded RET in 2009, an estimate of 15,000 GWh was used. Analysis for the 2012 RET Review used a lower value of 14,300 GWh reflecting a downward revision of long-term hydro capability. Industry analysis suggests that total below-baseline generation has historically averaged in the order of 14,000 GWh although the amount has varied from year to year.

For its modelling, ACIL Allen has recognised the potential for below-baseline generation in 2020 to be below the maximum, but based its forecast less on historical levels and more on recent longer-term energy forecasts for the large hydro systems in NSW/Victoria and Tasmania. ACIL's estimate used in the modelling was 16,150 GWh.

The ACIL Allen modelling indicates that reducing the forecast estimate for below-baseline generation by 2,000 GWh to reflect historical levels would:

- Reduce the calculated renewables share by around 1 percentage point; and/or
- Increase the size of an LRET target calibrated to achieve a particular renewables share in 2020 by 2,000 GWh. This would:
    - increase the potential wind energy capacity stimulated by the LRET by around 700 MW; and
    - for a 20 per cent share, increase the RET cost in 2020 of the additional certificates to households and businesses by around $120 million based on ACIL Allen's modelling.

The approach adopted by the Panel for the ACIL Allen modelling

The Panel adopted the following approach for calculating the renewables percentage in 2020 and estimating a 'real 20 per cent target' for modelling purposes:

- A 2020 forecast of Australia-wide renewables-based electricity which:
    - reflects ACIL Allen's estimate of 16,150 GWh for below-baseline generation from pre-existing generators;
    - reflects ACIL Allen's modelling which indicates the LRET target of 41,000 GWh of additional generation from RET-accredited power stations would be achieved;
    - uses ACIL Allen's estimate of underlying small-scale solar PV generation of 9,920 GWh in 2020 for current settings and 9,673 GWh under the modelled 'real 20 per cent in 2020' scenario;
    - does not include generation under schemes designed to encourage renewable energy that is additional to the RET; and
    - does not include the energy produced by solar water heaters.
- A forecast of total Australia-wide electricity, including metered and unmetered supply in the NEM, SWIS and smaller grids, as well as off-grid electricity using the latest central electricity demand estimates from AEMO and the Independent Market Operator, along with BREE and ACIL Allen estimates for smaller grids, self-generation and off-grid electricity.

- This approach yields a 26.3 per cent renewables share in 2020 under the current design and a 2020 LRET target of 25,200 GWh to achieve a 'real 20 per cent' share in 2020.

$$\% \text{ RE } (2020) = \frac{41{,}000 \text{ GWh} + 9{,}920 \text{ GWh} + 16{,}150 \text{ GWh} + 0) * 100}{255{,}300 \text{ GWh}}$$

$= 26.3\ \%$

$RE_{\text{LRET eligible}}\ (2020) = 0.2 * (255{,}300 \text{ GWh}) - (9{,}673 \text{ GWh} + 16{,}150 \text{ GWh})$

$= 25{,}200$ GWh (rounded)

The implications of adopting the various approaches

Based on the analysis above, application of the various approaches to calculating the renewables percentage in 2020 would yield the following:

- An upper estimate for the renewables share - based on the inclusion of energy produced by SWH, the ACIL Allen estimate of below-baseline generation and including additional generation under voluntary schemes is 28.3 per cent.
  - This approach would yield a lower estimate for an LRET target in 2020 to achieve a 20 per cent renewable share: 20,000 GWh.
- A lower estimate for the renewable share - based on exclusion of SWH and generation under voluntary schemes and a lower (14,000 GWh) estimate of total below-baseline generation is 25.4 per cent.
  - This approach would yield an upper estimate for an LRET target in 2020 to achieve a 20 per cent renewable share: 27,400 GWh.

The calculated percentage share and 2020 LRET target used in the modelling lie between these upper and lower estimates.

Changes to the Panel's adopted approach to the treatment of SWH and estimation of below-baseline generation would not be material to the Panel's preferred options for the LRET (grandfathering or a share of growth model).

However, should the Government choose a policy option that involves setting LRET targets to achieve a specific share for renewables in a particular year, these issues, along with the electricity demand and small-scale renewables forecasts, could significantly impact on desired outcomes and would need to be further considered in implementing changes.

APPENDIX E: INTERNATIONAL RENEWABLE ENERGY POLICIES

Internationally, renewable energy is supported through a wide range of policy measures. According to the Renewable Energy Policy Network for the 21st Century (REN21), 144 countries have renewable energy targets. Of those, 138 countries have policy measures in place to support those targets being met, including regulatory settings, public financing, fiscal incentives or tax settings, tendering and feed-in-tariffs (FiTs). While FiTs are the most prevalent support mechanism, many countries are moving away from FiTs to more competitive market arrangements including reverse auctions. Each country's domestic energy policy is determined by a range of factors, including natural resource endowment, economic conditions, existing energy infrastructure, international or regional obligations, energy security and industry development objectives.

Comparing the ambition, nature and progress of a particular country's environmental or renewable energy policy is fraught as each country may express their targets differently, for example, as a percentage of electricity generation or final energy consumption. Information in Table 6 below is indicative of the variety of drivers influencing renewable energy policy internationally. In Europe, new state aid rules released by the European Commission will require all European Union (EU) member countries to transition away from FiTs to market driven arrangements. Domestic energy policy reviews recently completed or underway in a number of member states have outlined new renewable energy policy settings to comply with the new state aid rules. For example, recent policy reviews in Germany and the United Kingdom have left the existing targets unchanged but endorsed new policy measures aimed at reducing costs, improving grid integration and transitioning to more competitive support mechanisms.

In some countries, the support for renewables has been in decline for a number of reasons including high levels of penetration, the impact of climate and renewable energy policy on electricity prices, changes in the generation mix and broader fiscal circumstances. Spain, for example, has achieved high levels of renewable energy penetration at relatively high cost with the government electing to minimise future support for renewable installations to repair a long standing electricity tariff deficit.

The International Energy Agency (IEA) ranks renewable energy as the world's fastest growing energy source, forecast to overtake natural gas and reach double the output from nuclear energy by 2016. By 2018, renewables are expected to reach 2,350 GW, or 25 per cent of gross electricity generation. Onshore wind is forecast to be deployed in 75 countries and large-scale solar in 65 countries by 2018.[85] Analysis by Bloomberg New Energy Finance and the IEA suggests that the areas of largest renewable growth to 2030 will be China and other developing economies. New fossil fuel capacity will be built to provide baseload support to the growing penetration of renewable generation and decentralised grids. Ambitious renewable energy policies and targets continue to drive investment in a number of major economies including China, Japan, India, France, California, Brazil, Mexico and Portugal.

Table 6 provides a brief overview of renewable energy targets and policies in a selection of counties.[86]

[85] International Renewable Energy Agency, 'Medium-Term Market Report 2013: Market Trends and Projections to 2018 Executive Summary,' 2013, p.3
[86] Prepared by the RET Review Secretariat for the Panel.

Table 6 Overview of renewable energy policies in selected countries.

Country/Region	Renewable Energy Target[87]	Policy/Mechanisms	Additional information
China	15% 'non-fossil fuel' energy by 2020, targeting 420 GW of hydro, 50 GW of solar, 200 GW of wind, 30 GW of biomass	Renewable energy portfolio standard, PV subsidies, and FiTs for solar, wind and biomass.	Energy policy is being driven by the need to meet growing energy demand while reducing particulate pollution. In 2013, China's new renewable capacity surpassed new fossil and nuclear capacity for the first time (REN21) generating nearly 10 per cent of total electricity demand. China has the largest installed renewable energy capacity and was the largest investor in clean energy technology in 2013.
Canada	-	Clean energy tax incentives, provincial targets and policies	Canada has the fourth largest installed renewable capacity, mainly hydro, in the world. Canada has the fifth largest installed wind capacity and is the third largest biofuel producer in the world. Provinces have deployed different renewable policies, including competitive tendering and portfolio standards.
European Union	20% final energy from renewables by 2020	Each member state negotiates domestic targets to contribute to EU wide targets.	Member states agreed to 2020 targets for renewable energy, emissions reductions and energy efficiency improvements to support the European Union Emissions Trading Scheme. 2030 targets are under development. The European Commission recently amended state aid rules to transition away from FiTs to other market mechanisms.
France	23% final energy from renewables by 2020	FiTs indexed for inflation. Periodic renewable power project tenders	In June 2014, the French government released a new energy bill setting targets for renewable energy, energy efficiency, transport and generation from nuclear sources. The energy market will transition to a capacity market and a range of financial and regulatory settings have been announced to meet the target of halving total energy consumption on 2012 levels by 2050. Direct tendering will be used instead of FiTs.
Germany	45% share of electricity generation from renewables by 2035	Competitive tendering for all new projects larger than 5MW, transitioning away from FiTs. Installation caps will apply with reduced support for onshore wind and PV and a self-generator surcharge to cover network fees.	Energy reforms recently announced in light of declines in electricity demand, rising electricity prices to account for high PV uptake and the need to expand network services, closure of nuclear fleet and greater cost sharing between all sectors. FiTs will transition to competitive tendering with technology specific caps on new installations in particular growth corridors. Network co-payments will be required from all self-generators and energy intensive industries.

[87] Bloomberg New Energy Finance, Country Profiles

Country/Region	Renewable Energy Target[87]	Policy/Mechanisms	Additional information
India	20% electricity consumption of final energy from renewables by 2020 20 GW of solar by 2020	FiT, tax incentives, capital subsidies and renewable power purchase obligations and certificate trading scheme.	India has a rapidly growing demand for energy and a diverse energy mix, with coal the main source of generation followed by large-scale hydro, renewable energy, gas and nuclear energy. In 2008, India adopted a National Action Plan on Climate Change which has led to the adoption of renewable energy and biofuels targets, a tax on coal exports, aspirational solar installation targets and energy intensity reduction targets for nearly 500 industrial facilities.
Japan	28 GW of solar by 2020	FiTs funded by consumer surcharge, tax incentives	With limited domestic resources and the closure of all nuclear facilities in 2012, Japan imports over 90 per cent of its energy requirements. However, the recently announced new energy plan will likely see nuclear generation recommence and an expansion in installed renewable capacity. The plan includes emissions reduction targets but not renewable energy targets.
Republic of Korea	11% of final energy from renewables by 2030	Increasing annual renewable energy targets, FiTs and portfolio standards.	In 2010, Korea embarked on a new energy policy to stimulate the economy and secure energy independence. An Emissions Trading Scheme is scheduled to commence in 2015, renewable portfolio standards apply and a national smart grid initiative is intended to be deployed by 2030.
Spain	20% of final energy from renewables by 2020	In 2012, Spain temporarily suspended FiTs. A new formula to calculate returns for renewable projects has recently been released.	In 2013, Spain generated more electricity from wind capacity than any other generation source. Spain's energy policy has been contributing to rising electricity prices after 15 years of tariff freezes without cost recovery for the Government subsidy of renewable projects.
United Kingdom	15% of final energy from renewables by 2020	Renewable Energy Obligation transitioning to Contracts for Difference reverse auction mechanism in 2017.	Recent energy market reforms have been announced due to the retirement of ageing coal fired generators and rising electricity prices. Reverse auctions will support large-scale renewable projects while small-scale renewable energy continues to receive FiT support.

United States of America	State based targets, e.g. California aiming for 33% of renewables in final energy by 2020. New York aiming for 30% of final energy from renewables by 2015.	Renewable Energy Portfolio Standards, federal and state tax incentives and public/ private programs.	Renewable energy investment, deployment and manufacturing remain strong with a combination of federal and state policies and tax incentives in operation. More than half of states have renewable portfolio standards with nine states involved in a regional greenhouse gas cap and trade scheme. In 2012, federal vehicle emissions standards were introduced followed by emissions intensity limits for new and existing power stations released in 2014, with state based emissions targets set by the Environmental Protection Authority.

[87] Bloomberg New Energy Finance, Country Profiles

ABBREVIATIONS AND ACRONYMS

Abbreviation	Term
ACT	Australian Capital Territory
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ARENA	Australian Renewable Energy Agency
BREE	Bureau of Resources and Energy Economics
CCA	Climate Change Authority
CEFC	Clean Energy Finance Corporation
CER	Clean Energy Regulator
CO_2	Carbon dioxide
CO_2-e	Carbon dioxide equivalent
CoAG	Council of Australian Government
CPRS	Carbon Pollution Reduction Scheme
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DKIS	Darwin-Katherine Interconnected System
EEIS	Energy Efficiency Improvement Scheme
EITE	Emissions-intensive trade-exposed
ERF	Emissions Reduction Fund
ESAA	Energy Supply Association of Australia
FiT	Feed-in-Tariff
GDP	Gross Domestic Product
GW	Gigawatt
GWh	Gigawatt hour
IPART	Independent Pricing and Regulatory Tribunal
kW	Kilowatt
kWh	Kilowatt hour
LGC	Large-scale generation certificates
LNG	Liquefied natural gas
LRET	Large-scale Renewable Energy Target

MFP	Multi-factor productivity
MRET	Mandatory Renewable Energy Target
Mt CO_2-e	Million tonnes carbon dioxide equivalent
MW	Megawatt
MWh	Megawatt hour
NECF	National Energy Customer Framework
NEM	National Electricity Market
NER	National Electricity Rules
NSW	New South Wales
NPV	Net Present Value
NWIS	North West Interconnected System
PEC	Partial Exemption Certificate
PPA	Power Purchase Agreement
PV	Photovoltaic
REC	Renewable Energy Certificate
REE Act	*Renewable Energy (Electricity) Act 2000* (Cth)
RET	Renewable Energy Target
RPP	Renewable Power Percentage
SGU	Small Generating Unit
SRES	Small-scale Renewable Energy Scheme
STC	Small-scale Technology Certificate
STP	Small-scale Technology Percentage
SWH	Solar Water Heater
SWIS	South West Interconnected System
VEET	Victorian Energy Efficiency Target
WCMG	Waste Coal Mine Gas

GLOSSARY OF TERMS

Term	Abbreviation	Explanation
Australian Energy Market Operator	AEMO	AEMO was established in 2009 and is responsible for the operation of the National Electricity Market which includes the east and south east regions of Australia (Queensland, New South Wales, Victoria, Tasmania and South Australia).
Australian Renewable Energy Agency	ARENA	ARENA is an independent statutory authority established under the *Commonwealth Authorities and Companies Act 1997* (Cth), tasked with the objectives of improving the competitiveness of renewable energy technologies and increasing the supply of renewable energy in Australia.
1997 baseline		During the process of accreditation for a power station under the Renewable Energy Target, the CER determines a baseline value for generation prior to 1997 (when the scheme was first proposed). The baseline is generally calculated by using the average amount of annual electricity generated from eligible renewable energy sources in 1994, 1995 and 1996. Accredited power stations are only able to create LGCs for generation above its baseline.
Clean Energy Finance Corporation	CEFC	The CEFC is an independent statutory authority established by the Clean Energy Finance Corporation Act 2012, tasked with the objectives of the financing, commercialisation and deployment of renewable energy, energy efficiency and low emissions technologies.
Clean Energy Regulator	CER	The CER is an independent statutory authority that administers regulatory schemes relating to the Renewable Energy Target, the National Greenhouse and Energy Reporting scheme and the Carbon Farming Initiative.
Clearing House (for Small-scale technology certificates)		The small-scale technology certificate Clearing House facilitates the exchange of small-scale technology certificates between buyers and sellers at the fixed price of $40.
Climate Change Authority		The Climate Change Authority is an independent statutory authority established by the Climate Change Authority Act 2011 and provides advice on the operation of Australia's emissions reduction targets, and other Australian Government climate change initiatives.
Closing the RET to new entrants		An ACIL Allen modelling scenario where the LRET scheme continues to operate, but only large-scale renewable energy power stations currently accredited under the scheme and those currently under construction or fully committed are able to create LGCs. For modelling purposes a fixed price of $40 in nominal terms per LGC was chosen. The SRES ceases from 1 January 2015.
Compliance period		A full calendar year, the period over which each annual target under the Renewable Energy Target must be achieved.
Council of Australian Governments	CoAG	CoAG is the peak intergovernmental forum in Australia. The members of the CoAG are the Prime Minister, State and Territory Premiers and Chief Ministers and the President of the Australian Local Government Association.

Deeming		The estimation of the amount of electricity a small-scale solar power system or small-scale wind or hydro system generates, or the electricity a solar water heater or heat pump displaces. Deeming allows the owners of these technologies to receive their entitlement to small-scale technology certificates before the system has produced or displaced the electricity.
Emissions-intensive trade-exposed	EITE	Businesses conducting specified emissions-intensive trade-exposed activities are eligible for assistance under the Renewable Energy Target scheme.
Floating target		A floating target is where the RET target would be regularly updated in line with the most recent projections of electricity demand. This is in contrast to including fixed GWh targets in legislation.
Gigawatt	GW	A measure of power (or demand) equal to a thousand Megawatts.
Gigawatt hours	GWh	A measure of electricity generation/use over a period of time.
Grandfathering		See 'Closing the RET to new entrants'.
Kilowatt	kW	A measure of power (or demand).
Kilowatt hour	kWh	A measure of electricity generation/use over a period of time (or energy).
Large-scale generation certificates	LGC	Large-scale generation certificates may be created by power stations generating electricity from renewable sources. Each certificate represents one megawatt hour of renewable energy generation.
Liable entities		Entities that are required by legislation to surrender a specified number of renewable certificates or pay a renewable energy shortfall charge.
Large-scale Renewable Energy Target	LRET	The LRET encourages the deployment of large-scale renewable energy projects. It sets legislated targets for large-scale renewable generation each year that increase to 41,000 GWh of electricity in 2020.
Mandatory Renewable Energy Target	MRET	The Mandatory Renewable Energy Target commenced in 2001. The MRET had a target of 9,500 gigawatt hours in 2010 (mandated out to 2020) and interim targets that gradually increased year on year.
Megawatt	MW	A measure of power (or demand) equal to one million watts.
Megawatt hour	MWh	A measure of electricity generation /use over a period of time.
National Electricity Market	NEM	The National Electricity Market interconnects five regional market jurisdictions (Queensland, New South Wales, Victoria, South Australia and Tasmania). Western Australia and Northern Territory are not connected to the National Electricity Market.
Net Present Value	NPV	The NPV of an amount of money accounts for the changing value of money over time by discounting future cash flows to an equivalent amount of money that is available to spend now.
North West Interconnected System	NWIS	The NWIS supplies electricity to communities in the north west of Western Australia including the Pilbara region.

Partial Exemption Certificate	PEC	The Renewable Energy (Electricity) Act 2000 (Cth) and the Renewable Energy (Electricity) Regulations 2001 include provisions to provide partial exemption from Renewable Energy Target liability for electricity used in defined emissions-intensive trade-exposed activities. To obtain an exemption, prescribed persons may apply to the CER for a partial exemption certificate.
Power Purchase Agreement	PPA	A Power Purchase Agreement (PPA) is a contract between a renewable generator and an electricity retailer for the purchase of both electricity and LGCs.
'Real 20 per cent' target		A modelled policy scenario where the LRET targets are reset to achieve a 20 per cent share of renewables in the generation mix by 2020, based on the electricity demand projections used in the modelling. The LRET targets are maintained at 2020 levels until 2030.
'Real 30 per cent' target		A modelled policy scenario where the LRET is reset to achieve a 30 per cent share of renewables in the generation mix by 2030, based on the electricity demand projections used in the modelling. The targets remain at 2030 levels until 2040.
Reference case		The modelled scenario of the current legislated RET policy. It includes an LRET target of 41,000 GWh by 2020 and an uncapped SRES scheme, where solar PV installations receive 15 years of deemed certificates (progressively phased out from 2017) and solar water heaters receive 10 years of deemed certificates (progressively phased out from 2022).
Regional Forestry Agreements		The regulation of logging activity is managed by state and territory governments through forestry plans, such as Regional Forestry Agreements, and generally requires harvesting to be conducted in accordance with ecological sustainability requirements.
Renewable Energy Certificates	REC	The term used for renewable energy certificates generated under the Renewable Energy Target scheme prior to 2011.
REC Registry		A secure web-based application managed by the CER that facilitates the creation, trade and surrender of certificates.
Renewable Energy (Electricity) Act 2000 (Cth)	REE Act	The legislative framework for the Renewable Energy Target scheme.
Renewable Energy (Electricity) Regulations 2001 (Cth)	REE Regulations	The detailed rules and provisions of the Renewable Energy Target scheme.
Renewable Energy Target	RET	The Renewable Energy Target operates in two parts – the Small-scale Renewable Energy Scheme and the Large-scale Renewable Energy Target.
Renewable Power Percentage	RPP	The RPP establishes the rate of liability for LRET and is the mechanism that liable entities use to determine how many LGCs need to be surrendered to meet their liability each year.

Repeal of the RET		The complete removal of both the LRET and SRES schemes
Self-generators		Self-generators produce and consume their own electricity. Where a self-generator consumes the electricity within one kilometre of the point of generation or via a dedicated line it is exempt from liability under the RET. This exemption has been in place since the commencement of the scheme in 2001.
Small-scale Renewable Energy Scheme	SRES	The SRES supports the installation of small-scale renewable energy systems, including solar PV and solar water heaters.
Small-scale Technology Certificate	STC	Certificates created by small-scale technologies like solar PV and solar water heaters. Each certificate represents one megawatt hour of renewable generation or the displacement of one megawatt hour of electricity.
Small-scale Technology Percentage	STP	The STP establishes the rate of liability for the SRES. The STP is the mechanism that liable entities use to determine the number of STCs needed to be surrendered to meet their liability each quarter.
Solar Credits		The Solar Credits multiplier was introduced in mid-2009 to provide support for solar PV by multiplying the number of certificates that systems were able to create. The multiplier was originally set at five, so systems were eligible to create five times 15 years' worth of certificates. Due to rapidly falling system costs and strong uptake, the mechanism was terminated on 1 January 2013.
South West Interconnected System	SWIS	The SWIS is the electricity network that services the majority of Western Australia's population.
'50 per cent share of new growth' scenario		A modelled policy scenario where annual LRET targets are set corresponding to the previous year's target plus a 50 per cent share of expected growth in electricity demand on the main networks and large-scale off-grid demand over the next year. The LRET targets are retained at 2020 levels until 2030.

Renewable Energy Target Scheme

Report of the Expert Panel

Australian Government
Climate Change Authority

RENEWABLE ENERGY TARGET REVIEW

Final Report

DECEMBER 2012

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FINAL REPORT

This final report sets out the Climate Change Authority's recommendations on the Renewable Energy Target review. The recommendations have been developed having regard to the Authority's charter, stakeholder views and modelling work commissioned by the Authority.

Process

Issues paper	›	Submissions received	›	Discussion paper	›	Consultation and feedback	›	**Final report**
August 2012		September 2012		October 2012		November 2012		**December 2012**

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www.climatechangeauthority.gov.au

Australian Government
Climate Change Authority

19 December 2012

The Hon Greg Combet AM MP
Minister for Climate Change and Energy Efficiency
Parliament House
CANBERRA ACT 2600

Dear Minister

In accordance with Section 162 of the *Renewable Energy (Electricity) Act 2000* (Cth), the Climate Change Authority has the pleasure of submitting to you its final report of the Renewable Energy Target review.

Yours sincerely

Bernie Fraser
Chair

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OVERVIEW

This is the final report of the Climate Change Authority on its review of the Renewable Energy Target.

The Climate Change Authority (the Authority) was established on 1 July 2012 as an independent advisory body on climate change. The Authority is to conduct climate change research, as well as periodic statutory reviews on a range of climate change policies. This report covers its first statutory review of the Renewable Energy Target (RET).

An issues paper was released in August 2012 setting out background to the RET and seeking feedback from stakeholders on key issues. Almost 8 700 submissions were received in response.

In October 2012, the Authority released a discussion paper outlining its preliminary views on the RET. Consultations were held with a wide range of stakeholders through a series of roundtables and individual meetings. Written feedback on the discussion paper was also received from a number of stakeholders. The Authority is grateful to all the industry and community groups, governments and other participants who provided initial submissions and feedback on the discussion paper; the Authority has taken this feedback into account in reaching its final recommendations.

The RET commenced operation in 2001 as the Mandatory Renewable Energy Target (MRET), with the objectives of encouraging additional investment in renewable energy generation and reducing emissions of greenhouse gases in the electricity sector. Various amendments (some substantial) have been made to the scheme over time.

The RET creates demand for additional renewable energy generation by placing an obligation on entities that purchase wholesale electricity to surrender a certain number of renewable energy certificates each year. The RET operates as two schemes – the Large-scale Renewable Energy Target (LRET) and the Small-scale Renewable Energy Scheme (SRES).

The RET is an established scheme, which has operated for some years.

The Authority acknowledges that in conducting this review, it was not starting with a blank canvas. The RET has operated for some years; many companies have already made significant investments on the basis of the existing legislation and more commitments are in the pipeline.

The Authority also acknowledges that the renewable generation and reductions in greenhouse gas emissions created through the RET entail costs that are borne by electricity consumers already experiencing large increases in electricity prices for other reasons.

The policy landscape is changing but major uncertainties remain.

The policy landscape has changed significantly since the MRET was introduced. In particular, a carbon pricing mechanism is in place and is intended, over time, to be the main instrument by which Australia achieves its greenhouse gas emissions reduction targets. In addition, the Commonwealth Government has established the Australian Renewable Energy Agency (ARENA) and the Clean Energy Finance Corporation (CEFC).

These organisations are intended to support the future development of renewable generation. Further changes have been on-going step rises in electricity prices – and lower projections of demand – largely for reasons unrelated to the RET.

The Authority believes the RET has a continuing role to play in supporting investment in renewable generation in an uncertain policy environment. The review therefore focusses on possible improvements in the RET, rather than challenges its continued existence.

The real challenge for the Authority has been to reach recommendations that would represent an appropriate balance between promoting investments in renewable generation to reduce Australia's greenhouse gas emissions on the one hand, and containing the costs of the arrangements to electricity users on the other.

The *Climate Change Authority Act 2011* (Cth) outlines certain guiding principles that the Authority must have regard to in pursuing this balance, including economic efficiency, environmental effectiveness and equity considerations. This the Authority has endeavoured to do, having regard to the following broad objectives:

- increasing confidence and predictability;
- managing overall costs to electricity users and providers;
- providing flexibility and choice; and
- streamlining administration and compliance costs.

Increasing confidence and predictability

Confidence and policy stability are critical for ongoing investment in renewables.

Confidence, including in the sustainability of important policy frameworks, is critical in persuading investors (and their financiers) to continue with their plans for long-term investments in renewable generation. Shocks to confidence, from whatever source, tend to be followed by curtailments and deferrals of investment plans, as witnessed in the mining sector of late.

The Australian electricity market is already facing considerable uncertainty, not least in response to the future of the carbon price arrangements. In its recommendations, the Authority has sought to avoid adding to these uncertainties in ways that could increase risk premiums required by lenders and investors in renewable energy.

Frequency and scope of future reviews

One of the Authority's recommendations intended to promote confidence and predictability relates to the frequency and scope of future reviews. Currently, the *Renewable Energy (Electricity) Act 2000* (Cth) *(REE Act)* requires reviews of the scheme to occur every two years. Many participants commented on this issue and, regardless of their position on the RET overall, mostly argued against two-yearly reviews.

The Authority should review the RET every four years to promote greater investor confidence.

Given the importance it attaches to supporting investor confidence, and the impracticalities of undertaking in-depth reviews within a two-yearly period, the Authority's recommendation is that the frequency of scheduled reviews should be amended from every two years to every four years. This approach would see the next scheduled review of the RET take place in 2016 when, hopefully, some current policy uncertainties will be somewhat clearer. Unscheduled reviews could be initiated by the Commonwealth Government of the day at any time.

The Authority is not recommending any narrowing of the scope of future reviews.

The level and form of the Large-scale Renewable Energy Target

The level and form of the LRET target was a major focus of the review, with potentially significant impacts on confidence and predictability for many stakeholders.

Currently, the RET comprises the LRET with a fixed legislated target rising to 41 000 gigawatt hours (GWh) per annum for the period 2020 to 2030, and an 'uncapped' SRES with no quantitative limit.

There was a wide range of views regarding the appropriate level and form of the large-scale target.

Most submissions to the Authority commented on the level of the LRET target, with views generally falling into one of four camps:

- leaving the existing target unchanged at 41 000 GWh;
- reducing the gigawatt hour target to align it with an updated version of 20 per cent of projected electricity supply, based on current forecasts of electricity demand, which are significantly lower than previous forecasts (either on a rolling or a once-off basis). Advocates of a target of no more than 20 per cent argued this would reduce the potential costs of the scheme, particularly for energy users and incumbent generators;

- increasing the target to promote a greater share of renewable energy more quickly and, particularly in light of the creation of the CEFC, to make any renewable generation attributable to the CEFC additional (in quantity terms) to that delivered by the RET; and
- repealing the RET altogether.

On balance, the benefits of changing the target do not appear likely to outweigh the costs of reduced investor confidence.

On balance, the Authority is not convinced that a compelling case exists to adjust the target. In arriving at this judgement, the Authority has given particular weight to concerns that any changes to the target at this time would reduce investor confidence and increase risk premiums for planned renewable energy projects. Given existing uncertainties in the climate change policy area, this would affect the likelihood of meeting any particular target.

Several supporters of a reduction in the target also advocated a change in its form – to either a floating percentage-based target, or retaining the current gigawatt hour target, but setting this level periodically.

The target should remain fixed in terms of gigawatt hours to provide confidence to investors.

The Authority recommends that the form of the target should remain fixed in terms of gigawatt hours. In its view, a one-off change to the level of the target risks damage to investor confidence and possibly more so if the target was expressed as a percentage, or in gigawatt hours but adjusted over time.

The 2016 review should take into account the fact that the RET is viewed as a transitional measure, to provide temporary industry support and encourage additional renewable energy generation ahead of a carbon price trajectory consistent with delivering on Australia's long-term environmental goals.

Shortfall charge

No change is required to the shortfall charge but, if circumstances were to change materially, it should be reconsidered.

Based on its consultations, as well as its commissioned modelling work, the Authority considers that the current shortfall charge is sufficient to encourage compliance with the 41 000 GWh target. The Authority does not, therefore, recommend any change to the shortfall charge at this time.
The Authority notes, however, that in the event that the carbon price or electricity demand are significantly lower than currently projected, there is a risk that the target would not be met with the current shortfall charge.
The Authority would propose to consider the level of the shortfall charge in its scheduled 2016 review, or earlier if circumstances warrant.

The ongoing existence of the Small-scale Renewable Energy Scheme

The SRES should remain separate from the LRET…

The Authority recommends that the SRES remain a separate scheme, and its broad structure remain largely unchanged. This would provide a degree of confidence and predictability for the small-scale installers, small businesses, households and community groups participating in the scheme.

… as there are less disruptive ways of addressing concerns over costs than remerging the schemes.

The Authority examined the possibility of remerging the SRES and the LRET into the one scheme. The primary benefit is a likely reduction in costs because it would cap SRES generation, leading to less overall renewable energy generation in 2020. The main disadvantage is the risk of undermining investor confidence. On balance, the Authority believes there are preferred ways of addressing concerns about the costs of the SRES, some of which have been implemented recently in respect to feed-in tariffs and multipliers.

The clearing house should be amended to a 'deficit sales facility' to make it clear that it cannot guarantee a set price of $40 per certificate in a timely fashion.

To provide clarity to scheme participants, the Authority recommends that the clearing house be amended to a 'deficit sales facility', whereby certificates are only allowed to be entered in the clearing house when the clearing house is in deficit (that is, only when regulator-created certificates have been issued to liable entities). This would allow the continued operation of the clearing house as a price cap, while making it clear that it is unable to guarantee a set price of $40 per certificate in a timely fashion. Such a change would also allow the clearing house price to be more easily amended as there would be no need for transitional arrangements for certificates on the transfer list.

Other recommendations in respect of the SRES, which bear upon cost containment, are discussed below.

The liability and exemption framework

The Authority's recommendations in relation to the liability and exemption framework also reflect its concerns to promote confidence and predictability.

The current settings for the point of liability and the 100 megawatt grid capacity threshold appear to be functioning effectively. Liable entities are accustomed to the existing arrangements and there are no compelling reasons for change.

The renewable power percentage and small-scale technology percentage should be set prior to a compliance year, preferably by 1 December of the preceding year.

Some participants proposed changing the timing of the publication of the renewable power percentage and small-scale technology percentage from 31 March of the compliance year, to before the commencement of the compliance year.

The Authority agrees and recommends that the percentages be announced by 1 December of the previous year. If the Commonwealth Government is attracted to this recommendation, it may wish to consider whether to continue setting the percentages in regulations or some other way.

Current arrangements for the surrender of certificates should be maintained.

Currently, certificates must be surrendered annually under the LRET and quarterly under the SRES. The Authority recommends the retention of this framework as it provides a reasonable balance between providing cash flows to sellers of certificates and managing the compliance costs for liable entities.

The recommended changes to the announcement of the percentages also help to reduce some of the compliance cost burdens of liable entities under the SRES, as they will have greater certainty of their first quarter liability earlier in the compliance year and may therefore be able to manage certificate purchases in a more efficient way.

The exemption from liability under the RET for self-generation should continue in its current form.

As to self-generation, the Authority's preliminary view was that the exemption should be retained for current projects but not allowed for new projects. Considerable feedback was provided by stakeholders on this issue, and further issues were identified regarding the effect of repealing the exemption for new self-generators.

The Authority has now revised its preliminary view. Given the small proportion of electricity estimated to be produced by self-generators, complications in setting of an appropriate threshold for exempting new self-generators, and the fact that the current provisions may support new lower-emissions investments, the Authority is of the view that the self-generation exemption should continue in its current form.

The Authority also recommends that an appropriate framework be developed to allow for incidental electricity offtakes under the self-generation exemption which provide community benefits in remote locations.

Eligibility under the Renewable Energy Target

The LRET eligibility and accreditation arrangements are working well and no change is required.

The Authority considers that the current LRET eligibility and accreditation arrangements are appropriate. They ensure power stations are established in accordance with relevant regulations and are registered to create large-scale generation certificates.

Existing arrangements for waste coal mine gas should be maintained…

Policy-makers have placed clear boundaries on the support for waste coal mine gas under the LRET. Only existing waste coal mine gas power stations are eligible to create renewable energy certificates and (only until 2020), with separate targets that are additional to the broader LRET target. Given this contained support, the Authority recommends maintaining the current LRET arrangements for existing waste coal mine power stations.

… but new waste coal mine gas should not be eligible under the LRET.

Waste coal mine gas was included in the LRET as a transitional measure. Given that a carbon pricing mechanism is now in operation, there is no strong rationale for new waste coal mine gas to be eligible.

The Commonwealth Government should explore whether the RET eligibility for native forest wood waste is likely to increase the rate of logging of native forests. If it is not, then wood waste eligibility should be reinstated, subject to appropriate accreditation processes.

Wood waste from native forests is not included in the LRET. It was originally included in the MRET, but removed from the RET in 2011.
Some stakeholders have argued for its re-inclusion in the scheme.

The Authority believes that the Commonwealth Government should explore whether RET eligibility for native forest wood waste is likely to increase the rate of logging of native forests. If satisfied that it would not, wood waste eligibility should be reinstated, subject to appropriate accreditation processes to ensure no additional logging of native forests occurs as a result.

New small-scale technologies should be considered for inclusion in the SRES on a case by case basis.

The Authority proposes that the possible inclusion of new small-scale technologies in the SRES should be considered by the Minister on a case by case basis, on a range of objective considerations.

At this time, the Authority does not consider that any new technologies are mature enough to warrant their immediate inclusion in the SRES.

No new displacement technologies

Displacement technologies are better suited to an energy efficiency 'white certificate scheme' than the RET.

One of the objectives of the RET is to encourage additional electricity generation from renewable sources. In principle, technologies that displace electricity, rather than generate it, do not further this objective and, while important, do not belong in the RET. Displacement technologies would seem to be better suited to an energy efficiency 'white certificate scheme' (a certificate trading scheme where the certificates would relate to an amount of energy saved).

The SRES already includes two 'displacement' technologies – solar water heaters and heat pumps. Given these anomalies already exist in the scheme, it is more difficult to argue that no new displacement technologies should be added (both technologies have potentially the same effect on greenhouse gas emissions, for example). This issue, incidentally, highlights the difficulties inherent in technology specific measures rather than broad-based measures, like a carbon price; technology specific schemes require that boundaries be drawn around eligibility.

No new displacement technologies should be admitted but existing displacement technologies should remain eligible.

Given the RET's primary focus on generation, the Authority recommends that no new displacement technologies be added to the RET.

The Authority recommends that existing displacement technologies should remain eligible at this time but, in the event that a national white certificate scheme were to be implemented, all displacement technologies should cease to be eligible under the RET, and be transferred to that new scheme. The ongoing eligibility of solar water heaters should be reviewed in light of regulatory developments: to the extent that solar water heaters are mandated through other means it would be difficult to justify their continued support through the RET.

Managing overall costs to electricity users and producers

The costs of the RET are borne by electricity consumers through some additional increase in electricity prices. They are borne also by fossil-fuel generators through lower wholesale prices and reduced market shares. Among consumers, low-income households spend less on domestic power and fuel costs than other households, but their spending represents a larger proportion of their total expenditure.

These considerations were of obvious interest to the Authority even though matters of cost and equity in the electricity market raised issues way beyond the RET and the scope of this review.

Options for cost-containment in the Small-scale Renewable Energy Scheme

The 'uncapped' nature of the SRES means its costs are also uncapped.

The SRES has no quantitative cap. Given quantity is unpredictable, there are also unpredictable impacts on electricity prices. There are no mechanisms for the price of certificates to decline automatically in response to falling technology costs or rising electricity prices.

In recent times, SRES has constituted an unexpectedly high proportion of retail electricity prices because of higher than anticipated certificate creation rates. Key factors driving this have either now ceased (generous feed-in tariffs at the state and territory level) or are being phased out (the end date for the Solar Credits multiplier was brought forward by six months to 1 January 2013).

A mechanism to constrain the costs of the SRES will ensure they remain appropriate and provide predictability to business.

The Authority considered other measures that could help constrain the future costs of the SRES and deliver greater confidence to participants about the sustainability of their industry.

There are a range of mechanisms that could be used to constrain the costs of the SRES.

Measures considered by the Authority to cap the SRES or otherwise limit its impact on electricity prices by controlling either the number of supported installations or the price of certificates, included:

- a gigawatt hour target;
- a small-scale technology percentage cap (capping liability);
- a discounting mechanism;
- lowering the existing price cap; and
- lowering the solar photovoltaic (PV) kilowatt threshold.

Many review participants expressed concern regarding the Authority's preliminary recommendation for a ministerial power to apply a discount factor.

The Authority's preliminary view proposed a discount mechanism be applied at the Minister's discretion based on a number of possible considerations, including the payback period falling below ten years, changes in net system costs, and the SRES constituting more than 1.5 per cent of an average electricity bill.

Many industry participants expressed concern with this possible approach. Some strongly supported the concept of discounting but were concerned the proposed method of application could generate too many uncertainties.

The Authority considers that mechanisms that reduce the risk of a possible rise in installations should be used rather than mechanisms that actively limit the number of installations.

After further consultation, the Authority is now of the view that possibilities of lowering the SRES capacity threshold for solar PV, reducing deeming as a way of phasing out the SRES, and retaining the ministerial power to lower the clearing house price cap offer the best prospects for balancing cost containment with predictability for scheme participants. These measures, together with the reductions in generous feed-in tariffs and the imminent removal of the Solar Credits multiplier, mean that the prospects of a new surge in SRES costs appear unlikely.

While a gigawatt hour target, a small-scale technology percentage cap or a discounting mechanism might all contain the cost of the SRES, they also require significant regulatory changes and would be likely to generate considerable uncertainty for scheme participants.

A gigawatt hour target or a small-scale technology percentage cap could also create certificate price volatility and 'boom-bust' cycles.

The Authority favours other measures to contain SRES costs which are likely to be more predictable and less disruptive in their impact. Specifically, the Authority recommends a number of measures that would reduce the number of certificates created in the small-scale scheme.

The most likely area for a future boom in installations is solar PV on commercial buildings. Should they remain in the SRES, a boom in installations of these systems could be costly to electricity users generally, especially given that the larger systems involved create more certificates than typical residential systems.

The current capacity limit for solar PV is 100 kilowatts (kW). This is considerably larger than the average size of solar PV systems installed by households, currently at around 2.6 kW.

The threshold for small-scale PV systems to be included in the SRES should be reduced from 100 kW to, say, 10 kW. Larger systems should be in the LRET, with reduced deeming periods.

Lowering the capacity limit would still provide an incentive for larger, commercially-installed solar PV, but in the context of the capped LRET scheme. It is envisaged that these systems would be subject to five year deeming, which would encourage better accuracy around deeming arrangements. The Authority recommends lowering the SRES threshold of solar PV units from 100 kW to, say, 10 kW. The Commonwealth Government should conduct further consultation with stakeholders to determine an appropriate threshold so that the bulk of commercial-scale PV systems were included in the LRET at a scale where five year deeming periods (rather than 15) was more appropriate.

This approach would limit potential price rises from the SRES and provide a degree of certainty to the as yet untapped potential for commercial deployment of small-scale systems in Australia.

Deeming should be used to phase out the scheme.

The Authority also recommends reduced deeming as a way of phasing out the SRES. Under this approach, small-scale systems would only be provided with certificates for generation up to 2030. The approach has the benefit of providing a clear and graduated reduction in support over time, consistent with the transitional nature of the RET. Under this proposal, 2016 would be the last year in which small-scale systems were provided with 15 years' worth of deemed certificates. In 2017, it would be for 14 years; in 2018, 13 years and so on.

The recommendation would not come into effect until 2017, after the scheduled 2016 legislated review. In that review, the Authority will again be considering, among other things, possible improvements to the SRES. If necessary, the Authority can re-examine this recommendation during that review as part of any broader recommendations regarding the future of the RET in the 2016 policy context.

If unexpectedly high levels of installations of units under the threshold limit occur, the Minister could exercise the power to lower the price cap as an 'emergency brake'.

In the event that there was an unexpectedly high level of installations of units under the threshold limit (signalling that the level of subsidy is unnecessarily high), the Minister could exercise the power to lower the price cap (set at $40 through the clearing house price). While this tool has its drawbacks, it could act as an 'emergency brake' should installations take off again, perhaps driven by falling technology costs or further rises in the Australian dollar. Lowering the price cap has the advantage of being known to scheme participants, who are aware when they invested that it could be exercised. Some of the disadvantages associated with lowering the price cap – such as transitional arrangements for certificates on the transfer list – would be more manageable should the Commonwealth Government adopt the Authority's recommendations regarding the clearing house.

Diversity of RET technologies

The Authority does not recommend any changes to the RET to promote diversity.

The RET allows a diverse range of technologies to generate certificates. The current mix of generation capacity reflects the adoption of technologies with relatively low costs. The Authority's view is that this approach should continue, so long as the future mix deployed under the RET does not affect the reliable delivery of electricity within networks.

The RET supports the most efficient technology used. The Authority does not believe the scheme should be used to promote diversity – especially through multipliers, introducing banding or caps – which would increase the cost of the scheme to consumers.

Other policy initiatives, particularly ARENA and the CEFC, are better placed to promote diversity.

Providing flexibility and choice

The Authority makes several recommendations to promote greater flexibility and choice in areas where existing constraints appear to impose avoidable costs.

Making partial exemption certificates tradeable

Partial exemption certificates should be made 'tradeable'…

In situations where RET costs are being passed on to emissions-intensive, trade-exposed industries, the Authority recommends that the resultant partial exemption certificates should be tradeable. That is, firms should be able to sell them to any liable party, not just their own electricity supplier. Currently, businesses carrying out eligible activities can apply annually for partial exemption certificates; they are provided as a form of assistance to reduce the cost impact of the RET.

… to make it more likely that emissions-intensive, trade-exposed businesses will receive a market value for them.

Partial exemption certificates are provided for the benefit of the recipients, not electricity suppliers: making them tradeable increases the likelihood that the recipient would receive a market value for them to offset actual scheme costs, as intended by the policy.

Introduce an opt-in option for large energy users

Opt-in liability arrangements would allow large electricity users to better manage their own compliance costs.

A second area where the Authority recommends greater flexibility and choice is in relation to an opt-in facility for large electricity consumers. Currently, large electricity users are not able to opt-in to manage their own liability under the RET. Opt-in arrangements for large electricity users have been used in other certificate-based trading schemes, including the carbon pricing mechanism and the New South Wales Greenhouse Gas Reduction Scheme.

The Authority considers that allowing large electricity users to manage their own liabilities (if they choose) would improve flexibility and choice.

Streamlining administration and compliance costs

The Authority believes there are opportunities to streamline the administration and compliance costs of the RET and lessen its impact on businesses.

Greater alignment between schemes

The level of assistance for emissions-intensive, trade-exposed businesses should be reviewed by the Productivity Commission

The partial exemption framework for emissions-intensive, trade-exposed industries has the same rationale as the Jobs and Competitiveness Program under the carbon pricing mechanism. The Productivity Commission is responsible for reviewing the level of assistance provided under the carbon pricing mechanism.

Given the similarities between the partial exemption framework under the RET and the Jobs and Competitiveness Program, the Authority recommends that they should be reviewed together by the Productivity Commission as part of its broader review of the assistance under the carbon pricing mechanism.

There is scope to streamline administrative requirements for the partial exemption framework and the Jobs and Competitiveness Program.

Another area where the Authority suggests that greater administrative streamlining could occur is in relation to the partial exemption framework under the RET. This framework is similar, but not identical to, the Jobs and Competitiveness Program under the carbon pricing mechanism. The Authority recommends greater streamlining of the processes for gathering information and for audits under the two arrangements.

Data collection by the Clean Energy Regulator

The second area where compliance and administrative costs could be reduced relates to the data collected by the Clean Energy Regulator, including information on out-of-pocket expenses for small generation units, and generation returns.

At present the Minister is required to consider the amount of out-of-pocket expenses that system owners contribute when reducing the clearing house price; the Regulator currently collects this information.

Current arrangements to collect information on out-of-pocket expenses should be removed…

Information on what customers are actually paying for small-scale systems is likely to be useful. It is questionable, however, whether the current arrangements create either an accurate data source or a cost-effective one.

… and be replaced by surveys.

The Authority's recommendation is that the requirement to provide data on the out-of-pocket expense for a small generation unit installation should be removed from the *REE Act*, reducing overall administration and compliance costs. The Regulator should continue to gather information on out-of-pocket expenses, but should do so through appropriate surveys.

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The *REE Act* requires any registered person creating more than 250 certificates in a calendar year to lodge a solar water heater and small generation unit return to the Regulator.

The requirement to submit a solar water heater and small generation unit return should be removed from the REE Act.

The solar water heater and small generation unit return is intended to provide the Regulator with quantitative and qualitative data. Most of the information submitted, however, is already available to the Clean Energy Regulator. The Authority recommends that the legislative requirement to produce a return should be removed: the administrative costs are not considered to be justified, given the absence of any clear benefit from collecting the information.

Maintain one accreditation body

The final recommendation in respect of administration and compliance cost relates to the accreditation of small-scale technology installers.

The Authority considered the benefits of opening up the accreditation of small-scale technology installers to more than one body.

Currently, the Clean Energy Council is the only organisation that can accredit small generation unit installers for the purpose of creating certificates. In its discussion paper, the Authority made the preliminary recommendation that the accreditation of designers and installers of small generation units be open to certified accreditation bodies beyond the Clean Energy Council. The rationale for this draft recommendation was that more accreditation bodies might provide greater opportunity for installers and products to become certified. This could also increase services and reduce costs for industry.

While there are inherent benefits to competition, in this case there are risks that it could lead to poor outcomes for customers.

There is a risk, however, that competition between accreditation organisations could encourage poor quality control and dilute public confidence in the accreditation system. It would also increase the costs of the Clean Energy Regulator. To manage this risk, the Commonwealth Government would need to develop and implement detailed provisions to ensure that the quality of products and installation is maintained. There are also issues in that the Clean Energy Regulator does not have legislative responsibility for electrical safety, which resides with the states and territories.

On balance, the Authority recommends maintaining one accreditation body.

On further investigation, at this time, the Authority considers the potential benefits of allowing multiple bodies to accredit installers and products do not outweigh the costs associated with the additional administrative requirements necessary to properly address these risks.

Next steps

The Authority has provided the final report to the Minister for Climate Change and Energy Efficiency for the consideration of the Commonwealth Government. Under the *REE Act*, the report must be tabled in the Commonwealth Parliament within 15 sitting days of the Minister receiving it.

The Commonwealth Government must respond to the Authority's recommendations within six months of receiving the final report.

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CHAPTER 1. INTRODUCTION AND HISTORY

The Climate Change Authority (the Authority) is required by legislation to review the Renewable Energy Target (RET) every two years, beginning in 2012. This report constitutes the Authority's first RET review. Chapter 1 introduces the RET review and outlines the structure of the report. It includes a brief summary of the major developments in the evolution of the RET.

1.1. The Climate Change Authority

The Authority was established on 1 July 2012 as an independent advisory body on climate change. The Authority is to conduct climate change research, as well as periodic reviews on a range of matters, including carbon pollution caps, progress towards meeting national emissions reduction targets, the carbon pricing mechanism, the RET and the Carbon Farming Initiative.

The Authority's constitution, functions and guiding principles are set out in the *Climate Change Authority Act 2011* (Cth).

1.2. An overview of the Renewable Energy Target

The RET aims to ensure that 'the equivalent of at least 20 per cent of Australia's electricity generation comes from renewable resources by 2020' (Commonwealth Government 2010) (see Box 1).The term 'equivalent' is used to capture displacement technologies – such as solar water heaters and heat pumps, which are included in the RET scheme but do not generate electricity.

Box 1 Summary of the Renewable Energy Target legislation

- *Renewable Energy (Electricity) Act 2000* (Cth)
  Establishes the large-scale and small-scale schemes, including the liability framework, certificate generation and administrative arrangements.
- *Renewable Energy (Electricity) (Small-scale Technology Shortfall Charge) Act 2010* (Cth)
  Imposes the small-scale technology shortfall charge at a rate of $65 per megawatt hour.
- *Renewable Energy (Electricity) (Large-scale Generation Shortfall Charge) Act 2000* (Cth)
  Imposes the large-scale generation shortfall charge at a rate of $65 per megawatt hour.
- *Renewable Energy (Electricity) Regulations 2001* (Cth)
  Sets out further detail regarding the operation and administration of the large-scale and small-scale schemes.

The RET scheme creates a demand for additional renewable energy by placing a legal obligation on entities that purchase wholesale electricity (mainly electricity retailers) to surrender a certain number of renewable energy certificates to the Clean Energy Regulator each year. Each certificate represents one megawatt hour of additional renewable energy for compliance purposes. Certificates are generated by accredited renewable energy power stations and eligible small-scale renewable technology systems. The sale of certificates supports additional renewable energy investment. Certificates are tradeable and may be 'banked', in the sense that certificates issued in one year may be surrendered to meet an obligation in a later year.

Since 1 January 2011, the RET has operated as two schemes – the Large-scale Renewable Energy Target (LRET) and the Small-scale Renewable Energy Scheme (SRES). The LRET supports large-scale renewable energy projects, such as wind generators and commercial solar, by helping to bridge the cost between renewable and fossil-fuel generation. The SRES assists households, small businesses and community groups with the upfront cost of installing small-scale renewable technology systems (for example, solar photovoltaics (PV) and solar water heaters).

The RET scheme is administered by the Clean Energy Regulator (formerly the Office of the Renewable Energy Regulator). The Clean Energy Regulator is an independent statutory authority established by the *Clean Energy Regulator Act 2011* (Cth). The Clean Energy Regulator's main functions in relation to the RET include maintaining the Registry, issuing certificates, managing the surrender of certificates, administering the liability provisions and enforcing compliance with the scheme.

Certificate creation, trade and surrender are managed through the Renewable Energy Certificates (REC) Registry. The Registry is an internet-based registry system that:

- facilitates the creation, registration, transfer and surrender of certificates;
- tracks the ownership of certificates;
- provides access to the small-scale technology certificate clearing house; and
- maintains the public registers required by the *Renewable Energy (Electricity) Act 2000* (Cth) *(REE Act)*.

1.3. The Renewable Energy Target review

1.3.1. Legislative requirements and scope of the review

The *REE Act* and the *Climate Change Authority Act 2011* set legislative requirements for the RET review in respect of timing, scope, conduct, recommendations and publication.

Timing and Scope

Section 162 of the *REE Act* mandates reviews every two years and defines the scope of these reviews:

> 162(1) The Climate Change Authority must conduct reviews of the following:
>
> a) the operation of the *REE Act* and the scheme constituted by the *REE Act*;
>
> b) the operation of the regulations;
>
> c) the operation of the *Renewable Energy (Electricity) (Large-scale Generation Shortfall Charge) Act 2000* (Cth);
>
> d) the operation of the *Renewable Energy (Electricity) (Small-scale Technology Shortfall Charge) Act 2010* (Cth); and
>
> e) the diversity of renewable energy access to the scheme constituted by this Act, to be considered with reference to a cost benefit analysis of the environmental and economic impact of that access.

In line with these requirements, the Authority has interpreted the scope of its review as covering:

- the capacity of the RET arrangements to support additional generation of electricity from renewable sources to contribute reductions in greenhouse gas emissions at reasonable cost;
- the role of the RET and its relationship to other policy measures;
- the LRET, including the level and trajectory of the target;
- the SRES, including its design, architecture, and administration;
- the liability and exemptions framework, and the shortfall charge of both the large-scale and small-scale schemes;
- the eligibility framework for both schemes and the diversity of renewable energy; and
- the frequency and scope of future reviews under the *REE Act*.

The Authority also sees the RET as part of a broader suite of government climate and energy policies, including:

- the carbon pricing mechanism, planning regulations, energy efficiency schemes and feed-in tariffs;
- the Clean Energy Finance Corporation and the Australian Renewable Energy Agency; and
- rules and regulations regarding electricity markets, including network connection arrangements and retail electricity tariffs.

These policies have implications for the RET review, but are not themselves the subject of specific recommendations in this review; issues in respect of electricity distribution networks, for example, extend beyond the RET arrangements.

The Minister for Climate Change and Energy Efficiency wrote to the Chair of the Authority on 13 July 2012 in respect of the RET review (Appendix B). As well as providing background relevant to the RET review, the Minister noted that the Council of Australian Governments was prioritising a review of climate programs to assess their complementarity with a carbon pricing mechanism, and that the Authority's report will be an input to the Council's work.

Conduct

In conducting its review, the *Climate Change Authority Act 2011* requires the Authority to have regard to a number of broad principles, including economic efficiency, environmental effectiveness, equity in the impacts of measures on households, businesses, workers and communities, and consistency with the development of an effective global response to climate change.

The Authority has had regard to these principles in this review.

As also required, the Authority has consulted widely with interested parties throughout the review, including energy retailers and consumers, environmental and welfare groups, and the renewable energy industry.

To assist the consultation process, the Authority released an issues paper and a discussion paper. The issues paper (released 20 August 2012) described the RET scheme and requested feedback from stakeholders on particular questions. Almost 8 700 submissions were received, including from two campaigns organised by GetUp (over 7 700 submissions) and Hepburn Wind (over 700 submissions). Submissions, including samples from the two campaigns, are available on the Authority's website at http://climatechangeauthority.gov.au/submissions/received.

The discussion paper (released 26 October 2012) set out the Authority's preliminary views on key issues. The discussion paper formed the basis for further consultation, including four stakeholder consultation roundtables held on 2 and 5 November 2012 in Melbourne and Sydney respectively. A summary of these discussions has been published on the Authority's website along with a list of the participating stakeholders.

The Authority received 54 written responses to the discussion paper and held more than 60 one-on-one meetings with participants over the course of the review.

Publication and response

As required by the *REE Act*, this RET review has been completed and provided to the Minister by 31 December 2012, as well as published on the Climate Change Authority website.

The Minister is required to table copies of the report in Parliament within 15 sitting days of the completion of the review. The Government's response to the Authority's recommendations is required within six months.

1.3.2. Modelling

Consultants SKM MMA were commissioned to undertake electricity market modelling to assess possible market impacts of potential changes to the RET. The modelling approach and the key results are summarised at Appendix D. The full SKM MMA modelling report is available at the Authority's website.

1.4. Development of the Renewable Energy Target

Prior to the announcement of the Mandatory Renewable Energy Target (MRET) in 1997, Australia produced around 16 000 gigawatt hours (GWh) of electricity from renewable sources. Most of this was from hydro-electricity schemes in Tasmania and the Snowy Mountains, with smaller contributions from landfill gas, biomass (bagasse and black liquor), and solar PV and wind generators. Renewable generation then amounted to around 10.5 per cent of Australia's electricity supply.

1.4.1. The Mandatory Renewable Energy Target

In 1997, Prime Minister, Mr John Howard, announced a suite of greenhouse gas mitigation measures in the statement *Safeguarding the Future: Australia's Response to Climate Change*. That initiative introduced the MRET, which was intended to impose a legal obligation on electricity retailers and other large electricity buyers to source an additional two per cent of their electricity from renewable or specified waste-product energy sources by 2010.

After two years of negotiation between the Commonwealth, states and territories and stakeholders, the MRET was enacted in legislation with a target of 9 500 GWh of additional renewable electricity to be generated by 2010. In the second reading speech to the House of Representatives, the MRET was said to have both environmental and industry development objectives, which were to:

- accelerate the uptake of grid based renewable electricity to reduce greenhouse gas emissions;
- provide an ongoing base for the development of commercially competitive renewable energy as part of the broader package to stimulate the use of renewables; and
- contribute to the development of domestic industries which could compete effectively in overseas markets. (Commonwealth House of Representatives 2000)

The MRET sought to achieve these ends by creating a liability for wholesale energy purchasers to encourage additional renewable energy by acquiring renewable energy certificates. The *REE Act* created a framework for renewable energy generators to create certificates for every megawatt hour of electricity produced above a renewable generator's baseline, which was set by the regulator as the average electricity produced between 1994 and 1996 by the generator (called the '1997 baseline'). Eligible generators could continue to create certificates until the final year of the scheme in 2020. The legislation also established a regulator (the Renewable Energy Regulator supported by the Office of the Renewable Energy Regulator) to oversee and manage the scheme.

The *REE Act* required that an independent review of the Act be undertaken in 2003.

1.4.2. The 2003 Tambling Review

The 2003 MRET review was chaired by Mr Grant Tambling (former Senator for the Northern Territory). It considered the extent to which the Act had contributed to reducing greenhouse gas emissions and encouraged additional renewable energy generation, as well as the achievement of other policy objectives, and the need to amend aspects of the Act or consider alternative approaches.

The review panel found that the MRET had broad community support, contributed significantly to additional renewable energy generation, resulted in some exports of domestically manufactured equipment, and had a very small negative effect on the Australian economy from the associated increases in electricity costs (MRET Review Panel 2003).

Of the review's 30 recommendations, the most significant was for the target to be increased over time, to reach 20 000 GWh in 2020. The Panel argued that such an increase would:

- provide investment confidence and industry development opportunities;
- deliver the minimum 'critical mass' of investment needed to demonstrate commercial viability and create the potential for domestically manufactured components of renewable energy projects;
- establish a domestic demand base for the development of further export markets; and
- provide for a more managed investment framework that would promote cost effective technology improvements and industry learning.

In August 2004, the Commonwealth Government accepted most of the review's recommendations, but decided not to increase the target, instead maintaining its commitment to the 9 500 GWh target announced in 1997.

By 2007, there was sufficient renewable energy generation capacity in place to meet the legislated targets and no further investment was necessary for that purpose.

1.4.3. State and territory renewable energy target schemes

Following the Commonwealth Government's decision to maintain the 9 500 GWh renewable energy target, a number of state governments planned or enacted their own renewable energy targets.

Victoria, New South Wales and South Australia all announced renewable energy targets. Victoria announced a scheme in 2006, which commenced on 1 January 2007 (Theophanous, Thwaites 2006). The Victorian Renewable Energy Target required electricity retailers to purchase a minimum of ten per cent of electricity from renewable energy sources by 2016. The New South Wales Renewable Energy Target was set at ten per cent of New South Wales end use consumption by 2010, and 15 per cent by 2020 (New South Wales Government 2006). However, while a certificate based trading scheme was planned, it never commenced. A target of 20 per cent of energy generated from renewable energy sources by 2007 was set in South Australia; this target was achieved ahead of schedule in

2011, and South Australia is now aiming for 33 per cent renewable electricity generation by 2020 (Rann 2011).

1.4.4. The 2009 expanded Renewable Energy Target

In 2007, the Commonwealth Government embarked on a two year consultation period with state and territory governments and stakeholders to expand the MRET, which was agreed by the Council of Australian Governments in April 2009. The amended *Renewable Energy (Electricity) Bill 2000* was introduced into the House of Representatives in June 2009, one month after the Carbon Pollution Reduction Scheme was introduced.

While the basis of the MRET remained, significant changes were made to both the target and how it would be achieved. These included:

- increasing the target to 45 000 GWh in 2020, to be maintained at that level until 2030;
- introducing Solar Credits, which would assist households and business with the upfront costs of small-scale renewable energy generation units by applying a 'multiplier' to the number of certificates received from installation of small-scale generation technologies;
- providing a partial exemption from liability for emissions-intensive, trade-exposed activities, to reflect the cumulative cost impact of the RET and anticipated carbon price on those industries. The partial exemption applied only to the expanded part of the RET and not the 9 500 GWh target set under the original legislation; and
- allowing state-based renewable energy targets enacted under state legislation to transition to the RET.

1.4.5. The Renewable Energy Target today

In 2010, the Commonwealth Parliament passed amendments to separate the RET into two parts: the LRET and the SRES. Higher than expected uptake of small-scale systems – stimulated by falling system costs, the financial incentives offered through the Solar Credits multiplier, and state and territory feed-in tariffs – had created a large spike in the number of certificates. This depressed certificate prices and discouraged investment in large-scale projects, which have very large capital requirements. The division of the RET was designed to address this issue by creating separate incentives for large-scale projects and small-scale technologies. This meant that large-scale and small-scale technologies were no longer directly competing with one another under the RET scheme, effective from 1 January 2011.

The LRET is expected to deliver the majority of the target – 41 000 GWh of the original 45 000 GWh 2020 target – and retains many of the design features of the original MRET scheme. The LRET is discussed in more detail in Chapter 4.

The SRES has an implicit target of 4 000 GWh of renewable energy generation or displacement of electricity through solar water heaters and heat pumps. However, the SRES is an 'uncapped' scheme, meaning its gigawatt hour contribution by 2020 is uncertain. The SRES is discussed in more detail in Chapter 5.

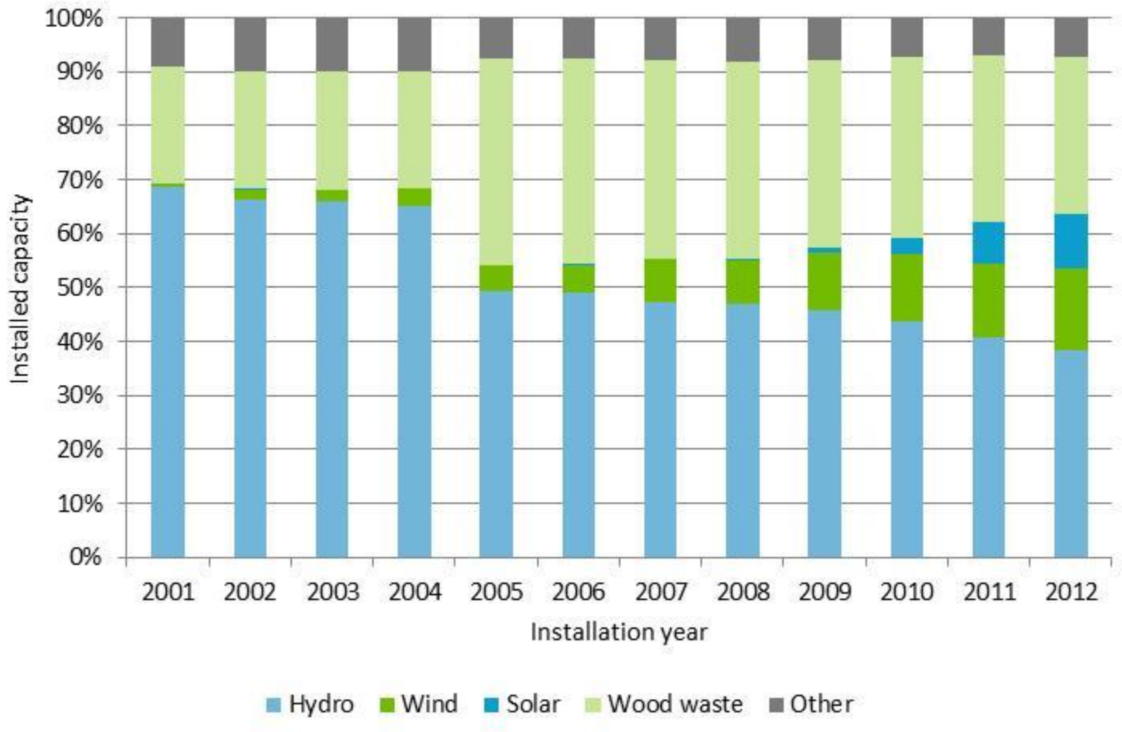
CHAPTER 2. PERFORMANCE OF THE RENEWABLE ENERGY TARGET

This chapter considers how the Renewable Energy Target (RET) has performed to date, against the objectives of the *Renewable Energy (Electricity) Act 2000* (Cth) (*REE Act)*. It explores the RET's impact on levels of renewable energy generation and capacity, changes in greenhouse gas emissions, and the development of the renewable energy industry. It also considers the impact of the RET on electricity prices.

2.1. Renewable electricity capacity and generation

The major aim of the *REE Act* is to encourage additional generation of electricity from renewable sources. Since the introduction of the Mandatory Renewable Energy Target (MRET) in 2001, Australia's renewable electricity capacity has almost doubled, increasing from around 10 650 megawatts (MW) in 2001 to around 19 700 MW in 2012. As Figure 1 illustrates, renewable generation from sources other than hydro now account for more than 50 per cent of total installed renewable capacity.

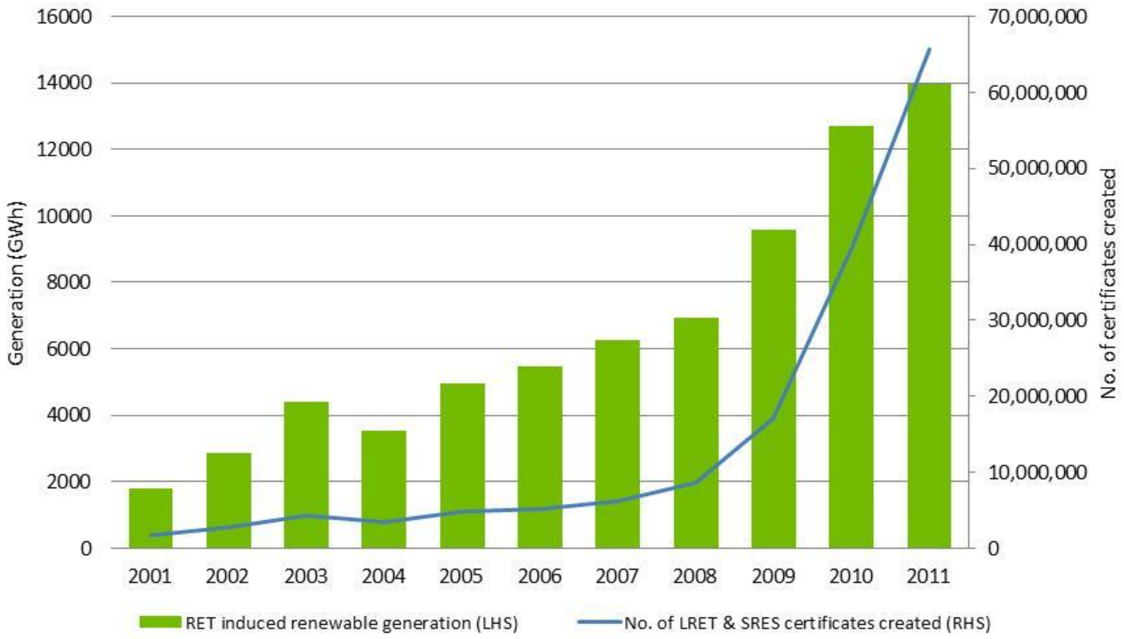
Figure 1 Technologies as a proportion of total installed renewable capacity, 2001-2012



Source: Clean Energy Regulator and Climate Change Authority, 2012.
Note: 'Other' includes landfill gas, bagasse, food waste, food processing waste, sewage gas and biomass-based components of sewage, black liquor, waste coal mine gas (to the extent that it is eligible under the RET scheme), agricultural waste, energy crops, waste from processing of agricultural products and biomass-based components of municipal solid waste.

The increase in renewable generation capacity has been supported by the sale of certificates under the RET. Almost 160 million certificates were created over the period 2001 to 2011, and generation eligible under the RET produced around 14 000 gigawatt hours (GWh) of electricity in 2011 (see Figure 2).

Figure 2 RET induced renewable generation and the number of certificates created



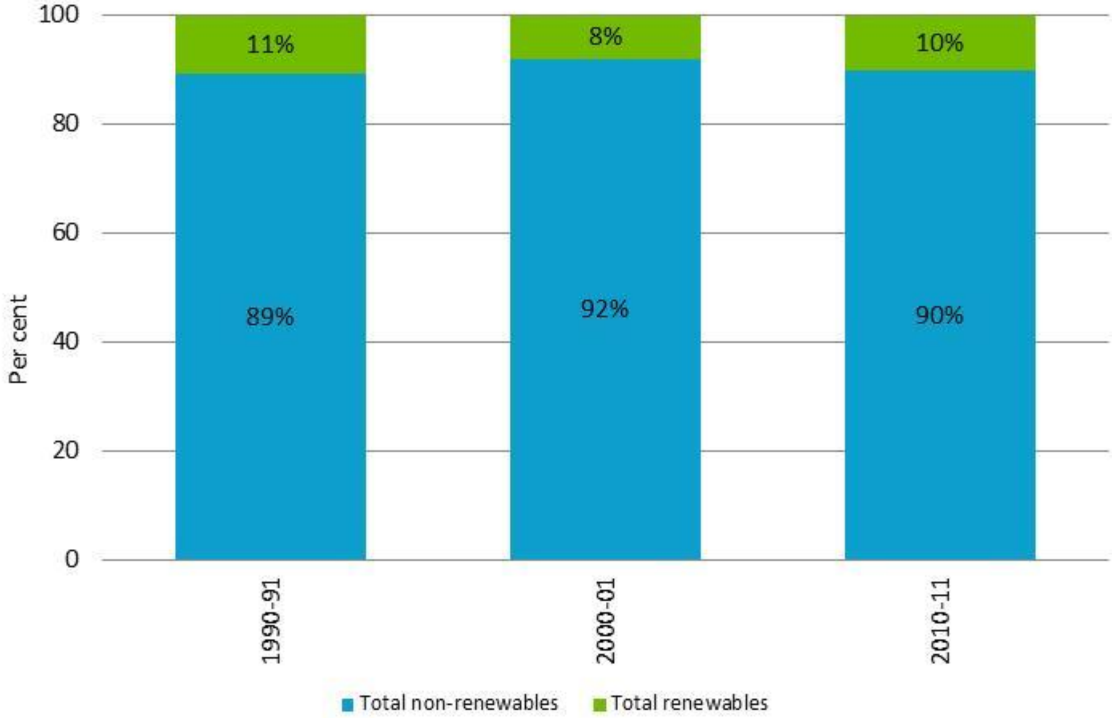
Source: Clean Energy Regulator and Climate Change Authority, 2012.
Note: 'RET induced renewable generation' has been calculated using renewable energy certificates accounting for any multiplier impacts.

Renewable electricity generation currently accounts for around ten per cent of total electricity generation in Australia. Despite the increase in absolute terms, renewable generation as a proportion of total electricity generation has not changed significantly since 2000-2001 (see Figure 3).This is because growth in electricity demand, which increased by around 13 per cent over the period, has been met with growth in both non-renewable and renewable electricity generation.

Electricity generation from non-renewable sources grew by ten per cent over the period 2000-01 to 2010-11, although substantial changes have occurred in the composition of the fossil-fuel generation mix. The contribution of natural gas almost doubled to more than 20 per cent of total electricity generation in 2010-11.

Black coal electricity generation decreased by around 13 per cent over the same period, to around 46 per cent of total generation in 2010-11, while brown coal increased by six per cent to contribute 22 per cent of total electricity generation. The growth in renewables has been significantly offset by a decrease in generation from pre-existing hydro generators, reflecting low rainfall between 2005-06 and 2008-09.

Figure 3 Australian electricity generation mix



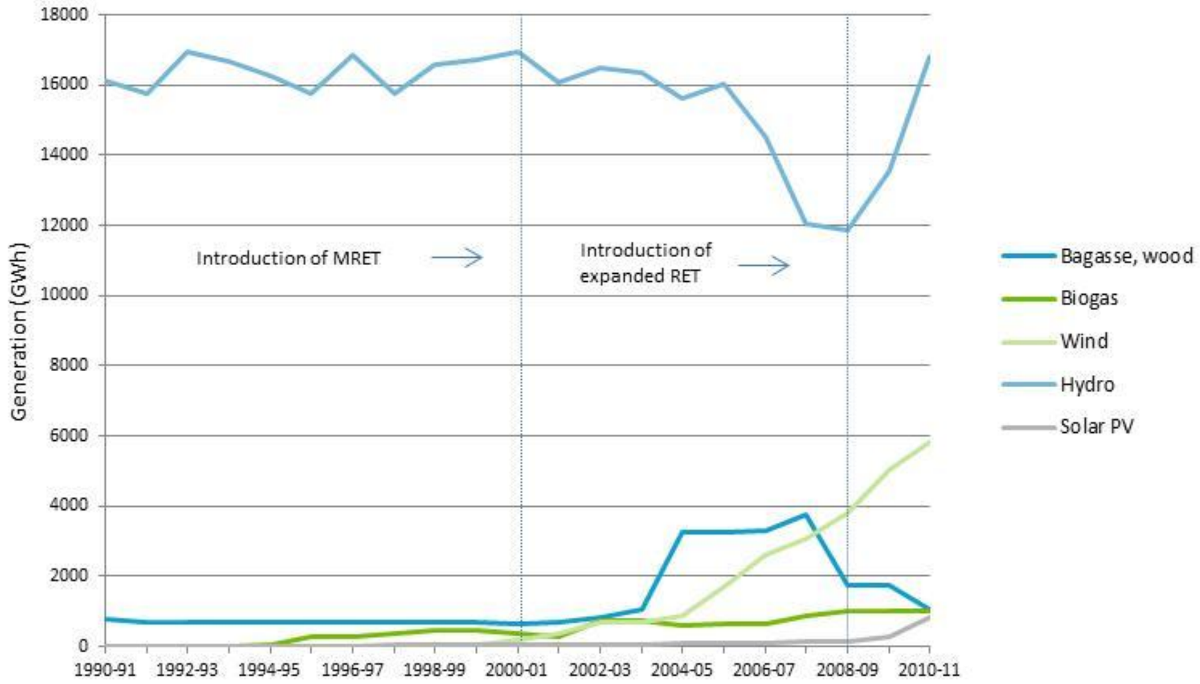
Source: Bureau of Resources and Energy Economics (BREE), 2012.

2.1.1. Mix of renewable energy generation

Wind and solar photovoltaic (PV) generation have accounted for the bulk of the (absolute) increase in renewable energy generation capacity (see Figure 1). Wind has grown rapidly under the RET, generating more than 5 800 gigawatt hours (GWh) in 2010-11, up from around 200 GWh in 2000-01 (see Figure 4). Solar PV generation has also increased significantly, generating around 850 GWh in 2010-11, compared with around 50 GWh in 2000-01 (see Figure 4). Despite the downward adjustment to the Solar Credits multiplier, the rate of solar PV installations remains strong in 2012 (see Chapter 5).

Hydro generation remains the largest single source of renewable energy in Australia, but much of this capacity was installed before 2001 and is therefore not included in the 41 000 GWh target (see Figure 4). Favourable seasonal conditions over the past two years have seen hydro electricity generation recover to its long-run average but, with hydro resources now largely exploited, further significant growth is unlikely.

Figure 4 Australian renewable electricity generation by fuel



Source: BREE, 2012.

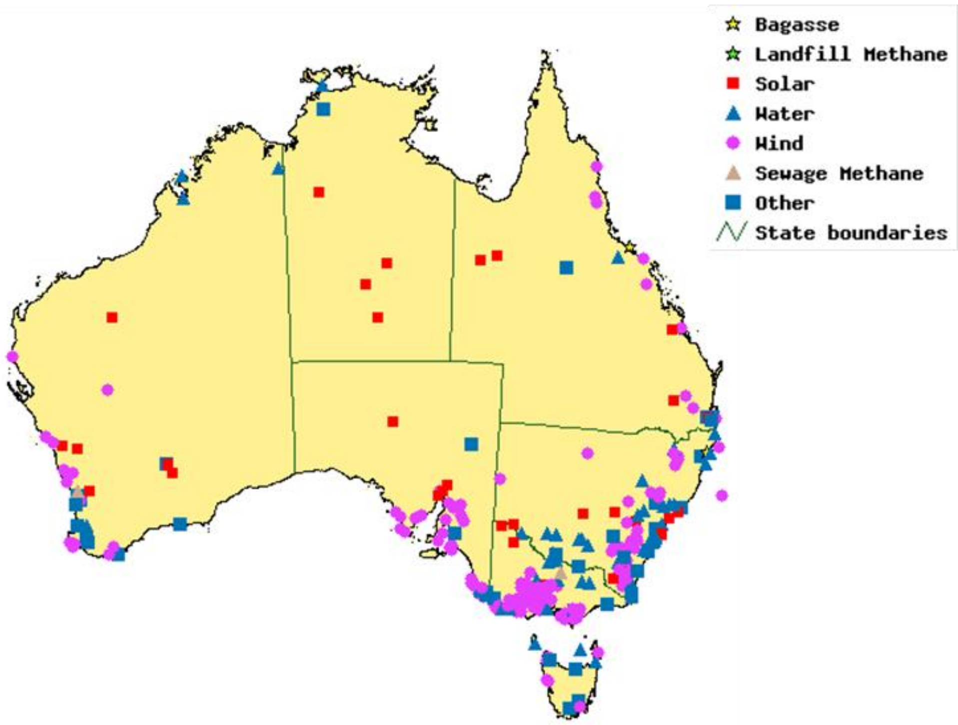
2.1.2. Distribution of renewable generation capacity

Large-scale renewable projects are scattered across all states and territories (see Figure 5). Significant wind generation occurs across large parts of southern Australia, with hydro generation concentrated in Tasmania, Victoria and New South Wales. Solar generation occurs across parts of central Australia while biomass is confined to eastern Queensland.

LRET certificate creation over the period 2001 to 2012 also indicates that eastern and southern parts of Australia have accounted for around 90 per cent of total new LRET generation, while Western Australia and the Northern Territory have accounted for around ten per cent of total LRET generation (see Figure 6).

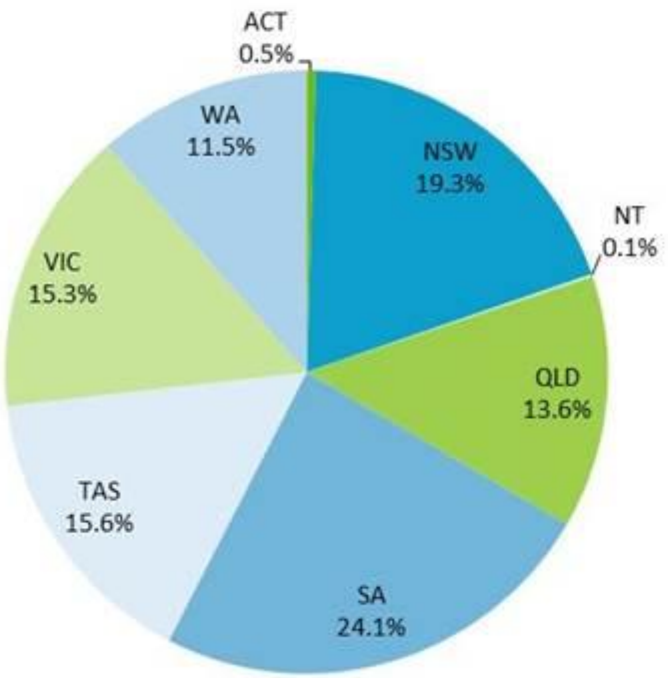
Small-scale Renewable Energy Scheme (SRES) installations over the period 2001 to 2012 also indicate that around 90 per cent of installations are located in eastern and southern parts of Australia. On a per household basis, however, solar PV and solar water heater penetration varies significantly from state to state (see Figure 7). Data submitted by the REC Agents Association suggests that small-scale renewable energy systems are widely dispersed across Australia, with urban areas accounting for 47 per cent of installations and regional and rural areas for 53 per cent.

Figure 5 Renewable energy generation in Australia



Source: Geoscience Australia, 2012.

Figure 6 Large-scale Renewable Energy Target induced generation by state, 2001 to 2012



Source: Clean Energy Regulator and Climate Change Authority, 2012.

Figure 7 Penetration of small-scale renewables per household by state, 2001 to 2012

Source: Australian Bureau of Statistics Census 2012, Clean Energy Regulator and Climate Change Authority, 2012.

2.2. Abatement from the Renewable Energy Target

A related major objective of the *REE Act* is to reduce emissions of greenhouse gases from the electricity sector by encouraging greater renewable generation.

Assessing the impact of the RET on greenhouse gas emissions requires a consideration of what emissions would have been if the RET had not existed. This counterfactual cannot be observed; it must be estimated.

A number of emission reduction estimates have been calculated by various organisations over time and often with different results, depending on the underlying assumptions used. A recent study conducted by SKM MMA for the Clean Energy Council, estimated that the RET had induced cumulative emission reductions of around 20 million tonnes of carbon dioxide equivalent between 2001 and 2012.
The SKM MMA report also indicated that over the same period, around 90 per cent of the abatement achieved in the electricity sector was attributable to the RET, with the remainder attributable to other renewable generation support mechanisms. The report suggests that without the RET, Australia would not have met its emissions reduction target under the Kyoto Protocol by around two to three percentage points.

2.3. Industry development

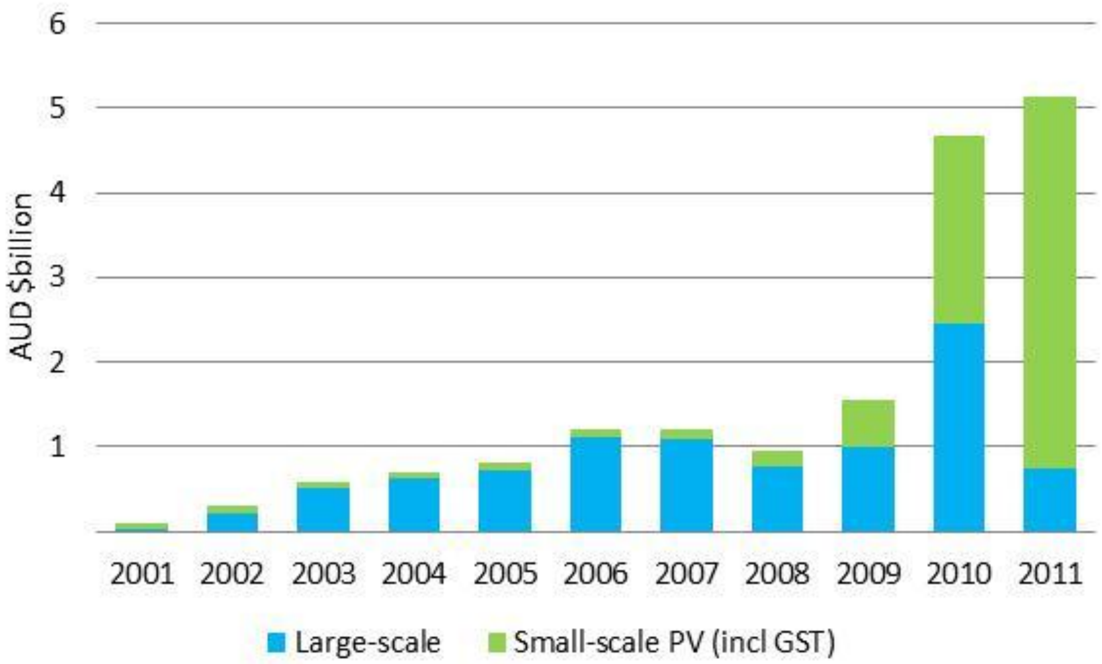
As noted, one of the announced objectives of the MRET was to 'contribute to the development of internationally competitive industries, which could participate effectively in overseas markets' (Commonwealth House of Representatives 2000, p.18 031). The impact of the RET on investment and employment patterns in the renewable generation sector is discussed below.

2.3.1. Investment

The RET has stimulated considerable investment in Australian renewable energy over the last decade. In 2011, investment in large-scale and small-scale renewable energy in Australia totalled in excess of $5 billion from almost nothing in 2001 (see Figure 8).

Investment in large-scale projects has dominated the renewables sector for most of the past decade but, since the introduction of the expanded RET and the Solar Credits multiplier, small-scale PV investment has eclipsed large-scale investment. In 2011, small-scale PV investment totalled more than $4.3 billion.

Figure 8 Total large and small-scale renewable energy investment in Australia

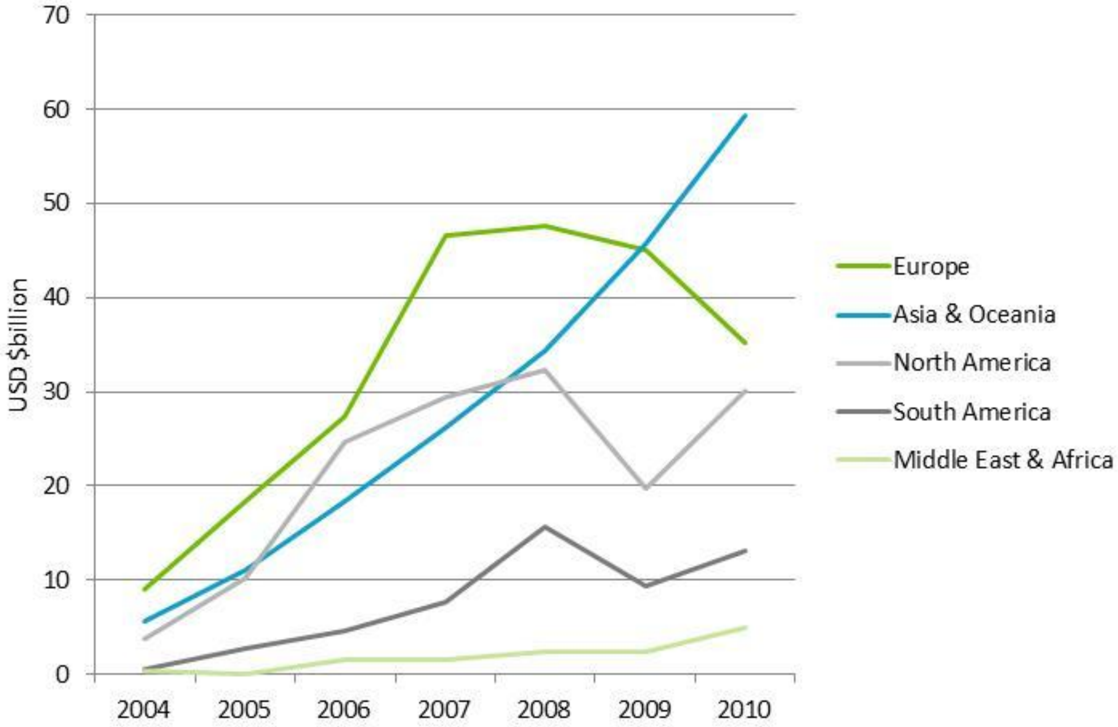


Source: Bloomberg New Energy Finance, 2012.

Globally, investment in renewable technologies has been increasing. According to Bloomberg New Energy Finance (2011), global investment in large-scale renewable technologies grew roughly sevenfold between 2004 and 2010, from US$19.2 billion to US$142.7 billion (see Figure 9).

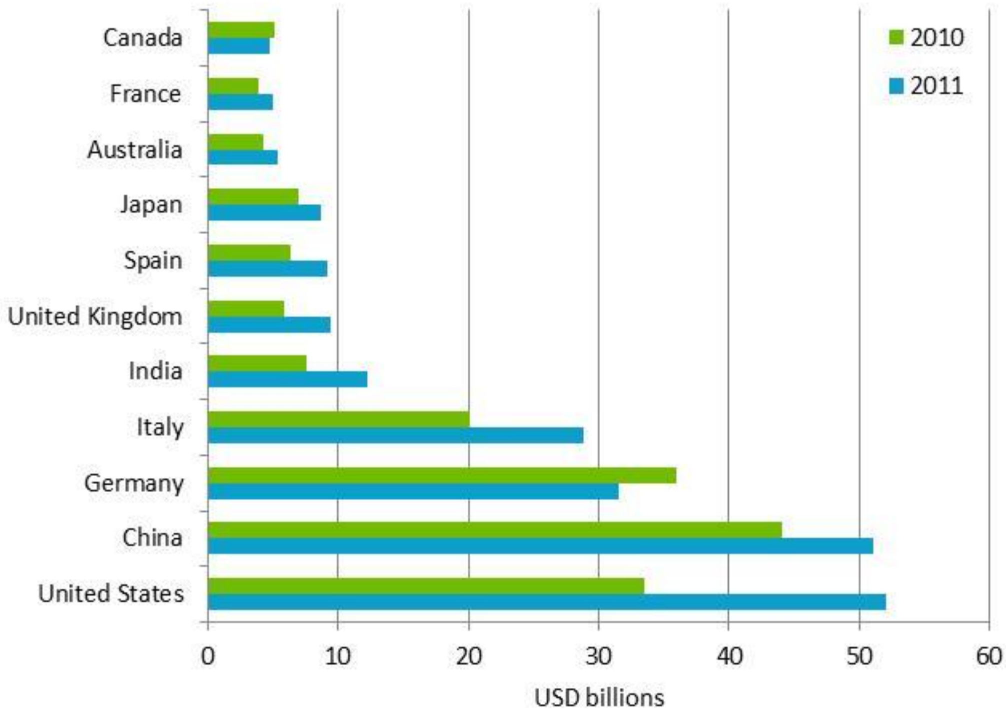
In broad terms, Australia contributed around US$5.3 billion, or two per cent, to global investment in clean energy in 2011 (see Figure 10).

Figure 9 New financial investment in large-scale renewable energy by region



Source: Bloomberg New Energy Finance, 2011.

Figure 10 Total new clean energy financial investment 2010 and 2011



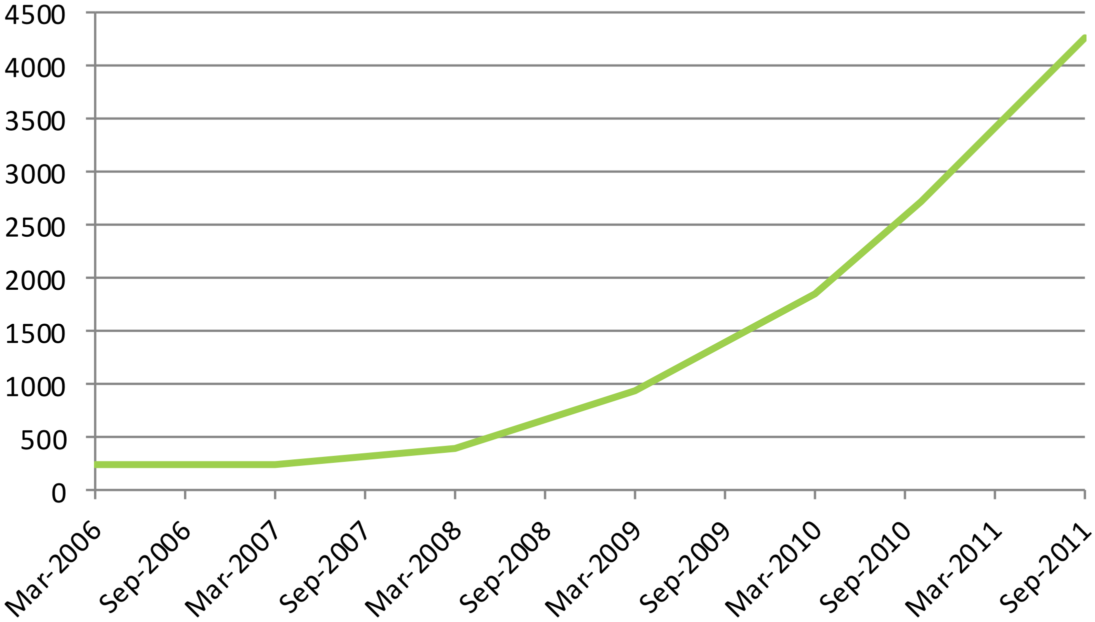
Source: Bloomberg New Energy Finance, 2011.

2.3.2. The renewable energy industry in Australia

Investment in renewable energy stimulated by the RET has boosted the renewable energy sector in Australia. This in turn has supported the growth of new firms entering the renewable energy industry.

Between March 2006 and September 2011, the number of accredited solar PV installers and designers in Australia accelerated to over 4 200 (see Figure 11), although not all installers work full-time on PV installations; many alternate between solar PV installations and other electrical work.

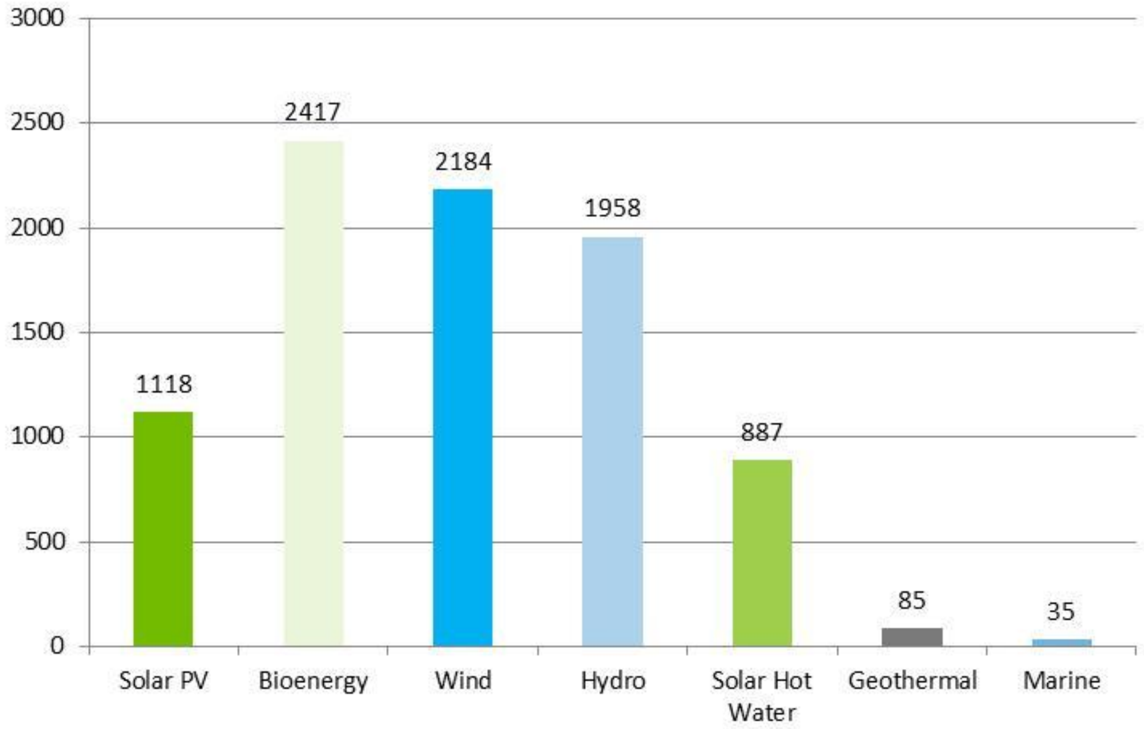
Figure 11 Total number of accredited renewable energy installers and designers in Australia



Source: Clean Energy Council, 2011.

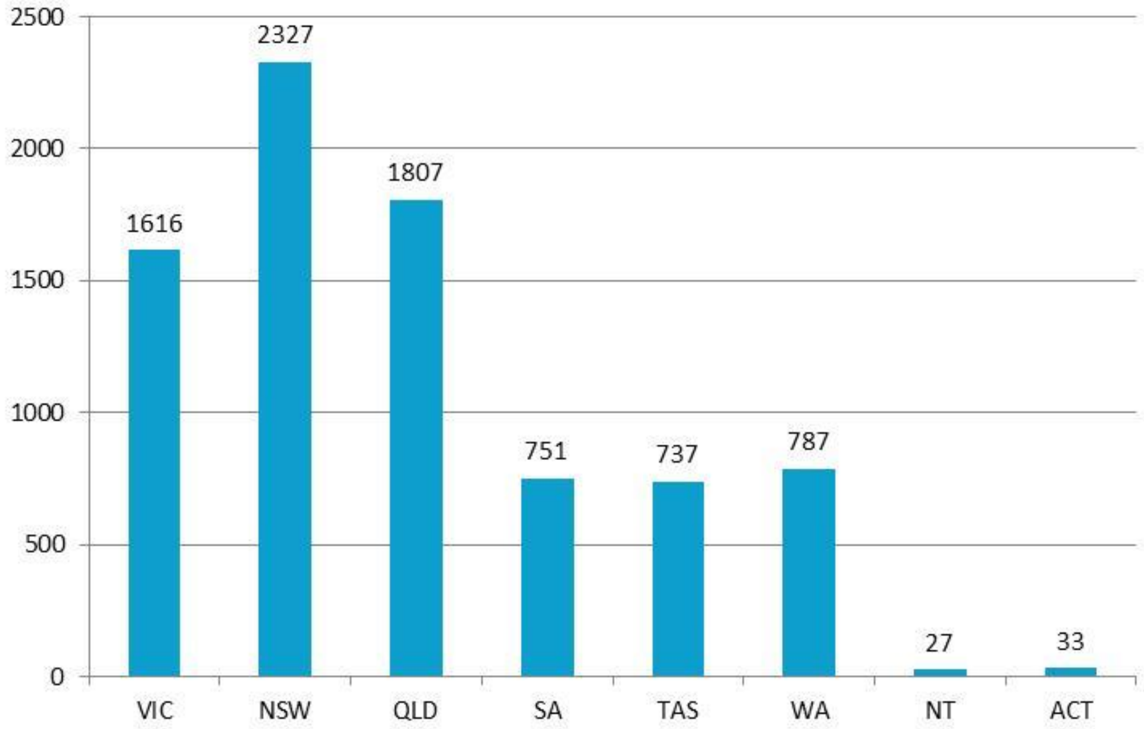
Employment in the renewable energy industry also has risen with increased levels of investment. In 2010, the industry employed more than 8 600 full-time employees, primarily in the bioenergy, wind, hydro, solar PV and solar water heating sectors (see Figure 12). New South Wales, Victoria and Queensland together accounted for more than 70 per cent of the total number employed (see Figure 13). These figures cover those directly involved in construction, installation, operations and maintenance activities, and exclude significant numbers in related sales, administration and management activities; the Clean Energy Council estimated that 6 000 people were employed in the distribution, sales and installation of solar hot water systems in 2011, compared with only around 900 working directly in the sector.

Figure 12 Full-time equivalent jobs in the Australian renewable energy industry, 2010



Source: Clean Energy Council, 2011.

Figure 13 Full-time equivalent employees in the renewable energy industry by state, 2010



Source: Clean Energy Council, 2011.

2.3.3. Cost performance of technologies over time

The cost of several renewable technologies has decreased significantly over the life of the RET.

Domestic and international factors can influence the costs of deploying renewable technologies in Australia. The bulk of domestic costs consist of labour costs in construction and installation activities. Improvements in Australian 'know how' and supply chains can be influenced by the scale of domestic operations, and by domestic policies. The most significant cost associated with wind and solar PV installations however, is the cost of the technology module. BREE (2012a) suggest that around 70 per cent of solar PV and onshore wind costs reflect internationally sourced technology, principally modules.

Module costs have fallen as increased global production capacity has created economies of scale, and as the technologies themselves have improved in response to research and development activities. As a relatively small player in the development and manufacture of renewable technologies, the RET has arguably had little impact in reducing technology costs. The high Australian dollar over recent years, however, has contributed to lower costs of imported modules.

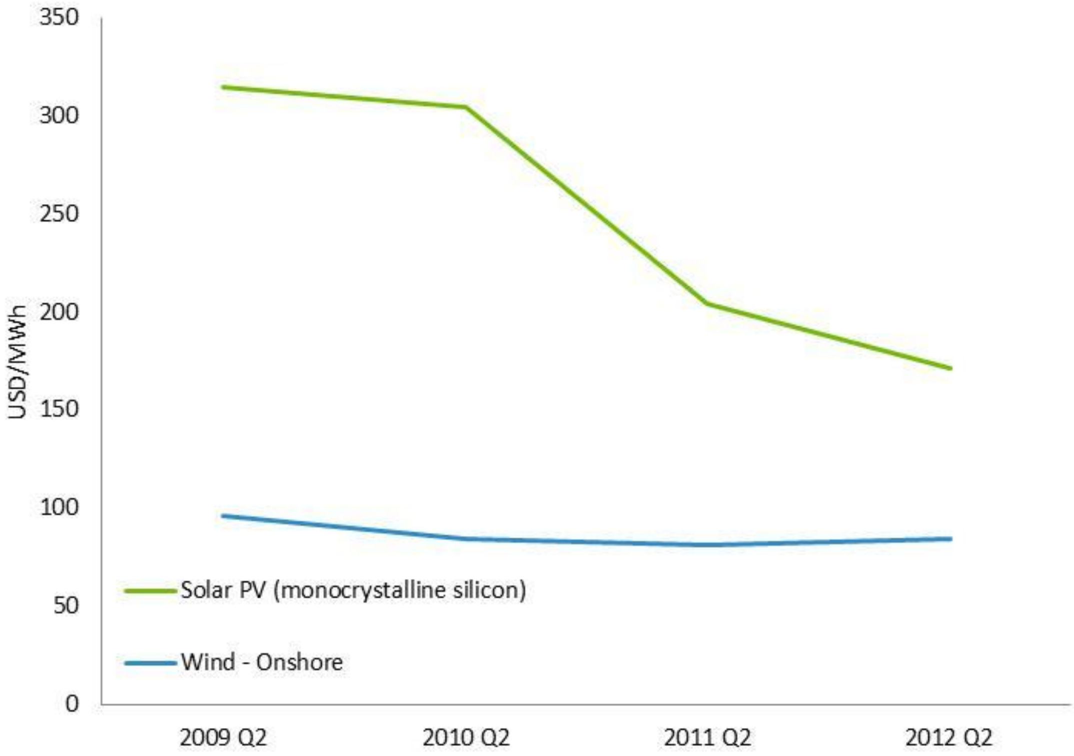
Many electricity generation technologies, and renewables in particular, are characterised by high fixed capital costs and low running costs. Different technologies operate at different capacity factors – that is, the proportion of the year they can produce energy. Levelised costs of energy are often used to compare the relative costs of different technologies when faced with varying capital and operating costs, as well as different capacity factors. The levelised cost of energy is a measure of the average cost per megawatt hour over the life of an electricity generating asset.

Historically, the levelised cost of renewable energy technologies has been far higher than that of fossil-fuel generation, although the gap has been shrinking. At a global level, solar PV and wind costs, in particular, have decreased dramatically on the back of advances in technology (see Figure 14).

The Bureau of Resources and Energy Economics (BREE) expect the cost differences in electricity generation between non-renewable and renewable sources to continue to narrow over time. In its 2012 report, BREE notes that the levelised costs of energy of solar PV and onshore-wind in Australia declined significantly over recent years and forecasts they will have the lowest levelised cost of all technologies by 2030; BREE's underlying assumptions include falling module costs and a rising international carbon price over the period (BREE 2012a).

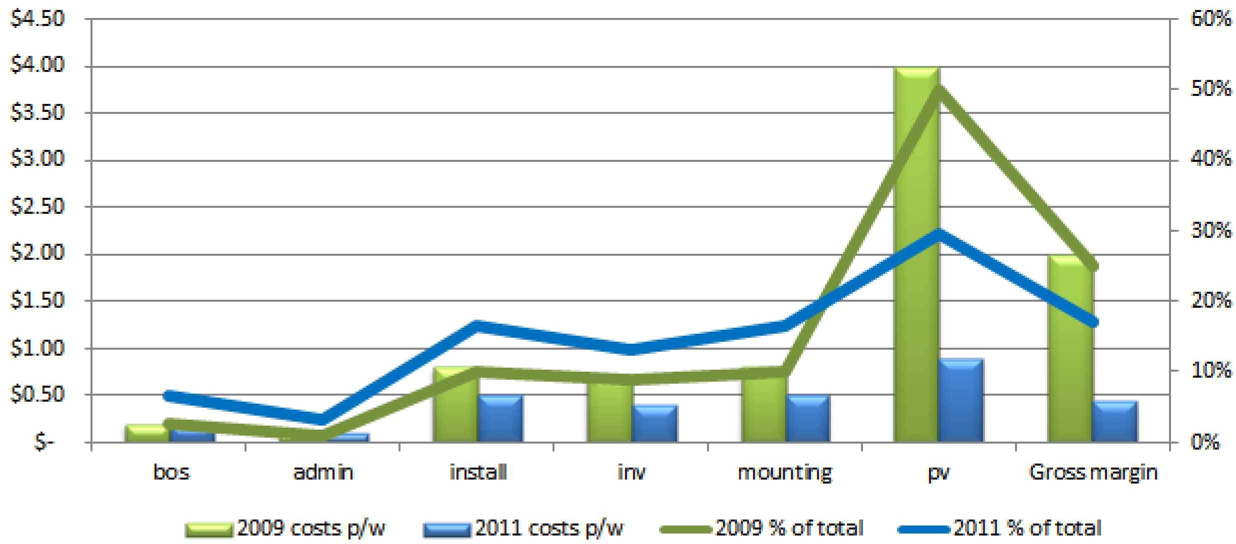
While international economies of scale appear to have driven down the module cost of many technologies, domestic costs associated with installing and mounting small-scale PV systems also appear to have declined between 2009 and 2011 (see Figure 15). Increased competition among installers and suppliers, driven in part by the RET, has also compressed retail margins, with flow-on reductions in the costs to households of PV systems.

Figure 14 Global levelised cost of energy



Source: Bloomberg New Energy Finance, 2012.

Figure 15 Average photovoltaic system prices and retail margins



Source: SolarBusinessServices, sub. 227.
Note: 'bos' refers to balance of system price, 'inv' refers to invertor costs and 'p/w' refers to per watt.

2.4. Impact of the Renewable Energy Target on electricity prices

The RET's impact on electricity prices paid by consumers is the net result of two factors:

- the RET's effect on wholesale prices arising from changes in the demand/supply balance in the electricity generation market; and
- the cost of certificates, which is passed on to consumers in retail prices.

2.4.1. Wholesale prices

The RET can be expected to exert downward pressure on wholesale electricity prices for two reasons. First, the RET can result in additional supply entering the market earlier than would otherwise have been required to meet demand. Secondly, this extra capacity is likely to be characterised by low marginal costs of production – it sits at the bottom of the supply curve, and means that the dispatch of generators with higher short run supply costs is sometimes avoided.

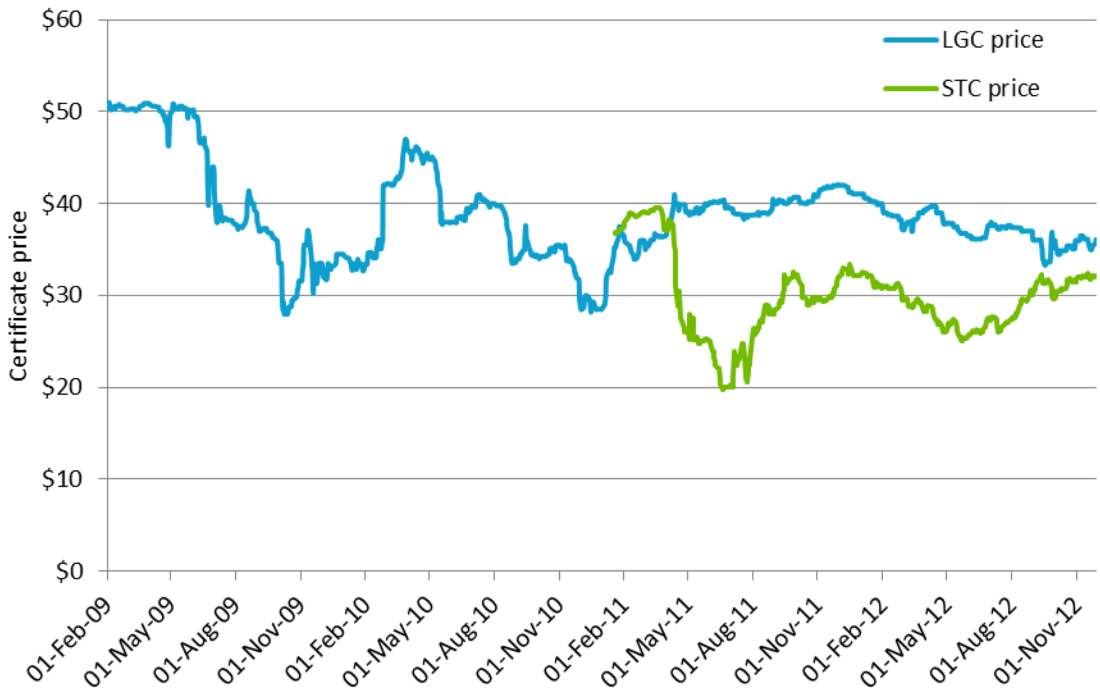
The Authority has not commissioned any modelling on the historic effect that the RET would have had on wholesale prices. SKM MMA modelling commissioned by the Clean Energy Council, however, suggested that for most states, the RET has reduced average wholesale prices which led to a reduction in retail prices (Clean Energy Council 2012).

2.4.2. Cost of certificates

Operating to offset any reduction in wholesale electricity prices driven by the RET are increases in retail electricity prices due to the need for liable entities, generally electricity retailers, to purchase renewable energy certificates to acquit their annual RET liability. Liable entities generally pass on the costs of these certificates to energy consumers.

Since 2009 certificate prices have fluctuated, ranging from around $20 for small-scale technology certificates (STC) to $50 for large-scale generation certificates (LGC), but have remained relatively stable in recent years (around $35 for large-scale certificates and around $30 for small-scale certificates) (see Figure 16).

Figure 16 Certificate price history



Source: Nextgen, 2012.

2.4.3. Retail prices

As noted, the RET's impact on retail prices depends on the net impact of its effect on wholesale prices and the cost of renewable energy certificates.

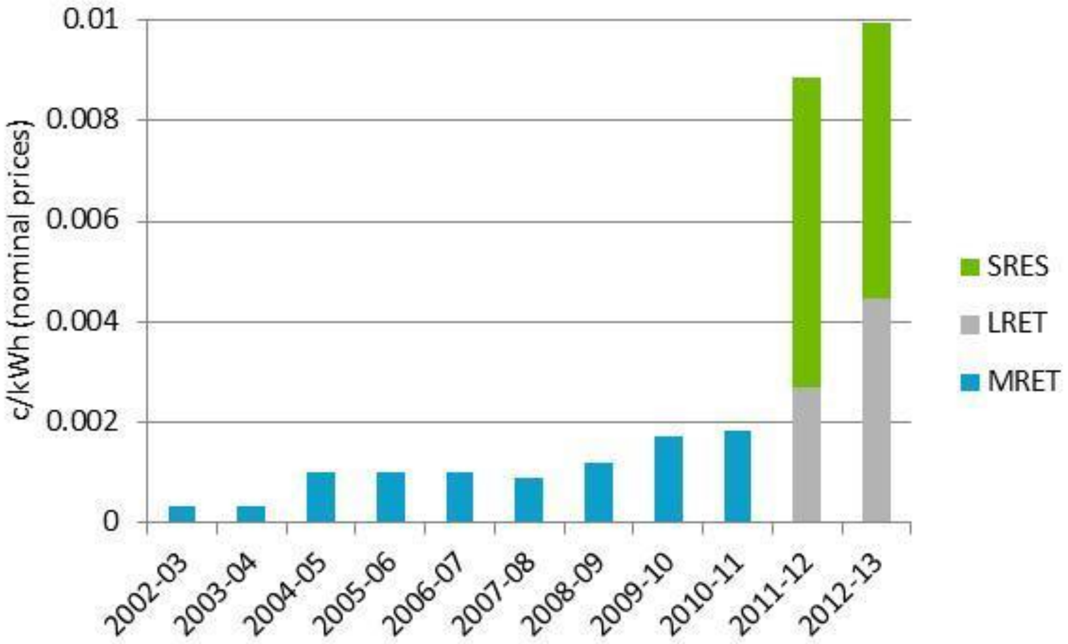
In jurisdictions where retail prices are regulated, the relevant regulator, as part of its price determination, estimates the cost impact of the RET and sets an allowable limit on RET-related costs that can be recovered from consumers through retail tariffs.

For example, in New South Wales, the Independent Pricing and Regulatory Tribunal (IPART) allowed for a sharp rise in the RET component of regulated tariffs in 2011-12 and 2012-13 (see Figure 17).

IPART estimates that the impact of the RET on a typical New South Wales customer's annual electricity bill in 2012-13 will be around $100, which represents around five per cent of that customers total electricity bill. It should be noted that the IPART 2011-12 figures assume a SRES price of around $40 per STC, while the actual cost of certificates averaged around $30 in 2011-12. It is possible that customers who found a competitive retail offer, rather than staying on the regulated tariff set by IPART, may have benefited from a lower SRES certificate cost.

SKM MMA modelling commissioned by the Authority delivers retail price forecasts under a number of scenarios (see Chapter 4). Under current settings, the modelling estimates that the effect of the RET on a typical Australian's annual electricity bill in 2012-13 will be around $68, or around 4.5 per cent of their total electricity bill. This is similar to the estimate in the Australian Energy Market Commission's (2011) report on the *Impact of the Enhanced Renewable Energy Target* that the cost of the RET accounted for around three per cent of residential retail electricity prices in Australia in 2011-12.

Figure 17 Electricity price tariffs in New South Wales attributable to the RET



Source: IPART determinations and reviews of regulated retail prices for electricity, 2002-03 to 2012-13.
Note: Tariffs have been averaged where determinations provide an allowable range. IPART did not incorporate the announced RET changes into its 2010-11 determination.

2.5. Distributional impacts of the Renewable Energy Target across states and socio-economic issues

The distribution effects of the RET can be considered, in very broad terms, according to their net impacts on different household types and on different regions.

2.5.1. Equity of benefits across households – beneficiaries

The geographic distribution of small-scale installations since the commencement of the RET is shown in Figure 18.

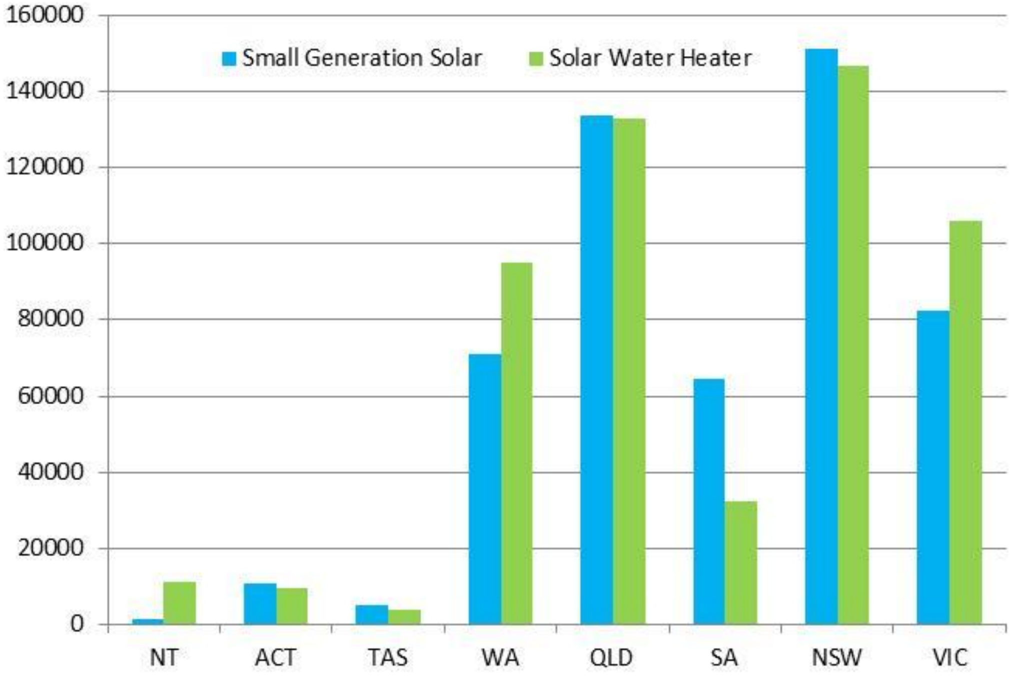
New South Wales and Queensland have the highest number of installations for both solar PV and solar water heaters. On a per capita basis, however, the Northern Territory has the highest penetration of solar water heaters, while South Australia has the highest penetration of solar PV units (see Figure 19).

Seed Advisory (2011) investigated the characteristics of postcodes which had installed solar PV and solar water heaters under the RET and found that postcodes with higher average income generally had a lower take-up of solar PV than the national average.

Penetration of solar PV was also found to decrease in areas where: residents were in the 20-34 age bracket, people had low levels of literacy and/or where there were high population density levels. Similar results were found for the installation of solar water heaters.

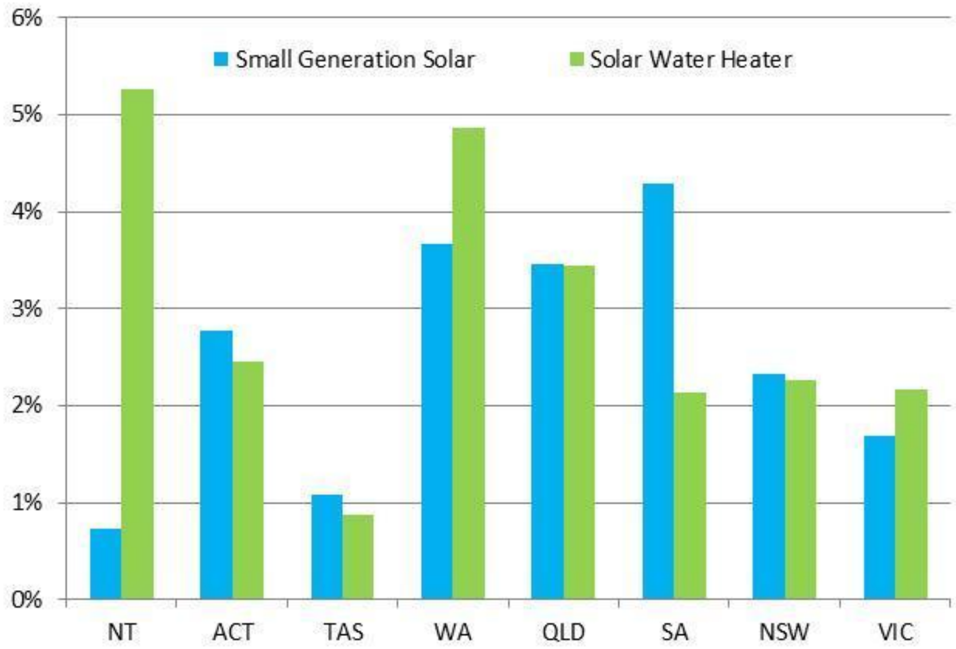
While some households have benefited directly from the SRES, all energy consumers, including households, share the costs of the RET through the impact which the renewable energy certificates (SRES and LRET) have on retail electricity prices.

Figure 18 Number of small-scale systems installed by state and territory, January 2001 to September 2011



Source: Clean Energy Regulator, 2012.

Figure 19 Per capita installation of small-scale systems by state and territory, January 2001 to September 2011



Source: Clean Energy Regulator, 2012.

2.5.2. Impact on household expenditure

Conceptually, the RET can be considered as a levy on electricity consumption to promote the development of the renewable energy industry and, ultimately to contain greenhouse gas emissions. The incidence of this levy affects different consumers in different ways.

Analysis conducted by the Australian Bureau of Statistics, in its Household Expenditure Survey 2009-10, indicated that households with the lowest disposable income spent $7 less each week on domestic fuel and power (including gas and electricity) than the average household. At the same time these households spent the highest proportion of their expenditure on domestic fuel and power (four per cent), compared with average households (2.6 per cent), abstracting from differences in types of dwellings and numbers of occupants.

Of households with the lowest disposable income, the Australian Bureau of Statistics found that 17.9 per cent experienced difficultly in paying electricity, gas or telephone bills on time during the 12 months before the survey, compared with the 12.5 per cent of average households.

While the Commonwealth Government has created the Household Assistance Package to offset cost of living increases as a result of the carbon price for low income households, no comparable arrangements were instituted to compensate for higher electricity costs attributable to the RET.

CHAPTER 3. THE ROLE OF THE RENEWABLE ENERGY TARGET

This chapter considers the role of the Renewable Energy Target (RET) in the current policy context, including the introduction of the carbon pricing mechanism and the establishment of the Australian Renewable Energy Agency (ARENA) and the Clean Energy Finance Corporation (CEFC). This chapter explores the way these policies interact with the RET and their implications for the future role of the RET. Finally, the appropriate frequency of reviews of the RET is considered.

3.1. The broader policy context

The legislative objects of the RET reflect a view that the renewable energy industry must be expanded and developed to promote greenhouse gas emissions reductions. The 2003 *Tambling Review* summarised the objectives of the RET as reducing greenhouse gases and promoting renewable industry development (Australian Greenhouse Office 2003). In the Australian context, where concerns over the availability of fossil-fuel energy sources are not warranted, the industry development objective also reflects, ultimately, a greenhouse gas mitigation objective (see Section 3.2.3).

In terms of both greenhouse gas emissions reductions and industry development, the policy landscape has changed considerably since the RET scheme began operating in 2001. The most significant of these changes was the Commonwealth Government's Clean Energy Future Plan in 2011, which introduced the carbon pricing mechanism and established ARENA and the CEFC.

This chapter considers the role of the RET in this new policy environment. First, it examines the interactions between the RET, the carbon pricing mechanism, ARENA and the CEFC, and the broader electricity market. It then explores the ongoing case for the RET in the current policy context.

3.1.1. Carbon pricing mechanism

When the RET was first legislated in 2000, there was no national carbon price in place, and the Commonwealth Government had no plans to implement such a scheme. In this context, the RET was expected to play a key role in helping Australia to meet its emissions reduction target under the Kyoto Protocol (Commonwealth, House of Representatives 2000, p.18 030).

A national carbon price has been in place since 1 July 2012 and it is intended to be the primary tool for reducing Australia's greenhouse gas emission levels (see Box 2). However, the future of the carbon price is subject to continued political and public debate (see Section 3.2.1).

The carbon pricing mechanism has a broad coverage of emission sources, allows for carbon units to be traded and is linked to international markets. This means that the market will determine the most cost effective way to reduce emissions, with the cheapest opportunities pursued first whether they are in Australia or overseas.

Box 2 How the carbon pricing mechanism works

The Australian carbon pricing mechanism commenced on 1 July 2012.

Liable entities will report on their emissions and buy and surrender to the Government a carbon unit or international unit for every tonne of greenhouse gas emissions they produce.

For the first three years of its operation (until 1 July 2015), the carbon pricing mechanism has a fixed price starting at $23 per tonne of greenhouse gases emitted and growing at around 2.5 per cent in real terms each year. The amount of carbon units that liable entities need to meet their obligations will be available at the set fixed price.

From 1 July 2015, the carbon pricing mechanism shifts automatically to an emissions trading scheme with a flexible price. The total number of carbon units issued by the Government will be capped. Australian emissions covered by the scheme can only exceed the cap if approved domestic or international carbon offsets are surrendered instead.

The price of carbon units will be determined by the market. Liable entities will compete to buy the number of carbon units they need to meet their obligations. Those that value carbon units most highly, because the cost of reducing their emissions is higher, will be willing to pay the most for them. Others will reduce their emissions if they can do so at a cost that is less than the carbon price.

From the start of the flexible price period, liable entities will also have access to international carbon markets to buy international units that represent emissions reductions that have occurred in another country. This means that liable entities can access emissions reductions in other countries if these can be achieved at a lower cost than emissions reductions in Australia. The Australian scheme will be linked to the European Union's Emissions Trading Scheme from the start of the flexible price period. European Union Allowances will be able to be used for compliance in the Australian scheme.

Liable entities must not surrender more than 50 per cent of their liability using international units including a 12.5 per cent limit on the use of Kyoto units (Certified Emissions Reductions, Emission Reduction Units and Removal Units).

The RET will interact with the internationally-linked carbon pricing mechanism in three important ways.

First, in the presence of a carbon price, the RET is likely to increase the short-term cost of achieving the emissions reduction target. This is because it mandates the type of abatement that has to occur. While the RET will, in general, promote the least cost renewable energy generation, it promotes more expensive abatement than that currently being encouraged by the carbon price alone.

The Productivity Commission's *Carbon Emission's Policies in Key Economies* concluded that broad-based carbon prices are likely to deliver abatement at a lower cost than industry-specific policies such as the RET:

> *Emissions trading schemes were found to be relatively cost effective, while policies encouraging small-scale renewable generation and biofuels have generated little abatement for substantially higher cost. (p.xiv)*
>
> *It is generally recognised that the most direct and, consequently, most efficient way of implementing the 'relative price' change required to discourage consumption of high-emission products in favour of low-emission ones, is through a global, broadly-based carbon tax or quota scheme (emissions trading scheme). (2011, p.49)*

> *Emissions trading schemes are found to have been the most cost-effective instruments identified. (2011, p.79)*

The Authority's modelling estimates that the additional reductions in greenhouse gas emissions driven by the RET cost, on average, around $40 per tonne.

Second, there is an interaction between certificate prices under the RET and the carbon price. Under the current design of the carbon pricing mechanism, the carbon price will affect certificate prices under the RET, but the RET will not affect the carbon price. Until 1 July 2015, the level of the carbon price is fixed in legislation. Thereafter, the carbon pricing mechanism allows the use of international offsets, including European Union Allowances. This link means that Australia is likely to be a price taker in international carbon markets: the carbon price in Australia will be determined by the price in linked markets (in the first instance, by the price of European Union Allowances).

The level of the carbon price does, however, affect the price of certificates under the RET. RET certificate prices represent the 'top up' on wholesale electricity prices required to make renewable energy commercially viable. All other things being equal, in Australia, higher carbon prices are likely to lead to higher wholesale prices, which therefore implies lower RET certificate prices.

Third, the RET will affect the pattern of emissions abatement in Australia. While Australia has an emissions trading scheme in place that is linked to international carbon markets, the effect of the RET on emissions will be to:

- reduce emissions and demand for emissions units in the electricity sector (therefore increasing domestic abatement); and
- not result in any changes to abatement activities of other sectors (which would respond to the unchanged international carbon price).

The overall impact would be to reduce the number of international units that Australia would need to purchase to meet its emissions reduction goals. That is, the RET is likely to increase the proportion of domestic abatement Australia undertakes to meet its targets, and reduce its reliance on imported emissions units.

3.1.2. The Australian Renewable Energy Agency and Clean Energy Finance Corporation

In relation to the industry development goal of the RET, two new institutions (ARENA and the CEFC) have been created, adding new dimensions to the overall renewable energy industry development policy.

ARENA's role is to provide grant funding of around $3.2 billion to support innovations that improve the competitiveness of renewable energy technologies and increase the supply of renewable energy in Australia. While ARENA's mandate is broad, it is expected to assist with the 'technology-push' phase of the innovation chain and will support research and development into promising and emerging renewable energy technologies (see Figure 20).

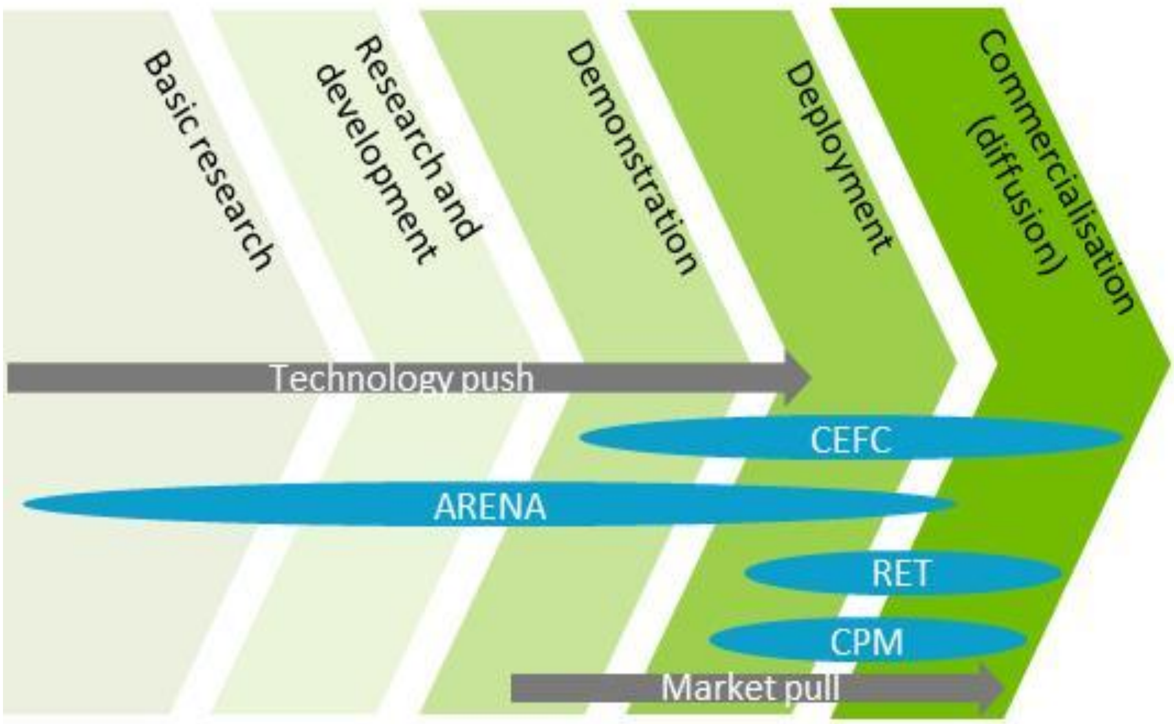
The objective of the CEFC is to overcome capital market barriers that hinder the financing, commercialisation and deployment of renewable energy, energy efficiency and low emissions technologies and the transformation of existing manufacturing businesses to re-focus on meeting demand for inputs for these sectors (see www.cleanenergyfuture.gov.au). It will invest in projects or firms on a commercial basis, seeking to catalyse private sector financing not previously available to

clean energy technologies and therefore contribute to the growth of the clean energy industry.
The CEFC has a goal of allocating 50 per cent or more of its total of $10 billion in funding to renewable energy investment, and the remainder to low-emissions and energy efficiency investment. The CEFC is intended to be commercially oriented and make a positive return on its investments. Given this focus on deployment and commercialisation, the CEFC assists with the 'market-pull' component of the innovation chain and is therefore designed to complement the work of ARENA (see Figure 20). Furthermore, according to the CEFC Expert Review Panel it:

> *…will finance Australia's clean energy sector using financial products and structures to address the barriers currently inhibiting investment.*
>
> *The Panel considers an appropriate objective to be:*
>
> - *apply capital through a commercial filter to facilitate increased flows of finance into the clean energy sector thus preparing and positioning the Australian economy and industry for a cleaner energy future. (Commonwealth Treasury 2012, p.ix)*

The RET supports the deployment of market-ready renewable energy technologies, where the chief barrier to 'business as usual' deployment is cost. ARENA and the CEFC appear likely to target renewable technologies at an earlier stage in their development – that is, technologies that would not otherwise be deployed under the RET. The Authority believes that ARENA and the CEFC are likely to influence the range of technologies that could ultimately be supported by the RET.

Figure 20 Position of government policies along the innovation chain



Source: Climate Change Authority, 2012.

3.1.3. Electricity market reform

Today the RET operates in a very different electricity market and policy environment to when it was first introduced. The energy market reforms that began in the 1990s created a national framework for governance, network regulation, planning, pricing demand-side participation and non-economic regulation. These developments have helped shape the outcomes of the RET to date.

Energy market reforms are, however, incomplete. A number of market review activities by energy market bodies in the National Electricity Market (NEM) and non-NEM jurisdictions are underway, along with a range of market and jurisdiction specific reviews. Key areas of focus include:

- improving electricity network efficiency and performance;
- enhancing wholesale markets;
- improving demand-side participation;
- promoting retail competition; and
- strengthening regulatory arrangements and governance.

Regulatory frameworks for electricity, along with other policy issues such as planning regulations, can have a material bearing on the RET. For example, wholesale market rules can affect the way renewable energy competes with other forms of generation, while network regulation can influence the cost and availability of access for renewable generation connecting to the grid.

In its recent review of electricity network regulatory frameworks the Productivity Commission found inefficiencies in the electricity industry and flaws in the regulatory environment. It called for:

> *… a more fundamental, nationally-focused, package of reforms that addresses the major, interlinked regulatory barriers to the efficiency of electricity networks, including:*
>
> - *a poor focus on consumers, despite their interests being the overarching objective of the regulatory regime*
> - *inadequate demand management*
> - *costly ways of achieving, and sometimes excessive, reliability requirements*
> - *state regulatory arrangements and network business ownership*
> - *the resourcing and capacity of, and structural arrangement for, the regulator*
> - *the regulatory rules, and ability of the regulator to apply them. (Productivity Commission 2012, p.2)*

Of particular relevance to the RET, the Productivity Commission also examined the issue of a fair and reasonable value for distributed generation, following similar studies by the Independent Pricing and Regulatory Tribunal of NSW (IPART) (IPART 2012) and the Victorian Competition and Efficiency Commission (VCEC) (VCEC 2012). Consistent with the Council of Australian Governments' national feed-in tariff principles, these studies have concluded that the energy (output) value of electricity exported to the grid by a distributed generator should reflect the market wholesale price at the time of energy production, and the (net) value to network businesses at peak periods. In regard to the network value, the VCEC found that regulatory reforms would be required to identify the (net) network value of distributed generation (VCEC 2012, p.xxi).

As outlined in Chapter 1, the Authority has not made recommendations on broader energy market settings. However, given that these issues can affect the efficiency and effectiveness of the RET, the Authority supports the Council of Australian Governments' efforts to develop and implement nationally consistent economy-wide energy market reforms in a manner that, among other things, maximises policy integration and alignment. The Authority considers that renewable energy should be treated neutrally in future reforms (compared with, say, energy efficiency activities in the home) and that renewable policy should not be adjusted to address broader regulatory failings.

3.2. Role of the Renewable Energy Target

In light of the broader policy context, it is necessary to consider what role the RET should play.

A number of review participants considered that the RET was no longer justified in the presence of the carbon price. For example, IPART concluded that:

> *… in our view, the introduction of the carbon price and a move towards an emissions trading scheme (ETS) removes the need for the RET (and ultimately electricity customers) to continue to subsidise investment in the renewable sector. The RET is not complementary to the carbon price and does not cost effectively address any other significant market failure. (IPART, sub.81, p.1)*

Literature on the effectiveness of energy technology policy and on the economics of innovation strongly supports the need for both 'technology-push' and 'market-pull' policies, although the emphasis will generally shift from push to pull as technologies mature (International Energy Agency 2012, p.118). As both the RET and the carbon pricing mechanism act as market-pull policies, there needs to be a justification for the additional demand for renewables created by the RET over and above that encouraged by the carbon price. Even in the presence of a carbon price, the RET may continue to be important if it helps to:

- mitigate the risk that uncertainty surrounding the carbon price (both in Australia and elsewhere) suppresses investment in low-emissions technologies (Section 3.2.1);
- mitigate the risk that the carbon price is lower than optimal to achieve long-run mitigation goals leading to suboptimal investment in low-emission technologies (Section 3.2.1);
- reduce the cost of climate change mitigation over time, by promoting 'learning-by-doing' cost savings (Section 3.2.2); and/or
- mitigate other risks or create other benefits (such as energy security, public health, increased retail competition or enhancing employment) (Section 3.2.3).

3.2.1. Carbon pricing policy credibility

In an ideal world, efficient global carbon markets would reflect faith in credible commitments to long-term emissions reduction targets by countries around the world, and would represent the true cost of achieving this long-term global ambition. These circumstances currently do not apply – considerable uncertainty prevails on the longevity of carbon pricing arrangements in Australia, and in relation to ultimate levels of global environmental ambition.

Uncertainty around carbon pricing policy may lead to less than optimal levels of innovation and investment. It can also increase the cost of any investment that does occur.

In Australia, climate change policy is currently the subject of intense political and public debate. A recent survey on the carbon price undertaken by the Centre for Climate Economics and Policy at the Australian National University found that 40 per cent of respondents think the carbon price will be repealed by 2016, however half of these respondents think it will be re-instated by 2020 (Jotzo 2012). The dominant finding from the survey was a pervasive uncertainty about the future of the carbon pricing mechanism in Australia.

The level of the international carbon price can also be affected by perceptions of the credibility of governments' commitments to long-term emissions reduction goals. For example, modelling conducted for the 2008 Garnaut Review estimated that the carbon prices required to create a 50 per cent chance of limiting global warming to 2 degrees Celcius started at over $40 in 2013, increasing steadily at a rate of four per cent each year. Current international carbon prices are well below this level.

In its submission to the Garnaut Review, the Productivity Commission made the following comments on the role of supplementary policies such as the RET when the credibility of future carbon prices is uncertain:

> *Whether a gap between the forward emissions price path envisaged by policy makers and the price path private agents factor into decision making might warrant a greater role for supplementary policies in the early years of an [emissions trading scheme] depends in part on the reason for the discrepancy.*
>
> *If private agents think that major technological breakthroughs that will greatly lower the cost of achieving emission reductions are imminent, the gap may simply reflect the market having access to better information and no enhanced role for supplementary policies is warranted.*
>
> *If, on the other hand, the departure is due to low credibility because of a view that future governments are likely to water down or dismantle the [emissions trading scheme], a case for an extra role for supplementary policies during the transitional phase can be argued. (Productivity Commission 2008, p.11)*

As also noted by the Productivity Commission, to perfectly address the uncertainty of the carbon price with supplementary policies would require governments to know the optimal investment path and to know how firms would have responded to a more certain emissions price path (Productivity Commission 2008, p.31).

It is impossible for governments to ever know the optimal investment path to achieve any particular outcome. Given Australia's abundant renewable energy resources, however, it is difficult to imagine that a growing renewable energy sector will not play a part in a carbon constrained future.

In his submission to this review, Professor Garnaut argued:

> *With uncertainty about the future of carbon pricing, the Renewable Energy Target has to play a more central role in the reduction of emissions in the Australian electricity sector. The acceptance of the Renewable Energy Target by both sides of partisan politics in Australia means that it can now provide a more secure basis than politically contested carbon pricing for emissions-reducing investments in the electricity sector. (Professor Ross Garnaut, sub.167, p.2)*

The Authority considers that the RET can be justified as a transitional measure in the presence of the current carbon pricing arrangements, ahead of a carbon price trajectory capable of delivering on Australia's long-term environmental goals.

Another potential consequence of uncertainty over future carbon pricing arrangements is to increase the risk of 'lock-in' of new emissions-intensive infrastructure. Most power generation plants have a long lifetime. The expected lifetime of a coal-fired generator is 40 years (International Energy Agency, 2010, p.43). The International Energy Agency (IEA) has assessed the global costs of locking in high-emissions energy infrastructure due to delayed investment in abatement. Under the IEA's 450 Scenario (stabilising greenhouse gases at 450 parts per million), for every $1 of avoided investment between 2011 and 2020, either through reduced low-carbon investment or adoption of cheaper fossil-fuel investment options, an additional $4.30 would need to be spent between 2021 and 2035 on additional abatement to compensate for higher emissions earlier in the period, as more low-carbon plant and equipment need to be installed (IEA 2011a, p.40).

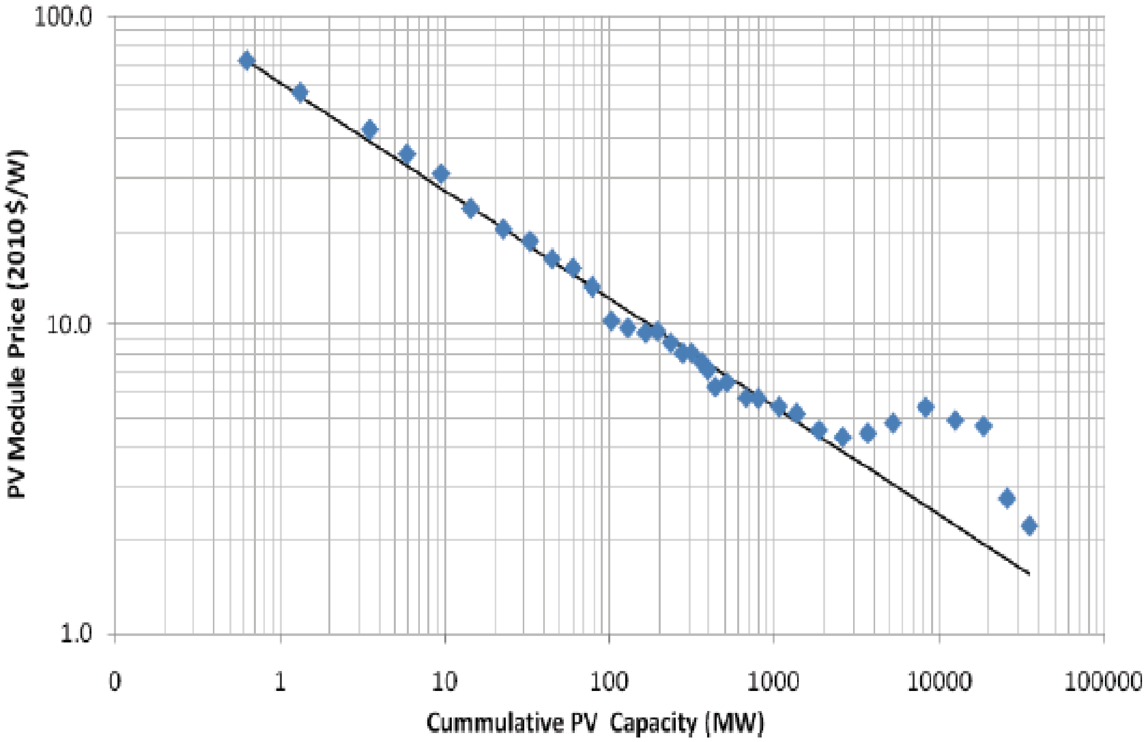
If, however, Australia continues to see slow growth in electricity demand over the coming years, the risk of locking in new emissions-intensive plant appears low – on current projections, no significant new generation capacity appears to be required for many years to come.

3.2.2. Minimising the cost of climate change mitigation over time

Globally, increased rates of deployment of renewable energy are associated with falling costs referred to as the 'learning by doing' effect. At an international level, increasing rates of deployment are likely to more rapidly bring renewable technologies down the cost curve, which could help reduce the longer term costs of emissions reductions.

Technology learning rates are generally defined as the cost reduction obtained for a doubling of capacity. For example, globally, solar photovoltaic (PV) modules have shown a learning rate of 22 per cent over the period 1976 to 2003 (see Figure 21) (Melbourne Energy Institute 2011, p.10).

Figure 21 Historic experience curve for photovoltaic with 22 per cent learning rate globally



Source: Melbourne Energy Institute, 2011.

As outlined in Chapter 2, the module cost of solar PV and the domestic costs associated with installing and mounting small-scale PV systems has significantly declined between 2009 and 2011, which may indicate that the trend in the above chart is continuing, or potentially accelerating. In addition, in their projections of technology costs, the IEA and the European Photovoltaic Industry Association expect that, with continued investment in solar PV, the historic global learning rate will continue into the future.

Furthermore, from a 2010 baseline, the IEA expects the capital cost for utility scale PV facilities could drop by 40 per cent by 2015, and 50 per cent by 2020 (IEA 2010, p.56).

Wind generation has also experienced cost reductions as capacity has increased.
The European Wind Energy Association assumes a learning rate of ten per cent over the period 2010 to 2015 (European Wind Energy Association 2009, p.59). While a more mature technology than solar PV, in 2010, the IEA expected the future learning rate for wind generation to be at about seven per cent (IEA 2010). The 2009 IEA Roadmap for wind generation expects investment costs to decrease for onshore wind by 23 per cent by 2050 and for offshore wind by 38 per cent by 2050 (IEA 2009, p.4).

Australia has benefited from global reductions in renewable technology costs, and is likely to continue to do so in the future. A key issue is whether there are additional cost reductions to be gained from increased deployment in Australia – that is, whether there are important local learning-by-doing cost savings that the RET could foster.

In response to its discussion paper, the Authority received evidence suggesting that there is some scope for local cost reductions in terms of developing an experienced workforce, improving logistics, and streamlining the process of obtaining (and granting) regulatory approvals. The solar industry also provided evidence that there were savings in terms of improved buying power that came from increased local scale (SolarBusinessServices, sub. 227).

Most of these local learning-by-doing cost savings appeared to be exhausted fairly early in the deployment process in Australia. For example, the Authority received no compelling evidence to suggest that increased deployment of wind farms in Australia would lead to further cost reductions – any future cost reductions are likely to arise from falling international technology costs, which are only marginally influenced by Australian deployment rates.

While the RET is likely to assist with domestic learning-by-doing cost reductions in the initial installations of any particular technology, in isolation, these benefits are insufficient to justify the RET.

3.2.3. Benefits unrelated to climate change

Other arguments that have been made in Australia and elsewhere for increasing the deployment of renewable energy include:

- promoting energy security;
- avoiding some of the health and broader environmental costs associated with the production and use of fossil-fuels;
- promoting retail competition; and
- creating employment.

Energy security

Energy security is frequently put forward in other countries as a reason for investing in renewable energy generation as it reduces reliance on finite, and often imported, fuels (United Kingdom Department of Energy and Climate Change 2011, pp.43-44). Australia, however, has an abundance of fuel resources and does not generally import fuel for electricity generation. Australian reserves are large enough to supply us for many decades into the future and underpin our energy security (Commonwealth Government Department of Resources, Energy and Tourism 2012, p.12). In the Australian context, therefore, the RET does not play a role in promoting energy security through reduced reliance on imported fuels.

The Commonwealth Government Department of Resources, Energy and Tourism's National Energy Security Assessment (2011) reports on energy costs as a component of energy security:

> *In the Australian context, energy security is defined as the adequate, reliable and competitive supply of energy to support the functioning of the economy and social development, where: … competitiveness is the provision of energy at an affordable price that does not adversely affect the competitiveness of the economy and that supports continued investment in the energy sector. (p.2)*

In the short term, renewable energy adds to the cost to society of electricity supply. Most renewable energy technologies, however, have very low running costs. Renewable energy sources, such as solar and wind, are not subject to fluctuations in world fossil-fuel prices, and will also not vary with world carbon prices – once built, their ongoing running costs are likely to be much more predictable than fossil-fuel power stations. Therefore, it could be argued that increasing the share of renewable energy reduces the risk of uncertain and potentially high energy costs in the future. This view is shared by the IEA:

> *Fossil energy technologies require an input fuel and are thus fully exposed to price volatility of fuels and price uncertainty. Because they do not need a fuel, renewables (hydro, solar, wind) are not exposed to these aspects. (IEA 2011, p.12)*

Stable operating costs that are not subject to fluctuations in fuel costs and carbon prices may be of some benefit, but could not be used as a primary rationale for the RET. The market has developed a range of products to hedge against uncertainties relating to both fuel and carbon prices. Furthermore, as a net exporter of energy, Australia is likely to benefit overall from higher fossil-fuel prices.

Public health benefits

Another source of benefits from renewable energy that does not relate to climate change relates to public health and broader environmental benefits.

The IEA has recognised that the deployment of renewables can lead to positive benefits for human health through displacing electricity generated by fossil-fuels and thereby decreasing harmful pollutants such as sulphur and nitrogen oxides (IEA 2011). The benefits of reducing harmful by-product pollution from fossil-fuel generation were noted by the Climate and Health Alliance:

> *Reducing the burning of fossil fuels for electricity and transport can reduce the incidence of heart and lung diseases, including lung cancer, as well as neurologic disorders. (Climate and Health Alliance (Attachment), sub.18, p.5)*

The Australian Academy of Technological Sciences and Engineering estimate that the total health damage cost of coal-fired electricity generation is about $13 per megawatt hour, equivalent to an aggregated national health burden of around $2.6 billion per annum (The Australian Academy of Technological Sciences and Engineering 2009, p.ii).

As noted in the RET review issues paper, the National Health and Medical Research Council is investigating the effect of wind farms on human health. The Council is commissioning a systematic review of the scientific literature to examine the possible effects of wind farms on human health, including audible and inaudible noise. See http://www.nhmrc.gov.au/your-health/wind-farms-and-human-health for further information.

The Authority has not attempted to quantify the health costs and benefits associated with renewable technologies compared with fossil-fuel generation. It is the Authority's view that the RET is unlikely to be the most appropriate mechanism for reducing the negative health effects from fossil-fuel generation, and that such issues are more likely to be better addressed directly through regulations or planning restrictions, taking into account local conditions (including limits on coal sulphur content or emissions of particulates).

Electricity retail competition

Meridian Energy Australia suggested that an additional benefit of the RET is to promote new long-term retail competition. It argues that sustainable retailers need to be vertically integrated, and that:

> *Without LRET, opportunities for generation asset investment which can be accessed by new entrant participants would be lacking. The absence of such opportunities would inhibit the ability of new entrants to participate on a sustained basis in Australia's retail market. (Meridian Energy Australia, sub.159, p.2)*

The Authority has not assessed the extent of this possible effect. While promoting retail competition is desirable, any effect that the RET has on supporting new entrants could be viewed as an unintended positive outcome, rather than a primary rationale for the scheme.

Creating employment

The IEA has recognised that an objective of renewable energy policy can be to enhance employment (2011). As shown in Chapter 2, there has been an increase in the number of people employed in the renewable energy sector since the commencement of the Mandatory Renewable Energy Target. Furthermore, analysis by SKM MMA and the University of Technology, Sydney for the Climate Institute estimated that there is significant potential for additional employment creation in the renewable energy sector, particularly in regional areas, with up to 34 000 new jobs created by 2030. This estimate is based on the existing RET settings and a significantly higher carbon price consistent with a 25 per cent emissions reduction target below 2000 levels by 2020. The report concludes that the RET:

> *… drives most of the investment in clean energy prior to 2020. (The Climate Institute 2010, p.3)*

A large portion of employment creation, however, is associated with the construction and installation of renewable electricity generation capacity. Ongoing employment tends to be for the operation and maintenance of electricity generators. The Climate Institute projects 7 600 ongoing positions, which is much smaller than the total 34 000 new jobs estimate (2010, p.5). Furthermore, the study does not assess job transfers or losses across the broader economy. The Authority has not assessed whether the RET will create net employment benefits and does not consider that job creation is an adequate rationale for the RET.

3.2.4. Conclusion

The Authority recognises that the RET is not a 'first best' approach to reducing greenhouse gas emissions, and that if a carbon price remains in place and gradually rises over time, the RET would phase itself out, as certificate prices drop to zero.

The Authority also recognises that the carbon price has only just been introduced in Australia and continues to be the subject of intense political and public debate. The RET is bolstering incentives for renewable investment in an environment of general uncertainty in relation to the future of a carbon price. In the current policy environment, the RET can be seen as being complementary to the carbon price, as a transitional measure, while a carbon price is being established, its future becomes more certain, and price levels adjust to reflect Australia's long-term emissions reduction goals. Therefore the review concentrates on whether any improvements can be made to the design of the RET, rather than challenging the RET's existence.

Furthermore, the Authority is aware that it is not starting with a blank canvas: the RET has operated now for many years. Companies have already made significant investments on the basis of that legislation and are planning on investing substantially more.

Transitioning to a clean energy future will require considerable investment over decades. A stable and predictable policy environment is crucial to fostering the confidence required for such investment. Consistent feedback from participants has highlighted the high level of policy uncertainty in the climate change policy environment and the negative affect this has on investment. Furthermore, the importance of maintaining a stable policy environment has been emphasised by many participants including the Ai Group:

> *… many businesses have commented on the importance of providing a stable policy environment for future investment in energy generation, whether renewable or otherwise. The RET has been through several major changes in recent years, and any further adjustments need caution if they are not to reduce the credibility and reliability of energy policy as a whole. (Ai Group, sub.46, p.5)*

Changes to policy can have considerable costs if the changes negatively influence the perception of regulatory risk. A strong and clear case needs to be made for any policy changes, including changes to the RET, with the benefits of such changes weighed against all likely costs, including the additional risk premium on investment and the effects of lower innovation and lock-in of high-emissions infrastructure due to perceived regulatory risk.

Professor Garnaut recognised the importance of providing regulatory stability in his submission:

> *It remains my view that if there were certainty about the retention of economy-wide carbon pricing at economically and environmentally rational prices, it would be advisable to retain the Renewable Energy Target and to allow it gradually to be made redundant by a rising carbon price. In this set of circumstances, for reasons of business certainty, it would be wise to retain the Renewable Energy Target with the legislated parameters. Many business decisions have been made on the basis of current legislation and changes in the law increase uncertainty about the stability of future policies. Uncertainty raises the supply price of investment and the costs of electricity to users. Change in the law should not be contemplated without compelling policy reasons. (Professor Ross Garnaut, sub.167, p.2)*

The Authority recognises the costs and uncertainty associated with regulatory risk and the need to establish a clear and strong case for changes to policy. Given this, there needs to be a strong policy rationale to recommend a change and the expected benefits of any recommended change need to exceed the expected costs.

3.3. Frequency of Renewable Energy Target reviews

Currently the *REE Act* requires that the Authority conducts reviews of the RET every two years.

A large number of submissions from a diverse range of participants, including liable entities, peak industry bodies and large energy users raised concern with the current frequency and scope of reviews, arguing that it adversely affects investor confidence. Participants supporting less frequent reviews were

Pacific Hydro, the Australian Industry Greenhouse Network, the Business Council of Australia and the Clean Energy Council, among others.

Following the publication of the discussion paper, in which the Authority expressed a preliminary view that the timeframe for reviews should be increased from two to four years, a number of participants expressed support for retaining the current two year timeframe. For example:

Alinta Energy stated:

> *Alinta Energy does not endorse the Authority's preliminary view that scheduled reviews take place every four years instead of the previously determined two years. Further, the Authority has failed to consider the validity of two-yearly reviews and that given the nature of the RET regular reviews provide consumers with an assurance the policy will be appropriately managed. (Alinta Energy, sub.183, p.2)*

GDF Suez considers:

> *In the interests of regulatory stability, less frequent reviews would normally be supported. However, given our reservations about many of the key design aspects of the RET we support having the next review in 2014 rather than 2016. (GDF Suez, sub.20, p.6)*

EnergyAustralia noted:

> *In general we support less frequent policy review periods and if a "real 20% by 2020" target was adopted then a review in 2016 would be appropriate. We note that providing four years of policy certainty (until 2016) is broadly consistent with EnergyAustralia's preferred approach to achieving a "real 20% by 2020" which is based on providing at least 3 forward years of fixed gigawatt hour targets at any point in the RET's operation.*
>
> *However if the current RET is maintained then the next review ought to occur in 2 years time to assess any further changes to electricity demand, scheme costs and deliverability of the target. (EnergyAustralia, sub.196, p.8)*

On balance, the Authority is of the view that the current frequency of reviews is affecting investor confidence. The Authority also considers that the two year review timeline could prove to be impractical. With the two year schedule, it is possible that the Authority would need to start work on its next review before the Commonwealth Government had a chance to respond to, and implement, recommendations from the previous review. Accordingly, the following options to address these concerns have been considered:

- maintain the existing time frame for reviews but narrow the scope of each review;
- extend the time frame for reviews to four years; or
- only review the scheme when and if certain conditions are met.

Under the first option, the Authority would continue to undertake reviews every two years, but narrow the scope of every second review so that it is focused only on administrative issues and eligibility of any new technologies that have emerged. For this option, more fundamental reforms, such as potential changes to targets, are only considered every four years. This approach is supported by the Business Council of Australia:

> *One way to address this is to identify now the nature of the future reviews making clear what the specific role of the review will be and matters to be considered. The BCA proposes the use of a "light touch" approach for most reviews and then specified years for matters such as*

the process for phasing out the RET at the end of the current legislated period (2030). (Business Council of Australia, sub.130, p.7)

This option allows for flexibility to respond to problems that have arisen in administering the scheme at regular intervals while ensuring a degree of policy stability on more fundamental aspects of the policy framework. All things considered, however, it may not provide sufficient predictability for investors.

The second option involves maintaining the current review scope, but undertaking the reviews less frequently, every four years. This allows flexibility to make amendments to reflect changed circumstances, but also provides policy stability and predictability. Furthermore, this option means that reviews of the scheme can be done in a holistic way and ensures that administrative and structural issues are reviewed in parallel. This approach is suggested by several submissions. For example, the Climate Institute noted:

The year 2016 should be the earliest major review and the scope should be narrowed to consideration of post-2020 design issues (e.g. expanding the target post-2020). (The Climate Institute, sub.86, p.4)

Eraring Energy also recommended:

… less frequent reviews of the scheme – perhaps once in 4 years as the current [biennial] review creates more uncertainty leading to unnecessary investment risks. (Eraring Energy, sub.146, p.2)

In addition, this time frame is more in accord with the Commonwealth Government Best Practice Regulation Handbook 2007, which recommends, as a benchmark, that reviews of regulation occur at least every five years.

The third option involves the Authority only undertaking a review if certain conditions are met. This approach has been suggested in a number of submissions, including by AGL Energy:

It is AGL's view that the policy should not be reviewed every two years – to do so is destructive to the efficient operation of the market. Rather than conducting a review every two years, market effectiveness would be better facilitated if the review only commenced once relevant threshold criteria were met. Such criteria would involve some type of LRET market failure which necessitated intervention. (AGL, sub.38, p.5)

Pre-specifying triggers for a review runs two key risks:

- first, market participants might try to 'game' the system, by modifying their behaviour to bring on a review; and
- second, it may be difficult to anticipate all of the changes in circumstances that might warrant a further review.

3.3.1. Conclusion

On balance, the Authority considers that full reviews every four years will provide an appropriate balance between policy flexibility and investor certainty.

Beyond the legislative review timetable, it should be noted that at any stage, reviews, including of the RET, can be requested by the Minister or the Australian Parliament. If warranted, the Authority can also conduct and commission its own independent research and analysis.

In regard to the review scope, the Authority considers that, to encourage investor confidence and predictability, at the time of the next review substantive changes to key components of the scheme such as the form and level of the 2020 target, should only be considered in the event of extenuating circumstances.

The Authority anticipates that its approach to future reviews will remain consistent with the approach established for this review. That is, the Authority will consider the scheme in the policy context at the time of the review and only make changes if a compelling case can be made.

RECOMMENDATION

R.1. The frequency of scheduled scheme reviews should be amended from every two years to every four years, so that the next scheduled review would be in 2016.

CHAPTER 4. THE LARGE-SCALE RENEWABLE ENERGY TARGET

This chapter considers the form and level of the Large-scale Renewable Energy Target (LRET). It examines the implications of maintaining the existing target compared to a higher or lower target.

4.1. Background

The Mandatory Renewable Energy Target (MRET) of 9 500 gigawatt hours (GWh) was intended to encourage an additional two per cent renewable energy generation beyond what would otherwise have been in place by 2010. By 2002, electricity demand was growing more rapidly than anticipated, prompting some to call for an increase in the gigawatt hour target to ensure the scheme delivered on the percentage target. This issue was considered in the 2003 Tambling Review of the MRET, which concluded:

> *The Review Panel [is] convinced … that any future target should continue to be expressed in terms of a fixed GWh level. By their nature, projections of electricity demand contain a degree of uncertainty. The changes in projected electricity demand that have occurred since the MRET was announced demonstrate that a percentage-based target would require the corresponding generation level to be regularly revised. This would adversely impact on market certainty. Risk is a key factor in investment decision making, so that any changes to MRET that would reduce market certainty would also reduce the prospect of attracting the required financial backing for projects. The Review Panel considers that a fixed target is more compatible with market certainty, with MRET's industry development objective, which defines a level of renewable energy generation rather than a percentage of a fluctuating electricity market over which the industry has no control. (MRET Review Panel, 2003, p.119-120)*

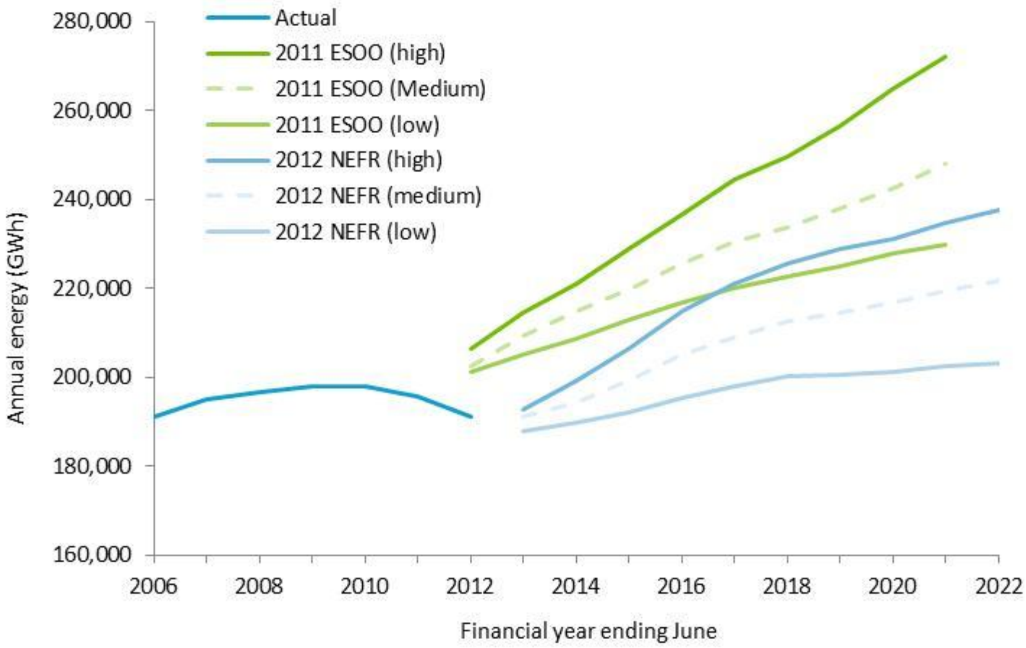
In 2009, legislation was passed to give effect to the Commonwealth Government's policy commitment that 'the equivalent of at least 20 per cent of Australia's electricity supply will come from renewable sources by 2020' (20 per cent by 2020 commitment) (Commonwealth Government 2009).

The 20 per cent by 2020 commitment was translated into a legislative target of 45 000 GWh of renewable generation in 2020 (through to 2030). In 2010, the Renewable Energy Target (RET) was split. The target was revised to 41 000 GWh in 2020 (through to 2030) for the LRET and the Small-scale Renewable Energy Scheme (SRES) was left uncapped, but notionally allocated at least 4 000 GWh.

The 45 000 GWh value was expected to deliver around 20 per cent renewable energy based on a 2007 forecast of electricity demand in 2020 and the inclusion of renewable generation already operating prior to the introduction of the MRET (see Box 3). At the time, it was estimated that the RET would ensure almost all of the growth in electricity demand would be met by renewable energy.

In June 2012, the Australian Energy Market Operator (AEMO) published its long-term electricity demand forecasts in the National Electricity Forecasting Report (NEFR), which represented a substantial downward revision to the level of electricity demand previously published in its 2011 Electricity Statement of Opportunities (ESOO) (see Figure 22).

Figure 22 Australian Energy Market Operator's long-term forecasts of electricity demand in the National Electricity Market



Source: Australian Energy Market Operator, 2012.

Several factors appear to be affecting current levels of electricity demand, including:

- lower industrial activity, particularly in manufacturing, than previously forecast;
- a user response to significant increases in retail electricity prices;
- the increase in penetration of household solar photovoltaic;
- the effects of energy efficiency programs and regulation; and
- the relatively mild summer weather over the past two years.

Some of these factors are permanent and structural, while others may be cyclical.

4.2. Form of the target

There has always been potential for conflict between policy statements about how much renewable energy the RET (and the MRET before it) is designed to achieve in terms of a percentage of total energy demand (20 per cent and two per cent respectively), versus the fixed gigawatt hour targets included in the legislation, which define actual liabilities.

Estimating the contribution of renewables in 2020 under the current LRET settings is sensitive to assumptions for key parameters (see Box 3).

Box 3 Estimating the contribution of renewable energy

Estimates of the proportion of electricity supplied by renewable generation in 2020 vary depending on the definitions used and the projections made of future electricity supply and renewable energy generation.

In projecting the proportion of renewable energy by 2020, today, there is a range of assumptions and forecasts that need to be employed. There are four distinct components that affect the proportion of renewable energy. Those components are:

- electricity demand;
- actual generation from renewable sources prior to the inception of the RET (and MRET before it);
- large-scale renewable generation; and
- small-scale renewable generation.

When the initial 20 per cent by 2020 target was translated to a fixed gigawatt hour amount in 2007, the following market expectations were relevant:

- Australia-wide electricity supply of around 300 000 GWh in 2020;
- pre-existing renewable generation of 15 000 GWh per year; and
- Renewable Energy Target of 45 000 GWh per year by 2020.

This translated to a total renewable energy contribution of 60 000 GWh per year, equivalent to 20 per cent of previously forecasted demand, by 2020.

The Authority has estimated the possible share of Australia's future electricity supply in 2020-21 using the following revised assumptions:

- as a measure of 'Australia's electricity supply', the Authority has used an estimate of Australia-wide native demand (a measure of electrical energy supplied by scheduled, semi-scheduled, and significant non-scheduled generation that includes electricity transmission losses but excludes non-grid generation) of around 258 500 GWh;
- pre-existing renewables of around 14 300 GWh per year reflecting a downward revision of their long term energy capability;
- renewable energy delivered by the LRET of around 43 000 GWh (due to financial year reporting, this figure is slightly higher than the 2020 calendar year target of 41 000 GWh. However, averaging the 2019-20 and 2020-21 financial years, total LRET generation is around 41 000 GWh in the calendar year 2020); and
- renewable energy delivered by the SRES of around 10 900 GWh (including approximately 3 000 GWh from solar water heaters).

This translates to a total renewable energy contribution (including deemed generation displacement by solar water heaters) of around 68 200 GWh, equivalent to around 26 per cent of forecast native demand, by 2020-21.

A key point is that several of the key inputs to any estimation of the future share of renewable energy – forecasts for electricity demand, pre-existing renewable generation and small-scale renewable generation – are subject to uncertainty and are liable to change over time.

Participants including Rio Tinto and EnergyAustralia (formerly TRUenergy) believe the policy intent of the RET was to deliver 20 per cent of electricity demand in 2020. For example, EnergyAustralia stated:

> *Retaining the current targets for the RET and allowing the SRES to continue uncapped is likely to result in an effective 26% RET by 2020, overshooting the original policy intent of 20% renewables. (TRUenergy, sub.102, p.3)*

Conversely, participants such as Meridian Energy Australia, Alstom Limited and Vestas believe the intent was the fixed gigawatt target. For example, Vestas states:

> *The choice of a headline percentage-based target is to a significant extent arbitrary, and the choice of a fixed gigawatt hour target to match the percentage goal is necessarily based on point estimates of future consumption. The fixed gigawatt hour target itself, however, then becomes a stable basis for investment decisions.*
> *(Vestas Australian Wind Technology Pty Ltd, sub.57, pp.6-7)*

The Authority considers that a fixed target is preferable to a floating target. The Authority concurs with the Tambling Review's reasoning and conclusion, that electricity demand projections are uncertain and trying to match gigawatt hour targets to a particular percentage of demand would require continuous change leading to significant uncertainty (see Section 4.1). In particular, the period over which the RET has operated in its various forms has shown the inaccuracy of initial estimates of relevant parameters and demonstrated that there will need to be constant readjustment of any floating target.
The Authority's view, therefore, is that the form of the LRET should continue to be expressed in terms of a fixed gigawatt hour level.

RECOMMENDATION

R.2. The form of the Large-scale Renewable Energy Target should continue to be expressed in legislation in terms of a fixed gigawatt hour level.

4.3. Implications for maintaining the existing 41 000 gigawatt hour target

Several submissions to the review commented on whether the existing LRET can be met and the implications for maintaining the existing target. These issues are considered in the following section.

4.3.1. Can the current target be met?

Industry participants have estimated that by 2020 between around 7 000 megawatts (MW) and 10 000 MW of new renewable energy is required to meet the existing LRET. Participants have expressed conflicting views about whether the existing target can be met.

Participants, including EnergyAustralia, the Energy Supply Association of Australia, Macquarie Generation and Origin Energy expressed a concern that the LRET will not be met, because insufficient renewable capacity can be built in time. Concerns centred around the industry's ability to build capacity at roughly double the rate of past Australian expansion, the ability to obtain planning approvals in time (especially given strong local opposition to wind farms in some areas), and the ability to negotiate connection agreements in time. For example, Macquarie Generation stated:

> *Achieving the 41 TWh target by 2020 would require a significant increase in the rate of windfarm commissioning over the next 8 years. This is likely to be difficult for a number of reasons:*

- *the projects with the best wind speeds and proximity to the grid will have already been commissioned;*
- *windfarm developers face significant planning and approval hurdles and there is growing opposition from some local community groups to new windfarm proposals; [and]*
- *this also requires a much faster rate of negotiation of network connection agreements and construction of transmission extension assets. (Macquarie Generation, sub.209, p.8)*

The potential effect of state planning regimes on the LRET was noted in the Australian Energy Market Commission's (AEMC 2011) review of the impact of the RET on energy markets. The modelling did not take into account the changes to the Victorian planning requirements, however, the AEMC concluded that so long as a carbon price was in place, the target was likely to be met by 2020.

> *Under both carbon emissions price scenarios, the LRET was found to just be met by 2020… It should be noted that the modelled result do not include the impact of recently announced changes to Victorian planning requirements for wind turbines… requirements may increase the resource costs of meeting the LRET as less economic sites may need to be used, and may reduce the level of future renewable generation in Victoria and affect the achievement of the LRET. (AEMC, 2011, p.6)*

In addition, large-scale renewable projects take a number of years to plan and build, and therefore the timing of investment decisions and project commissioning is critical to meeting the target. Samsung C&T Corporation stated:

> *Any further delays or deviations away from the already aggressive construction schedule needed to meet the current trajectory will almost certainly result in its [the target] not being met due to constraints in resources needed to deliver projects.*
> *(Samsung C&T Corporation, sub.11, p.3)*

A number of other participants considered that the target can be met, including RATCH-Australia Corporation (RAC), Wind Prospects, AGL Energy and the Clean Energy Council. For example, RAC has stated:

> *The electricity industry has been able to meet the requirements of the RET to date and RAC expects that the industry will be able to meet requirements to 2020.*
> *(RATCH-Australia Corporation, sub.134, p.2)*

The Clean Energy Council noted:

> *In terms of future investment, there is a significant pipeline and drivers for increased deployment that can all ensure the 20 per cent target is ultimately achieved.*
> *(Clean Energy Council, sub.12, p.9)*

AGL Energy stated:

> *To be clear, AGL believes that achievement of the RET is possible, provided sensible and economically efficient pricing decisions are made by jurisdictional pricing regulators.*
> *(AGL Energy Limited, sub.181, p.1)*

The need for significant additional transmission infrastructure to underpin the RET has been raised by some participants as both a potential cause for delays and a 'hidden cost' of the RET. For example, Alinta Energy noted:

As an aside, it has also been suggested that, regardless of the reduction in demand, the ability to build the amount of transmission investment required to connect 45,000 GWh of renewables by 2020 is not feasible. (Alinta Energy, sub.89, p.4)

Analysis by AEMO does not support the notion that major new upgrades of transmission capacity are required because of the RET. This finding is consistent with the analysis conducting by SKM MMA on behalf of the Authority. AEMO's 2012 National Transmission Networks and Distribution Planning report (2012, p.iii) noted that modelling for transmission investment found that:

There is generally sufficient capability in the main transmission network for new generation to connect at locations which allow for growth avoiding the need for significant new transmission investment.

Project pipeline

The Bureau of Resource and Energy Economics (BREE) publishes a list of major electricity generation projects in Australia, ranging from "committed" projects through to projects in the planning phase. Table 1 shows that over 6 000 MW of wind projects have received at least approval; around a further 10 800 MW are in the planning phase.

Table 1 Possible new wind energy projects in Australia

Development stage	Approximate capacity
Committed	550 MW
Under construction	700 MW
Government, planning and/or development approval received	5 100 MW
Planning (for example, feasibility studies and approvals) underway	10 800 MW

Source: Bureau of Resource and Energy Economics, 2012.

The BREE list of major generation projects also includes approximately 2 300 MW of proposed hydro, biomass, geothermal, ocean and solar projects in various stages of development.

The BREE project list is broadly similar to a number of other sources.

AEMO data shows around 13 400 MW of publically announced wind energy projects in the National Electricity Market, which does not include Western Australia and the Northern Territory. GE reiterated the availability of projects to meet the target:

GE believes the AEMO report identifies a significant range of possible projects well in excess of the 8GW to 10GW of wind anticipated to deliver the 2020 LRET of 41,000GWh. (GE, sub.203, p.4)

Further, WindLab Systems has provided its own estimate of the project pipeline for wind projects and stated:

… 'Approved' wind is not far off being able to supply the whole target and projects actively seeking approval (Permitting) well exceed the target. (WindLab Systems Pty Limited, sub.63, p.4)

Authority's view

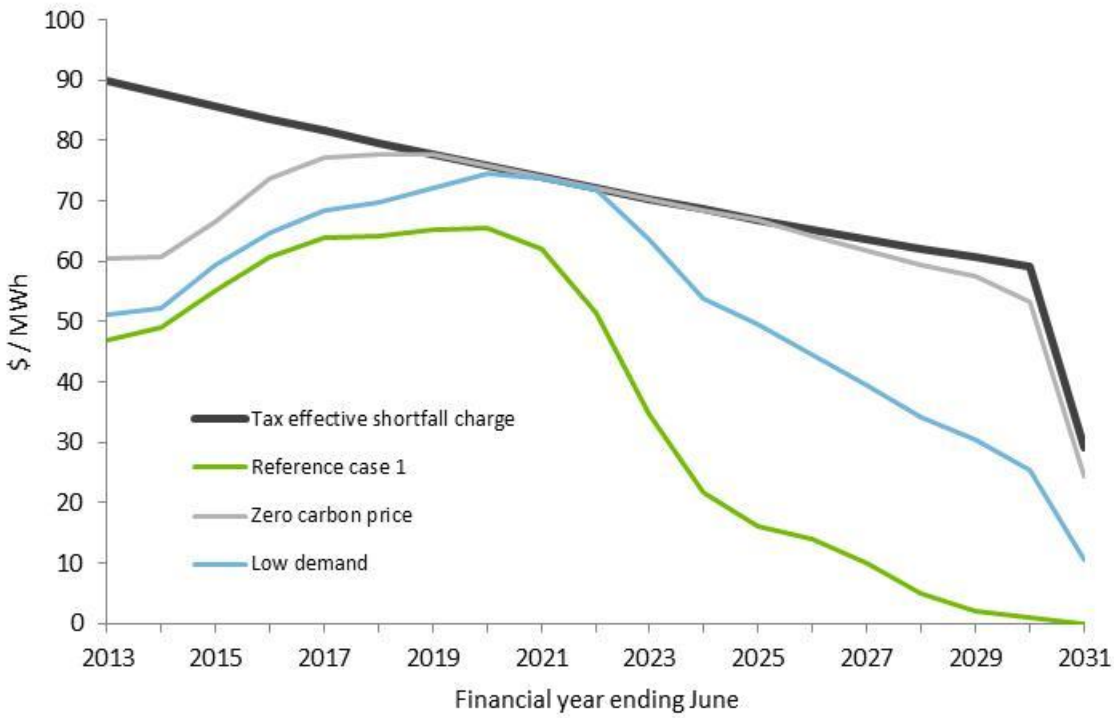
As discussed in Chapter 6, a situation in which the target cannot be met and liable parties pay the shortfall charge is neither a desirable nor sustainable outcome. However, the Authority does not consider there to be sufficient evidence that the target cannot be met to warrant changing the target on those grounds. The need for transmission network upgrades, an ability to negotiate new network connections in time, and the logistical challenges of industry expansion do not appear to be compelling impediments.

Regulatory impediments could potentially pose a harder constraint. However, a number of active wind farm developers have stated that even with the more stringent planning approval processes in some states now in place, more than enough projects would still go ahead to meet the target.

In modelling commissioned by the Authority, SKM MMA has taken the current planning arrangements into account, and estimates that the target can be met. This is consistent with the finding of AEMO's National Transmission Networks and Distribution Planning report (2012).

In the *reference case 1* scenario, modelled by SKM MMA with the current LRET, it is projected that the target could be met without breaching the shortfall charge, which effectively acts as a price cap for the scheme. A change in electricity demand and/or the carbon price will influence the ability to meet the current LRET (Figure 23).

Figure 23 Large-scale generation certificate prices and shortfall charge under alternative scenarios



Source: SKM MMA and Climate Change Authority, 2012.

In the *low demand* scenario the target is met, however the certificate price nears the tax-effective shortfall charge. The modelling indicates, however, that with a zero carbon price the shortfall charge is breached between 2019-20 and 2022-23.

Given the concerns expressed by a number of participants in relation to planning arrangements, the Authority considers there may be value in the Standing Council on Energy and Resources examining the implications of current planning regimes for national energy markets.

Finally, the presence of the Clean Energy Finance Corporation (CEFC) increases the likelihood that the existing target can be met. The CEFC is in a position to facilitate the flow of funds into the renewable energy industry, and encourage projects that otherwise may not have gone ahead.

In summary, the Authority does not consider that there are currently any policy or physical impediments to the existing LRET being met.

4.3.2. Authority modelling of the existing 41 000 gigawatt hour target

Electricity market modelling was undertaken to compare the existing 41 000 GWh target (*reference case 1* scenario) to a scenario with no RET from 1 January 2013 (*no RET* scenario). The *no RET* scenario provides a baseline from which to examine the effects of the existing target. In summary, the main effects of the existing RET (LRET and the SRES) over the period 2012-2013 to 2020-21, are estimated by the modelling to be:

- an additional 8 800 MW of new renewable energy capacity;
- a decrease in emissions in the stationary energy sector of around 100 million tonnes of carbon dioxide equivalent (Mt CO_2-e) or six per cent;
- additional resource costs incurred in the electricity sector of around $5 billion in net present value terms or 6.5 per cent of the total resource costs of $77.5 billion under *reference case 1* incurred in the generation sector (in terms of both capital and operating costs); and
- an increase in retail electricity prices of between one and four per cent, representing an increase of between $12 and $64 to a household's annual electricity bill.

Detailed context, key assumptions and results for these scenarios can be found in Appendix D and SKM MMA's modelling report, available on the Authority's website.

4.4. Reduce the target

Some participants have proposed changing the level of the target:

- reduce the target in line with lower electricity demand; or
- increase the target, mainly to cater for the effects of additional renewable energy projects that might be financed with the assistance of the CEFC.

Modelling undertaken for the Authority compared the existing LRET target (*reference case 1* scenario) with a scenario in which the target is decreased to 26 400 GWh (*updated 20% target* scenario). Box 4 summarises the key outcomes.

Box 4 Key outcomes for the modelled *updated 20% target* scenario

The estimated effects of maintaining the RET scheme (including the LRET and the SRES) as it currently stands (*reference case 1* scenario) compared to a scenario in which the LRET is decreased (*updated 20% target* scenario with a LRET of 26 400 GWh) over the period 2012-13 to 2020-21, are:

- around 4 500 MW of additional new renewable energy capacity;
- a decrease in emissions from the stationary energy sector of around 47 million tonnes (Mt CO_2-e) or around three per cent;
- additional resource costs of around $2.5 billion in net present value terms or three per cent of resource costs of $77.5 billion under *reference case 1* incurred in the electricity industry; and
- no material change in estimated average household bills over the period.

Detailed context, key assumptions and results for this scenario can be found in Appendix D and SKM MMA's modelling report, available on the Authority's website.

4.4.1. Assessment of the benefits of reducing the target

In general, those in favour of a reduction in the target argued that there has been a 'material change' in economic conditions, the electricity market and the climate change policy environment compared with the anticipated settings when the initial LRET was established. Several participants have argued that the current LRET target should be reduced to:

- ensure that the scheme does not deliver more than 20 per cent of Australia's electricity generation by 2020, given the lower electricity demand forecasts that have been previously assumed; and
- reduce the cost burden of the RET.

Box 5 summarises alternative options for reducing the existing target that have been put forward by review participants.

Reduced electricity demand

Participants including Visy and the National Generators Forum noted the lower electricity demand forecasts as a rationale for decreasing the target. For example, Visy noted:

> *It is imperative that the target should be relative to total electricity consumption, to properly reflect the electricity market's dynamics and to attenuate otherwise unmitigated price increases. (Visy, sub.224, p.1)*

The Business Council of Australia stated:

> *We believe that the current level of the target is materially out of line with the stated objective of the policy mechanism. What is required is a return to the 20 per cent target based on current AEMO demand forecasts not the forecasts that applied at the commencement of the RET. (Business Council of Australia, sub.130, p.6)*

There has also been concern that reduced demand will lead to renewable generation displacing existing generation. For example, the Australian Coal Association stated:

> *Part of the burden of this increased generation cost is borne by baseload generators given the crowding out effect that the RET is having on their ability to despatch electricity competitively into the grid. (Australian Coal Association, sub.178, p.4)*

Box 5 Options for reducing the LRET

Review participants have put forward four main options for reducing the existing target:

- A once-off adjustment to the target, supported by participants including Origin Energy (sub.69, p.7) and the Business Council of Australia (sub.130, p.7).
- Incremental changes such as EnergyAustralia's (sub.102, p.8) suggested approach of establishing three years of fixed targets followed by a range of possible targets dependent on future demand forecasts.
- Annual adjustments to the target, to meet 20 per cent, reflecting projections of electricity demand in that year, supported by participants such as Ergon Energy (sub.88, p.6).
- Maintaining the current targets but including baseline generation (pre-1997 renewable generation) that is currently excluded from the LRET, supported by participants such as Eraring Energy (sub.146, p.1).

A common issue for the options is the considerable uncertainty surrounding the future path of electricity demand. Of the options, a once-off reduction is likely to have the least-worst impact in respect of policy uncertainty associated with a target that changes with movements in demand. Nonetheless, even a once-off change increases the risk that further changes could be contemplated in the future.

Electricity price impacts

Another key reason put forward by participants, such as the Major Energy Users Inc. and Stanwell Corporation Limited, in support of a reduced target was that the RET imposes additional cost pressure, on electricity consumers. For example, Stanwell Corporation Limited stated:

> *The substantial increase in renewable energy generation required to achieve the current target will have a material impact on electricity prices for consumers, through increases in both generation and network costs. (Stanwell Corporation Limited, sub.139, p.4)*

Electricity prices are difficult to forecast, especially over long periods. Any estimate is dependent on key assumptions such as future carbon, fuel and technology prices. Generators' bidding behaviour will also affect prices, and bidding incentives can change over time as degrees of market power shift and portfolio compositions evolve. For these reasons, any modelled estimate of electricity prices, particularly for periods far into the future, should be treated with appropriate caution. The Authority's approach has been to be transparent in relation to the modelling it has commissioned, publishing the assumptions, consultant's report and detailed output data, to encourage public scrutiny and debate.

Modelling undertaken for the Authority suggests that over the period 2012-13 to 2030-31, there is no material difference in the average retail price per megawatt hour (MWh) under the *updated 20% target* scenario compared to the *reference case 1* scenario.

The modelling shows an interaction between the wholesale price of electricity and RET certificate costs. The RET causes additional, subsidised capacity, into a market with slow growth, which tends to suppress wholesale prices. The modelling estimates that the cost of certificates was largely offset by this reduction in wholesale prices.

The impact of low wholesale prices was raised in the Australian Energy Market Commission's submission:

> *Prices in the wholesale electricity spot market have been at historically low levels in recent years due to a relatively high level of generation, given recent falls in demand levels. Modelling undertaken for the AEMC suggested that the Large Scale Renewable Energy Target (LRET) distorts the balance of supply and demand in the wholesale electricty market. This occurs as the additional revenue renewable generators have access to through the sale of certificates serves to increase the level of renewable generation beyound the quantity that would have been otherwise developed. This leads to lower prices in the wholesale electricty market than there would have otherwise been which results in lower revenues and profitability for all generators. This may affect incentives to invest in new generation and impact the longer term reliability of the electricity supply. (Australian Energy Market Commission, sub.64, pp.1-2)*

Some participants have questioned the Authority's modelling results and raised concerns that if the forecast lower wholesale prices eventuated, and were sustained, they would result in existing generators (rather than consumers) bearing the majority of the cost burden of the RET through low wholesale prices, higher risk premiums on existing debt as it matures and reduced asset values. For example, Macquarie Generation noted:

> *… existing generators bear 98% of the burden of the additional $6 billion cost of building the additional 15 TWh and consumers bear just 2%... However, SKM MMA results are highly dependent on the modelling assumptions, particularly in relation to how generators react. If generators retire/mothball units or bid more aggressively than the modelling assumes then the merit order effect will be less, wholesale prices will be higher and consumers will bear a greater share of the RET costs. (Macquarie Generation, sub.209, p.3)*

The Authority agrees that wholesale price outcomes are uncertain, and that changes in bidding behaviour or earlier retirements of existing plant may result in higher wholesale prices than those estimated.

The Authority therefore considers that price outcomes can best be estimated in terms of a range: at one end, prices could include a significant suppression of wholesale prices (as estimated), and at the other end, it could be assumed that retail prices would rise by the full certificate costs, with no offsetting suppression of wholesale prices. For any given electricity demand and carbon price scenario considered, the Authority considers the latter methodology to deliver an upper bound on likely price impacts, because:

- it seems unlikely that there could be no impact at all, in any period, on wholesale prices as a result of introducing new, subsidised, low marginal cost renewable generation into the market; and
- if wholesale prices were indeed higher for sustained periods, LGC prices would be expected to be lower than those included in these estimates.

The Authority investigated the impact on retail prices with and without the impact of lower wholesale prices. Table 2 shows the effect of maintaining the current target (*reference case 1* scenario) compared to moving to an *updated 20% target* scenario, is estimated to be between almost $0 and $2 per (MWh on average for the period 2012-13 to 2020-21 and between almost $0 and $4 per MWh on average in 2012-13 and 2030-31.

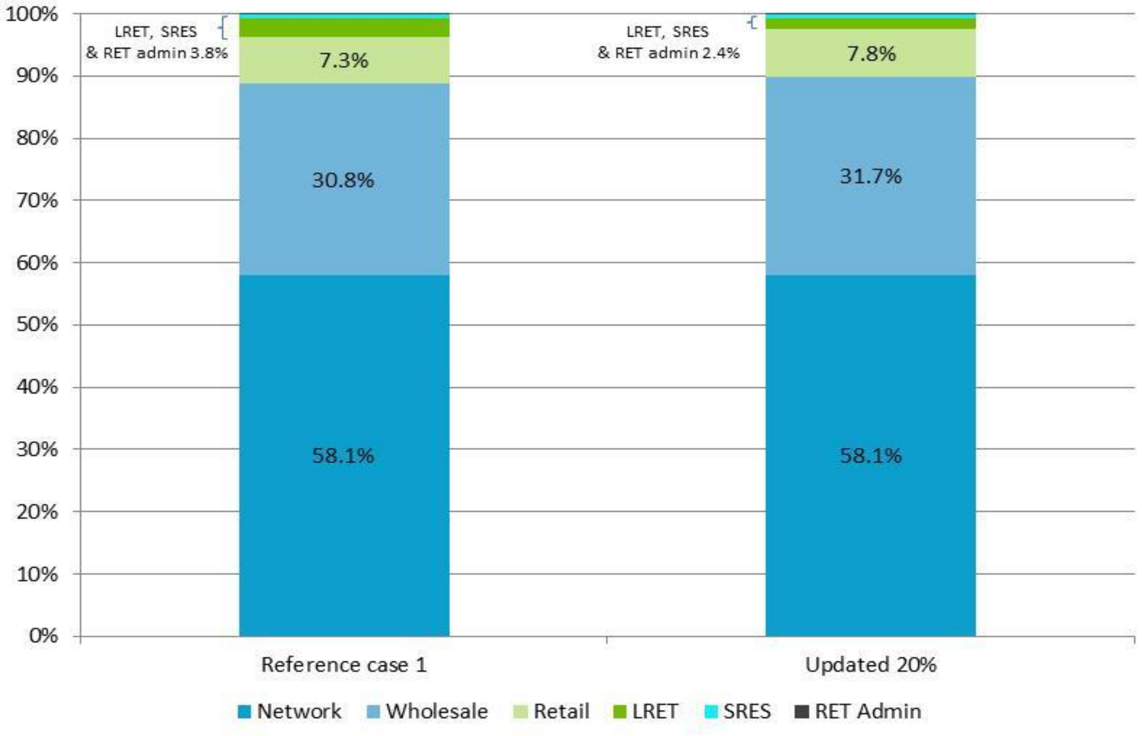
Table 2 The possible range of retail prices (dependent on the change in wholesale price)

	***reference case 1* scenario**		***updated 20% target* scenario**	
	Retail price with wholesale price suppression	Retail price without wholesale price suppression	Retail price with wholesale price suppression	Retail price without wholesale price suppression
2012-13 to 2020-21 (average)	$228 per MWh	$235 per MWh	$228 per MWh	$233 per MWh
2012-13 to 2030-31 (average)	$265 per MWh	$273 per MWh	$265 per MWh	$269 per MWh

Source: SKM MMA and Climate Change Authority, 2012.
Note: For retail price without wholesale price suppression, the RET per MWh certificate cost was added to the retail price in the *no RET* scenario.

As a percentage of average retail electricity prices, as modelled for the Authority, moving to a lower target is estimated to reduce the contribution of the RET (including LRET and SRES certificates and administration costs) from around 3.8 per cent to around 2.4 per cent over the period (see Figure 24).

Figure 24 Estimated components of the average retail price over the period 2012-13 to 2030-31



Source: SKM MMA and Climate Change Authority, 2012.

By applying retail price outcomes to average annual household and small to medium enterprises (assuming seven MWh of electricity consumption per year and 140 MWh per year, respectively), the modelling forecasts that moving to a lower target will not have a material effect on electricity bills. In the case where no wholesale price suppression is assumed, the difference is more pronounced but is projected to remain relatively small.

Over the period 2012-13 to 2030-31 the average annual household bill is estimated to be $0.40 higher with wholesale price suppression in the *updated 20%* scenario compared to the *reference case 1* scenario or $27 lower without wholesale price suppression. This represents an increase in the bill of around 0.02 per cent and a decrease of around 1.4 per cent respectively.

In relation to small to medium enterprises, over the period 2012-13 to 2030-31, the average annual bill is estimated to be around $13 lower with wholesale price suppression in the *updated 20%* scenario compared to the *reference case 1* scenario and $540 lower without wholesale price suppression. This represents a decrease in the average annual bill of up to a 1.7 per cent.

Ultimately, the actual contribution of the RET to individual household and business electricity bills will be affected by a range of factors including the actual mix and cost of renewable energy built, wholesale prices, individual consumer usage patterns and the level of retail competition/price regulation.

Some participants proposed that the Authority's modelling did not appropriately account for additional charges such as financial contracts to reflect the intermittency of wind, additional open cycle gas turbine requirements and transmission costs. For example, Origin Energy noted:

> *The wholesale cost of energy that is incorporated into retail prices reflects retailer's cost of hedging rather than the spot price. Due to their non-firm nature, wind farms are unable to write swap contracts against their capacity, and hence retailers are still required to source contracts written against firm thermal power stations…Additionally the cost to retailers of firming up intermittent wind generation in their hedge book do not appear to be taken into account. (Origin Energy, sub.213, p.3)*

Energy Users Association of Australia noted:

> *For completeness we would like to record that we consider many aspects of this modelling highly implausible. This includes:*
>
> - *that the RET will not affect the need for additional fast response open cycle gas generation. This seems completely unrealistic considering the introduction of more than 18,000 MW of additional variable renewable generation;*
> - *that significant transmission augmentation will not be required. Again this seems remarkable considering the geographically remote location of most renewable capacity. (EUAA, sub.226, p.5)*

In addition, participants such as EnergyAustralia raised market design concerns:

> *An obvious tension arises between the two market designs as the RET's proportion grows, because reliable generation capacity is not explicitly rewarded in an energy-only market and is heavily penalised by a mandated market for renewables. (EnergyAustralia, sub.196, p.3)*

With the exception of energy market design, which is outside the scope of the review, SKM MMA's modelling report responds to these issues.

- Hedging costs: The retail margin estimated by SKM MMA includes the cost of purchasing electricity hedge contracts and this cost is assumed to be the same across the scenarios modelled. The potential cost variation between scenarios, however, has not been explicitly modelled.
- Transmission costs: The modelling accounts for the cost of network connections and augmentations for electricity generators as part of the overall project cost. Consistent with other studies, including AEMO's National Transmission Networks and Distribution Planning (2012), it is assumed that the South Australia-Victoria (Heywood) transmission interconnector will be upgraded to a capacity of approximately 650 MW. Other than this upgrade, which is assumed in all scenarios

(including the *no RET* scenario), no other major inter-regional transmission augmentations are required.

- Reliability: SKM MMA analysed whether there were any reliability or network issues related to the degree of renewable development and the results indicated that the available renewable energy could be dispatched for the assessed scenarios. Furthermore, unserved energy did not exceed the 0.002 per cent reliability criteria in any cases.

Neither SKM MMA nor AEMO's National Transmission Networks and Distribution Planning report (2012) found that large amounts of new open-cycle gas turbine capacity was required due to the RET.

Costs to society

The Authority's modelling explored the RET's costs to society by examining the impacts on the cost of resources (capital, fuel and labour) deployed in electricity generation. Resource costs reflect the new renewable and gas-fired capacity installed over the modelling period to meet the LRET obligations and the thermal generation required. Some participants have focused on certificate costs as a measure of the overall cost of the RET. However, certificate costs do not represent the costs to society, rather they represent the additional revenue required to make renewable investments economically viable.

The resource cost savings from an *updated 20% target* scenario are estimated to be:

- around $2.5 billion in net present value terms over the period 2012-13 to 2020-21; and
- around $4.5 billion in net present value terms over the period 2012-13 to 2030-31.

4.4.2. Assessment of the costs of reducing the target

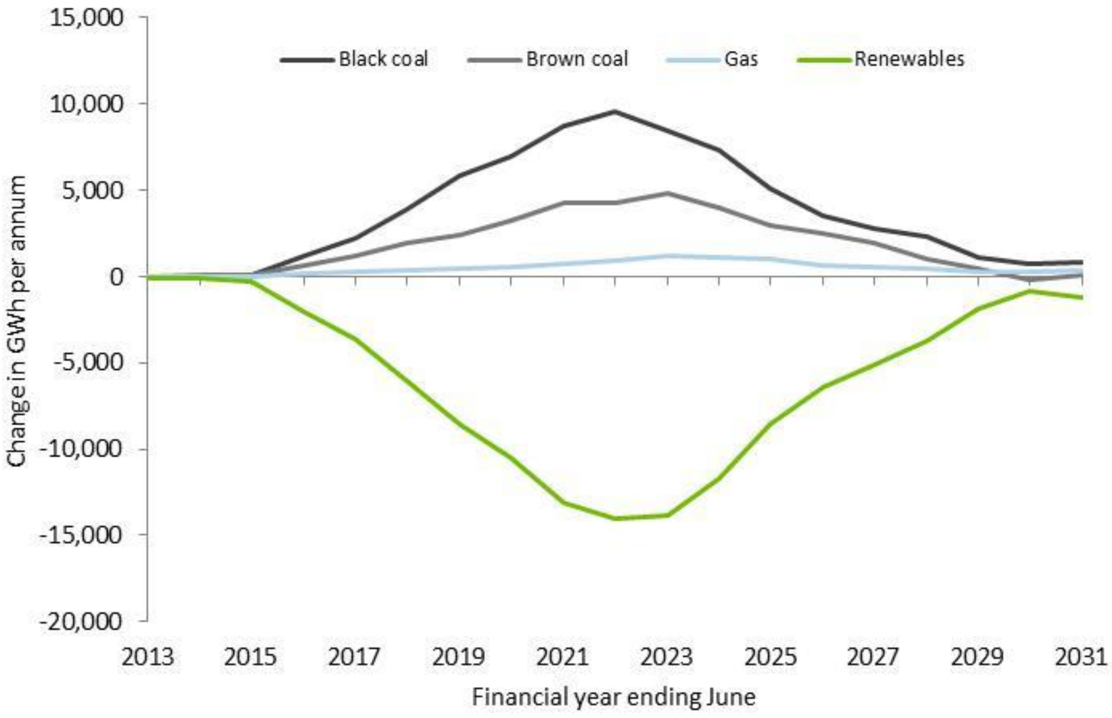
The costs associated with reducing the target relate to higher greenhouse gas emissions, reduced investor confidence, increased uncertainty over climate change policy, and additional health and environmental costs.

Additional renewable generation and emission abatement in the stationary energy sector

The objects of the *Renewable Energy (Electricity) Act 2000* (Cth) include encouraging additional renewable generation and reducing greenhouse gas emissions in the stationary energy sector.

Under an *updated 20% target* scenario, it is estimated there would be 111 422 GWh less renewable generation over the period from 2012-13 to 2030-31 (Figure 25).

Figure 25 Change in generation production mix – *updated 20% target* compared with *reference case 1* (GWh)



Source: SKM MMA and Climate Change Authority, 2012.
Note: A positive number indicates the value is higher in the *updated 20% target* scenario than in the *reference case 1* scenario.

The difference in renewable capacity is pronounced in 2021-22 when the targets in each scenario are most different (around 14 000 GWh less than under the *reference case 1* scenario). Moreover, by reducing the target to the *updated 20% target* scenario, the modelling estimates that this will result in a total of 119 Mt of additional emissions created in the electricity sector between 2012-13 and 2030-31, or an additional 47 Mt in the period to 2020-21. Compared to *reference case 1* this equates to an increase of around 3.3 per cent in emissions over the period 2012-13 to 2030-31 or 2.8 per cent in the period to 2020-21. This is due to the higher levels of fossil-fuel generation in the *updated 20% target* scenario.

Based on the modelled outcomes the additional abatement under the *reference case 1* scenario, compared to the *updated 20% target* scenario, is forecast to result in an average cost of abatement of $38 per tonne of CO_2-e over the period to 2030-31 and $53 per tonne of CO_2-e to 2020-21 (detail of the cost of abatement methodology can be found in Appendix D).

Investor confidence

If the Commonwealth Government were to make a one-off change to the target in the face of changed electricity demand, it would be difficult for the Government to argue convincingly that no further changes should be contemplated in the future. This was acknowledged by participants such as the Ai Group:

> *On the other hand, lowering the existing targets would raise serious questions. Would it be a one-off adjustment, or part of an ongoing process? How could confidence be established that an adjustment was for once and all, and what would happen if electricity demand projections declined further – or rebounded?*

Certainly, ongoing adjustments to the 2020 targets would mean intense uncertainty. The nature of investment decisions in long-lived, capital intensive assets means that such uncertainty would be severe for new investment, likely raising financing costs or leading to more frequent imposition of the shortfall charge. It would also mean heightened risks and lower returns for businesses that have invested on the basis of existing laws. (Ai Group, sub.46, p.8)

If there is a risk that future annual gigawatt hour targets could be adjusted in response to changes such as movements in energy demand, investors would likely to be reluctant to invest in plants that could potentially be stranded.

Assuming a decrease in demand, as renewable power stations are built, risks would increase with each subsequent investment that there will be a future reduction in the LRET and the market will be over-subscribed. Similarly, retailers would be unlikely to lock in future power purchase agreements that included the purchase of renewable certificates if there was a risk that those future certificates would not be required – not only by that liable party, but the market as a whole.

Along with the impact on commitment to future investments, a policy change would affect investments in the electricity market that have been made in the context of the current RET policy.

A number of participants including the Climate Markets and Investment Association and Pacific Hydro have argued against any change to the level of the LRET on the basis that it could increase the perception of future investment risk making renewable energy projects less attractive to investors. Others, such as the Energy Supply Association of Australia, argued for a lower target but acknowledged that reduced investor confidence could increase risk premiums:

The ESAA acknowledges that policy uncertainty can increase risk premiums, and that this increase can lead to significantly increased costs in such a capital-intensive industry. Whether this will outweigh the benefits from a lower target is unclear, as reflected in the differences in views amongst our members. (Energy Supply Association of Australia, sub.199, p.2)

Participants such as EnergyAustralia and Origin Energy have criticised the qualitative nature of the Authority's assessment of uncertainty. Concerns have also been raised that, given that reduced energy demand is depressing wholesale prices, increased certainty for investors in renewable generation comes at the cost of greater uncertainty for existing generators.

There is no easy or definitive methodology which can be relied upon to estimate the uncertainty premium related to the LRET in current circumstances. Nonetheless, while not comparable with the Authority's estimate of the impact on resource cost, participants such as AGL Energy and the Climate Institute have sought to quantify elements of policy uncertainty. AGL Energy conducted a survey to quantify the potential effect of policy uncertainty on the financing of power generation projects and noted 'these costs would likely manifest themselves as higher cost to consumers – up to $119 million (net present value) in the event of a significant amendment to the RET (for example, a reduction in the target)' (AGL Energy, sub.38, p.2). The Climate Institute noted that:

...the reduced costs of policy uncertainty noted above, [are] worth $266 million in 2020. (The Climate Institute, sub.86, p.13)

Participants including RAC and the Australian Sugar Milling Council express concern that investment uncertainty, along with other factors such as the limited liquidity in financial markets, is limiting the ability of planned investments. For example, RAC's submission stated:

Uncertainty about the future level of the RET is leading to caution in investment in renewables. Developers of renewable projects currently face difficulty in achieving financing for projects due to this uncertainty, as offtakers (primarily the electricity retailers) seek to pass on RET review risks to the project owners. In addition, offtakers are reticent to sign offtake agreements due to this uncertainty. (RATCH-Australia Corporation, sub.134, p.3)

Some participants such as Alinta Energy have argued that there will always be uncertainty related to the LRET, stemming from a history of policy change and ongoing scheme reviews, no matter the outcome of the review:

Alinta Energy does not agree that reaffirming Government support for the existing RET will deal with the current uncertainty and supports the targets revision to a real 20 per cent of generation. (Alinta Energy, sub.183, p.2)

Others have stated that the principal threat to meeting the target is continuing uncertainty. For example, in the context of current government energy and climate change policy, the Grattan Institute noted:

The process of RET reviews and the approach of the 2020 target date have contributed to uncertainty and therefore to the question of whether the target can be delivered. If such uncertainty was removed and the Government clearly re-committed to the target then there is no fundamental reason why the target should not be achieved.
(Grattan Institute, sub.165, p.2)

In addition to future investment, the value of investment made in the context of established policy settings should be considered. A number of participants noted the value of investment to date. Even participants that supported reducing the target such as Alinta Energy and International Power GDF-Suez Australia have acknowledged the need to account for investments that have already been made, although do not see this as a barrier to change. For example, International Power GDF-Suez Australia stated:

Over $6 billion has been invested to date in renewable generation, and in making those commitments, investors (both Australian and international) have relied on the Renewable Energy Target (RET) legislation remaining in effect. (International Power GDF-Suez Australia, sub.83, p.2)

Given the implications for investor confidence, participants including the Investor Group on Climate Change and Professor Garnaut conclude that the target should remain unchanged. For example, Professor Garnaut stated:

In [the current] set of circumstances, for reasons of business certainty, it would be wise to retain the Renewable Energy Target with the legislated parameters.
(Professor Garnaut, sub.167, p.2)

In addition, some participants have expressed concern that changes to the LRET could reduce investor confidence in climate change policies more broadly. The Investor Group on Climate Change stated:

Investors, particularly in infrastructure assets, seek policy settings that are long term, low risk, have low volatility and evolve predictably. Changes to the design or operation of the RET at this time will weaken the confidence of investors, not only about the future of the RET, but the stability of climate policy in Australia. This is likely to undermine investment plans, current and future, in renewable energy in Australia and would also likely have a negative impact on the

> *returns from existing energy infrastructure investments. (Investor Group on Climate Change, sub.70, p.4)*

As discussed in Chapter 3, replacing fossil-fuel generation with renewable generation can lead to other benefits in terms of public health and the environment (although the Authority has not attempted to quantify these benefits).

4.5. Increase the target

Participants, largely individual respondents, non-governmental organisations and some renewable energy proponents have expressed the view that the RET should be increased to deploy more renewables into Australia's electricity mix.

Proposals for an increased RET target – of up to 100 per cent renewables – have been put forward by participants including Beyond Zero Emissions, the Australian Youth Climate Coalition, Hepburn Wind and Doctors for the Environment Australia Inc. Arguments for increasing the target included further reducing greenhouse gas emissions, promoting energy diversity, health and environmental benefits and ensuring sustained growth of the renewable energy industry.

The *People's RET Review* survey undertaken by 100% Renewables and the Australian Conservation Foundation (2012) found that:

> *93 per cent of respondents want a higher Renewable Energy Target … [and] 98 per cent want to see our renewable energy industry continue to grow with a 2030 target.*

A number of submissions proposing an increase to the target have cited the additional investment in renewable energy that would be created by the activities of the CEFC as their rationale. This rationale is considered in more detail below.

4.5.1. Increasing the target for the Clean Energy Finance Corporation

Participants including GetUp, Australian Conservation Foundation, WWF and the Conservation Council of South Australia have argued that the LRET target should be increased to account for the additional LGCs that could be generated by projects under the CEFC. For example, GetUp put forward the view that:

> *… if the CEFC's projects are viewed as part of the RET there is a risk that the CEFC and RET will work in concert to actually limit investment and stall the growth of renewable energy in Australia. (GetUp, sub.168, p.3)*

Concern was also expressed by participants such as RAC and LMS Energy about the uncertainty that may be imposed on the RET market should the target fail to be increased to account for CEFC projects. For example, LMS Energy stated:

> *If the [CEFC] does finance projects at significantly lower commercial rates, any LGCs created from these projects should be additional to the 41,000 GWh target, otherwise the CEFC financed projects could crowd out privately funded renewable energy projects. (LMS Energy Pty Ltd, sub.79, p.7)*

Some participants, however, held a contrary view. For example, Alstom Limited stated:

> *CEFC financing simply displaces commercial financing, and there is no reason why it should be treated differently in terms of the target. (Alstom Limited, sub.10, p.3)*

Infigen Energy also stated:

> *The CEFC does not begin operations until July, 2013 – just a few months before the next Federal election. As with the Carbon Price, there is some political uncertainty with regards to the future of the CEFC. Should the CEFC continue to operate well into this decade, as Infigen Energy agrees it should, then it is possible that this topic may be worth further consideration in future RET reviews. (Infigen Energy, sub.111, p.6)*

4.5.2. Assessment of the costs and benefits of increasing the target

In examining how the LRET should account for CEFC activity, the Authority has considered:

- the differing roles of the RET and the CEFC; and
- the practical challenges in accounting for projects with a yet to be defined scope.

As discussed in Chapter 3, the Commonwealth Government has formed the CEFC to help bridge the gap between earlier stage innovation and deployment. This role could ultimately affect the mix of technologies that are deployed to meet the RET targets.

The CEFC Expert Review Report commented on the CEFC interaction with the RET and a carbon price (Commonwealth Government, Department of Treasury, 2012, p.ix). The report explained that:

> *The CEFC is part of a suite of Commonwealth Government initiatives designed to transform the Australian economy for a cleaner energy future. The RET and carbon price will be the primary drivers in this. (Commonwealth Government, Department of Treasury, 2012, p.9)*

The intent that the CEFC and the RET should work alongside each other is reiterated by the Commonwealth Government Department of the Treasury in their evidence to the House Economics Committee:

> *The purpose [of the CEFC] is to overcome the financial barriers. The renewable energy target affects the pricing of renewable energy and what can be achieved, but the individual projects themselves may still have barriers which inhibit investment. The purpose of the CEFC is to address those barriers and not the target itself. (Commonwealth, House of Representatives, 2012, p.4)*

Moreover, there are distinct practical challenges in changing the target to account for CEFC investments. In particular, there are significant uncertainties about:

- the level of renewable generation that the CEFC will support given its goal to invest 50 per cent or more of available funds in renewable energy;
- the types of technologies it would support given the definition of renewables includes hybrid technologies and technologies (including enabling technologies) that are related to renewable energy technologies; and
- when those investments will deliver electricity to the market.

The CEFC has not yet commenced operations (it starts in July 2013), and its investment mandate has not been finalised. The uncertainty about exactly what the CEFC is likely to fund could persist for some time.

Nonetheless, based on assumptions of future investments WWF and the Australian Solar Council (2012) have undertaken modelling of the CEFC in addition to the RET. In relation to this modelling the Australian Conservation Foundation stated:

> *Recent modelling undertaken by WWF and the Australian Solar Council demonstrates that the CEFC has the potential to unlock up to 11,000MW of large-scale solar energy by 2030, creating approximately $54 billion in investments and a total of 28,000 jobs, while having no impact on retail energy prices …*
>
> *However if the CEFC is not additional to the 20% target, by 2030 Australia will have missed out on 7,800 GWh of renewable energy generation (the equivalent of 1300 wind turbines), $8 billion in private investment and 2000 jobs. (Australian Conservation Foundation, sub.179, p.1)*

However, a number of participants such as the Clean Energy Council shared the view that until the CEFC's investment mandate is clear, an increase to the LRET should not be recommended.

> *The CEFC and future reviews of the RET may consider this matter once the CEFC is fully operational and beginning to make investment decisions. This impact and risk may also be addressed by considering increases in the RET target beyond 2020. Again, this should be done at a later stage. (Clean Energy Council, sub.12, p.13)*

4.6. Conclusion

Almost all submissions commented on the level and form of the LRET target. Submissions regarding the target fell broadly into three camps:

- maintain the target to provide the regulatory certainty necessary to drive investment in renewable energy generation;
- reduce the target to reflect lower electricity demand forecasts, thereby saving costs; and
- increase the target to drive additional renewable energy deployment and account for the additional large-scale generation certificates that may be created by CEFC projects.

The Authority considered all submissions, commissioned electricity market modelling and has undertaken internal analysis to examine the costs and benefits of making potential changes to the current target.

On balance, the Authority considers that the existing target of 41 000 GWh should not be reduced. In arriving at this judgement, the Authority has given particular weight to stability, predictability and investor confidence for the LRET and climate policy more broadly. Since 2009, a number of significant changes were made to the RET, which have reduced investor confidence. While challenging to quantify, the Authority considers that a material adjustment to the target would exacerbate this situation and affect the likelihood and cost of meeting any given target. Reduced investor confidence is likely to affect existing projects, hamper access to finance and increase the risk premiums associated with finance and generate greater uncertainty about Australian climate change policy more broadly.

The Authority does not consider the target should be increased at this stage, again in order to promote stability and predictability, and recognising the unknown profile of renewable energy projects to be funded by the CEFC. Moreover, the presence of the CEFC provides greater confidence that the existing target can be met – an issue on which several participants have expressed doubts.

The Authority's view therefore is that the target should be maintained at its current level and in its current form. Nevertheless, the rationales for adjusting the target should be considered in the 2016 review, as recommended in Chapter 3, after:

- the existing RET policy has had sufficient time in which to operate as two separate schemes;

- the carbon price trajectory is clearer; and
- the CEFC has been operational for a number of years with an investment mandate that is clear to industry participants.

RECOMMENDATION

R.3. The existing Large-scale Renewable Energy Target of 41 000 GWh and interim targets should be maintained in their current form.

R.4. The Renewable Energy Target review in 2016 is an appropriate time to consider adjusting the targets beyond 2020 in light of the policy and economic conditions prevailing at that time.

CHAPTER 5. THE SMALL-SCALE RENEWABLE ENERGY SCHEME

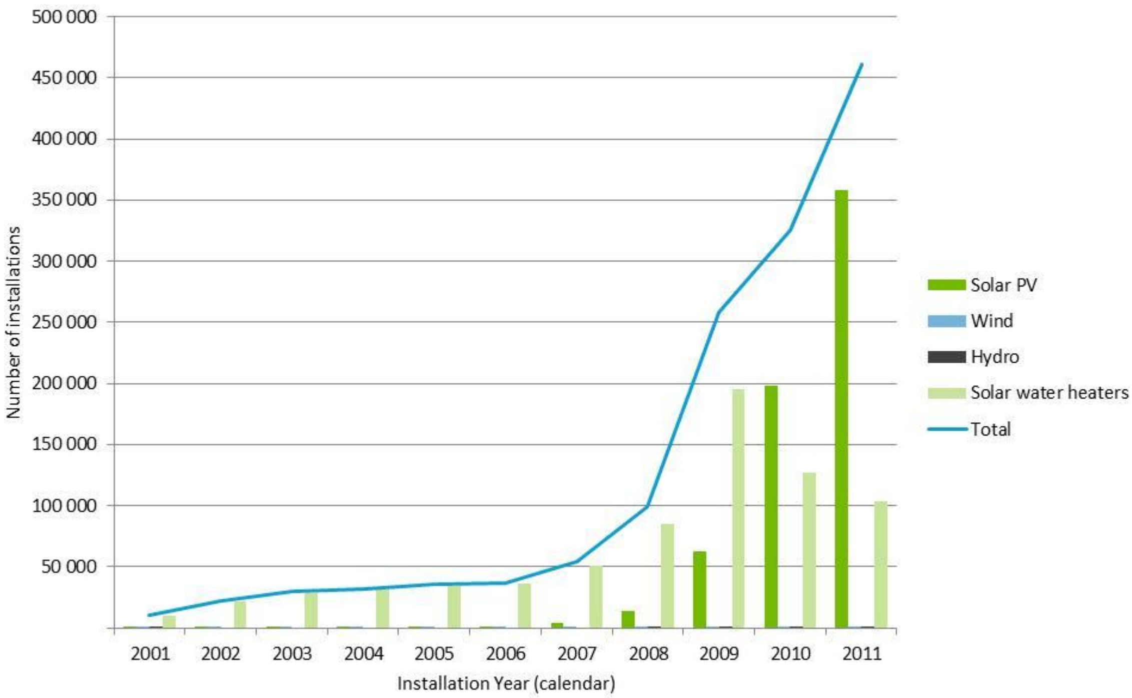
This chapter considers the architecture of the Small-scale Renewable Energy Scheme (SRES) and in particular its uncapped nature and lack of a legislated end-date. It considers the costs and benefits of different options for addressing these issues, including combining it with the Large-scale Renewable Energy Target (LRET), establishing a scheme end-date and capping the SRES. Finally, it considers potential enhancements to the clearing house and the utility of data currently collected by the Regulator.

5.1. History of the Small-scale Renewable Energy Scheme

Small-scale systems, in the form of solar water heaters and small generation units (small-scale solar photovoltaic (PV), wind and hydro), have been included in the Renewable Energy Target (RET) since its inception in 2001. Historically, the uptake of these systems was relatively low (see Figure 26). This changed in 2009 when the Commonwealth Government introduced Solar Credits to replace the Solar Homes and Communities Plan. Solar Credits was intended to provide an upfront capital cost subsidy worth around $7 500 by applying a multiplier – initially set at five – to certificates generated from small generation units (Swan et al, 2008). At the same time, system costs began falling rapidly, the value of the Australian dollar increased, and states and territories put in place generous feed-in tariffs (see Box 6). These factors contributed to a large increase in the installation of small generation units and, consequently, renewable energy certificates (exacerbated by the Solar Credits multiplier).

The rapid increase of certificates caused certificate prices to fall dramatically, creating uncertainty for both the large-scale and small-scale renewable energy sectors. The certificate price was not sufficient to support large-scale energy projects and investment stalled. Similarly, businesses selling small-scale systems were unable to provide accurate information to customers regarding the price they were likely to receive for certificates. As explained in Chapter 1, the Commonwealth Government responded by legislating to separate the RET into two schemes: the LRET – for large-scale projects – and the SRES, to assist households and businesses with the upfront costs of small-scale systems.

Figure 26 Number of installations of small-scale systems



Source: Clean Energy Regulator, 2012.
Notes: Installation numbers in 2011 are likely to be higher as owners/agents have one year to register the instalment of small-scale systems. Installations of small-scale wind and hydro systems are very low and are not visible – hydro ranges from zero to five installations per year from 2001-2011 and wind ranges from one to 136 installations per year over the same period.

Box 6 State and territory feed-in tariffs

Until recently, most feed-in tariffs offered by state and territory governments have been considerably above the wholesale price of electricity. The Productivity Commission's 2011 review *Carbon Emissions Policies in Key Economies* found that 'subsidy rates for solar PV often have been set at excessive levels, essentially providing windfall benefits to households that install solar PV.' (p.80). The NSW Independent Pricing and Regulatory Tribunal's (IPART) 2012 report on solar feed-in tariffs stated 'the generous subsidies offered by governments contributed to a much higher than anticipated uptake of PV in NSW, and led to higher than anticipated costs' (p.8).

Most states and territories have now revised their feed-in tariffs for new applicants to a level reflecting expected wholesale electricity prices. The Victorian Competition and Efficiency Commission's (VCEC) 2012 inquiry into distributed generation noted that 'advice to the Commission suggests the efficient and fair market price for 2013 to be, at a minimum, in the range of 6 to 8 cents per kilowatt hour (kWh) (compared with 25 cents currently for the Transitional Feed-in Tariff). This minimum range is consistent with rates announced in New South Wales, Queensland, South Australia and Western Australia over the past year.' (p.xxi)

5.2. Small-scale Renewable Energy Scheme design

There are a number of issues with the current design of the SRES:

- its uncapped nature means that the number of installations – and therefore total scheme costs – can be unpredictable and difficult to control;
- the subsidy provided to small-scale systems does not automatically reduce as technology costs fall and wholesale electricity prices rise (unlike in the LRET, where certificate prices would be expected to fall in such circumstances);
- there is no legislated end-date for the scheme; and
- the 15 year deeming periods are unlikely to be justifiable for larger solar PV systems that are currently below the 'small-scale' threshold (100 kilowatts (kW)).

To address these issues, the Authority has considered a number of potential changes to the SRES, including:

- recombining the SRES and the LRET into one scheme;
- lowering the solar PV threshold;
- capping the scheme by setting a gigawatt hour target, capping the small-scale technology percentage (STP), discounting the number of certificates that can be created, or lowering the existing price cap; and
- setting an explicit end-date for the SRES (in line with the LRET).

Some of these options address several of the issues raised with the scheme's design, others are focused on a particular aspect. The costs and benefits of each are assessed in turn.

5.2.1. Recombining the two schemes

Recombining the SRES with the LRET would address several of the issues raised with the SRES design: it would cap the scheme so that increased installations are matched with a price signal, and establish an end-date. Many of the distorting factors that led to separation of the RET into two schemes are no longer in play. The reduction of the Solar Credits multiplier has been brought forward and will end on 31 December 2012 (see Table 3) and state and territory feed-in tariffs are now generally comparable to the wholesale electricity price. In light of this, there could be a case for recombining the schemes.

Table 3 Solar credits multiplier

Time frame	Multiplier	Notes
9 June 2009 – 30 June 2010	5x	
1 July 2010 – 30 June 2011	5x	
1 July 2011 – 30 June 2012	3x	The Commonwealth Government reduced the multiplier from four to three times from 1 July 2011 to 30 June 2012 (Combet, Dreyfus 2011)
1 July 2012 – 31 December 2012	2x	
1 January 2013 onwards	1x (no multiplier)	The Commonwealth Government announced on 16 November 2012 that the Solar Credits multiplier would be phased out on 1 January 2013, six months earlier than planned (Combet 2012)

Source: *Renewable Energy (Electricity) Regulations 2001* (Cth) (REE Regulations 2001).

Cost and administrative requirements

Operating two separate schemes is likely to impose a greater cost on society than a single scheme. It effectively creates separate incentives – or 'bands' – for large-scale and small-scale renewable energy generation (see Chapter 8). This potentially increases the RET's overall costs as more expensive technologies may be deployed than if large and small-scale generation competed to meet the same target. Furthermore, it imposes greater administrative requirements, and therefore costs, for the renewable energy industry, liable entities, and the Clean Energy Regulator.

Most stakeholders that supported merging the schemes did so on the grounds that it was likely to lower costs. For example, Australian Paper submitted:

> *We would recommend … a wholesale review of the SRES and RET schemes as this aspect of the [RET] has created significant problems and expense for business. The uncapped nature of the [SRES], along with an inappropriate [feed-in tariffs] and deemed multiples resulted in unforeseen and uncontrolled cost imposts. (Australian Paper, sub.53, p.4)*

Ergon Energy also noted the administrative burden of complying with two schemes:

> *The separate scheme has posed an additional administrative burden on liable entities. Ergon Energy has been required to establish and maintain separate models to administer, track and settle both large and small certificates in two separate markets. (Ergon Energy, sub.88, p.8)*

The Authority's modelling estimates that the resource cost of maintaining separate schemes is higher than combining the schemes, costing almost $1 billion (in June 2012 dollars) more from 2012-13 to 2020-21 and around $2.4 billion more from 2012-2013 to 2030-31. This is because operating separate schemes is estimated to result in around 5 300 gigawatt hours (GWh) of additional renewable energy generation in 2020-21, resulting in around 16 million tonnes fewer greenhouse gas emissions compared to a combined scheme. However, combining the schemes is estimated to increase wholesale prices on average by around $1 per megawatt hour (MWh) over the period 2012-2013 to 2020-21, and $1.70 per MWh over the period 2012-2013 to 2030-31. It is projected that combining the schemes does not result in a reduction in retail electricity prices, as the increased certificate costs of separate schemes is offset by the decreased wholesale rates achieved through greater renewable energy generation.

Level and mix of renewable energy generation

The majority of submissions – including from environmental and business groups, liable entities, and the renewable energy industry – supported retaining two separate schemes. The main reasons put forward were regulatory certainty and concern that further changes might jeopardise the prospect of meeting the 41 000 gigawatt hour target. Some stakeholders also argued that merging the schemes would reduce investment in more efficient large-scale renewable energy projects.

Merging the schemes could affect the likelihood of meeting the Renewable Energy Target if it results in regulatory uncertainty and reduced investment in renewable energy projects. In the last three years, the RET has undergone several significant amendments – the expansion and inclusion of multipliers in 2009, and separation of the scheme in 2011. The Commonwealth Government has also twice brought forward the reduction of the Solar Credits multiplier. A constantly shifting regulatory framework (or the perception of one) may reduce investors' willingness to invest in further renewable energy, and increased perceptions of risk may increase the cost of making such investments.

Many stakeholders considered that a further change to merge the schemes could undermine policy certainty and investment confidence. For example, AGL noted:

> *The separation of the RET scheme was vital to … creating conditions conducive to investment in large scale renewable generation. If this separation was removed, the market for large scale renewable certificates could again face distortion, jeopardising the 20% target and stymieing large scale renewable electricity generation in Australia (particularly if any new State-based policies emerged)… There have been no fundamental changes to the market dynamics which made necessary the division of the RET scheme in 2010. Accordingly there is no rationale upon which to remove this separation now. (AGL, sub.38, p.4)*

Many stakeholders expressed concern that merging the schemes would affect the mix of renewable energy generation and potentially disadvantage large-scale projects, which require a greater degree of investment certainty due to the high capital investment and lack of deeming provisions. Hydro Tasmania submitted:

> *Any re-introduction of small-scale technologies into the LRET will almost certainly immediately stall investment in large-scale projects due to the recent experiences of certificate supply volatility and the increased market risk this would bring. (Hydro Tasmania, sub.40, p.8)*

5.2.2. Lowering the solar photovoltaic threshold

Even if the schemes remain separate, there may be a case for moving some small-scale systems into the LRET by reducing the threshold of small generation units in the SRES. The *Renewable Energy (Electricity) Act 2000* (Cth) (*REE Act)* sets the capacity limits for eligible small generation units under the SRES. While the capacity limits for small-scale wind turbine systems and small-scale hydro systems are relatively low (10 kW and 6.4 kW respectively), solar PV systems that have a capacity of 100 kW are still included in the SRES. This is considerably larger than the average size of solar PV systems installed in 2011 and 2012, which was approximately 2.6 kW (sourced from the Clean Energy Regulator, 30 September 2012).

To date, the vast majority of solar PV installations in Australia have been installed on residential dwellings (see Table 4). Over 99 per cent of small-scale PV systems installed are below 10kW. This is unusual compared to other countries where there are significant amounts of solar PV on commercial buildings (see Table 4). A number of stakeholders have highlighted the as yet untapped potential for commercial deployment of larger solar PV units on shopping centres, storage facilities, office blocks or farms. Potentially, these installations could generate a relatively high number of certificates compared to residential systems, increasing the overall cost of the scheme.

Table 4 Photovoltaic installations by country

2011 installations by country	Installed capacity MW	Residential proportion %	Residential capacity MW
Italy	9 301	8	744
Germany	7 500	9	675
China	2 200	27	600
US	1 867	37	698
France	1 634	16	261
Japan	1 296	90	1 166
Belgium	958	68	651
UK	899	56	503
Australia	865	95	822
Spain	345	5	17

Source: REC Agents Association, sub.47, p.11.

One option to guard against this potential cost increase, while still providing an incentive for commercial deployment, would be to lower the capacity threshold of solar PV so that larger installations are captured in the LRET – a capped scheme. Many of the disadvantages identified above with merging the schemes would not apply to lowering the solar PV threshold. In particular, business models for operating in this market are only now being developed – there is no existing, established industry that would be disrupted by the change.

A number of LRET participants raised concerns that including systems of greater than 10 kW in the LRET could crowd out investments in large-scale projects. However, the potential for disruption by two key 'artificial' sources – multipliers and generous state and territory feed-in tariffs – is now low.

The Authority considers that it is important to retain some level of deeming for all systems under 100 kW, regardless of whether they are included in the small-scale or large-scale scheme. Deeming provides an efficient method for allocating a meaningful number of certificates to smaller sized systems without the administrative burden of metering each individual system's output. Furthermore – unlike large-scale PV systems – there is generally no third party data to verify a systems owner's claim of generation.

Some LRET participants argued that deeming arrangements for these systems would give them an unfair advantage. Analysis by the Authority suggests that while deeming does bestow some benefit – by removing the risk associated with future regulatory change – there is no inherent financial advantage to receiving certificates up-front rather than having them issued periodically in line with generation. In a scheme with banking, the market can be expected to take account of the value of certificates in the future.

That said, there is a clear case for reducing the deeming period for larger solar PV units. The larger the system, the less justification there can be for long deeming periods, since the scope for inaccuracies is greater and the additional compliance costs as a proportion of total certificate revenue created by the system is lower. Participants who install larger systems are likely to have more capacity to respond to the greater administrative requirements of more regular deeming.

5.2.3. Capping the Small-scale Renewable Energy Scheme

As noted above, one issue with the SRES design is that, unlike the LRET, it is 'uncapped' with liability tracking certificate creation. Annual liability (set through the STP) is based on the number of certificates expected to be created that year, adding or subtracting any surplus or deficit of certificates from the previous year. This means that as installations increase, so does the STP and, consequently, the cost of the scheme to liable entities and, through them, electricity consumers.

The uncapped nature of the SRES has become particularly relevant because the number of installed small-scale systems, and therefore scheme costs, has been so much higher than expected. When the SRES was legislated in 2010, it set an 'implicit target' of 4 000 GWh of generation in 2020. It has already exceeded this target with current estimates of approximately 5 000 GWh per annum and the Authority estimates it will reach around 11 000 GWh in 2020-21.

Many review participants – particularly large energy users and liable entities – expressed concern regarding the cost of the SRES. IPART stated:

> *The design of the SRES, combined with generous State and Territory Government financial incentives, has put the annual costs of complying with the SRES at almost twice that of the LRET. The costs of complying with the SRES were a driver of retail electricity price increases, particularly on 1 July 2011. (IPART, sub.81, p.14)*

The modelling undertaken for the Authority estimates that the total SRES certificate cost was around $1.3 billion in 2011-12 and may fall to around $300 million in 2020-21.

The high uptake of small-scale systems might also suggest that the level of subsidy provided by the SRES is too high and that small-scale systems are becoming affordable in their own right.
Origin Energy noted:

> *… the twin effects of falling solar panel costs and rising retail tariffs will create a situation where the subsidy required to support distributed solar PV will continue to reduce over time. There may be a point in the latter part of this decade when such subsidies are no longer required. (Origin Energy, sub.69, p.11)*

On the other hand, a number of review participants considered that, while the level of support may have been too high in the past, the cost of the SRES was likely to stabilise in the near future because the factors that drove the rapid growth in uptake are no longer at play. For example, in information provided to the Authority by Warwick Johnston from SunWiz, he commented that system costs were likely to stabilise:

> *While PV prices are hard to predict, clearly the massive price reductions in recent years cannot continue... the global market for PV grew extraordinarily in recent years, and recognising that scale was required to reduce manufacturing costs, a massive supply of PV manufacturing capacity was built... As a result we have an international oversupply of PV, which has created a price war that now sees panels being produced below-cost. The largest PV manufacturers are all struggling to turn a profit, a situation that cannot be sustainable… Hence, such rapid reductions in PV prices cannot be expected to continue. Instead, I expect that PV prices will stabilise within a year as wise companies turn their focus towards profit-based survival instead of attempting to capture market share through a price-war. Reductions in manufacturing costs will continue, but for the medium term prices should*

remain steady as major manufacturers pay down their debts.
(SunWiz, email correspondence, November 2012)

The Australian PV Association supported this assessment.

Others, such as the Australian Aluminium Council pointed to the history of underestimating SRES generation, noting:

The cost burden on electricity users of the SRES component of the scheme has been many times greater than the modelling that was used by the Government to undertake the separation and the nominal 'assigned' target of 4 000 GWh for the SRES. Any statement or modelling about future SRES permit generation levels will therefore be treated with a healthy amount of scepticism. (Australian Aluminium Council, sub. 73, p.5)

A number of participants suggested capping the SRES to provide certainty about the number of future installations – and therefore cost – of the scheme. This section considers the costs and benefits of four potential ways of controlling the compliance costs under the SRES – a gigawatt hour target, an STP cap, a discounting mechanism and lowering the existing price cap.

A gigawatt hour target

A gigawatt hour target for the SRES would cap the quantity of certificates that were required to be surrendered each year – in the same way the annual LRET targets currently work. Accordingly, if there were an oversupply of certificates, the price would be expected to fall. This option has the benefit of being simple and familiar to many RET participants.

A number of review participants expressed concern that a gigawatt hour target for the SRES would create a 'boom-bust' cycle because small-scale systems are relatively inexpensive and households are able to respond promptly to changes in incentives. For example, the Clean Energy Council stated:

If the scheme were to be capped you would see installations of small scale systems pulled forward (to avoid being outside the cap) which would create a cycle of boom and then bust, as once the cap was reached demand would plummet until the cap reset the following year. (Clean Energy Council, sub.12, p.17)

The Ai Group expressed similar concerns in its submission, noting:

… in the context of the market for small-scale systems, a cap is likely to cause considerable problems and dislocation. The experience with other capped benefits, such as the former rebates for solar PV or state government grants and tariffs, is that demand spikes when the public believes that time is running out; governments often find it hard to enforce a cap; and neither government nor industry may have a clear picture of total activity or the pipeline for certificates. The risk is that the cap does not hold, and that the cap drives annual boom-and-bust cycles that damage the industry. (Ai Group, sub.46, p.16)

Investing in small-scale systems is quite different from investing in large-scale renewable energy projects. Large-scale projects are generally planned and announced years in advance – investors are generally well-informed about the progress of projects that will contribute to the LRET target. By contrast, quantities of installed small-scale systems can change very rapidly, and accurate information is only available after the fact. For this reason, boom-bust cycles are more likely in a capped SRES scheme than a capped LRET.

An SRES boom-bust cycle would create difficulties for both households and businesses. In particular, in terms of equity, it would be unfair if non-expert participants, such as households, invested on the basis of a certain set of circumstances and then discover they have missed out on the expected subsidy because the cap has already been reached and the price of certificates has plummeted. This was demonstrated with the off-grid multiplier that gave an additional incentive to off-grid systems. The incentive had an annual cap and in its first year of operation it led to a rush to install systems, which resulted in the scheme being oversubscribed. This resulted in many applicants missing out, leaving them significantly out of pocket.

In summary, while introducing a gigawatt hour target would likely limit the overall costs of the SRES, it would require a major structural overhaul, creating significant regulatory uncertainty. This would adversely affect the small-scale industry, as well as households and, ultimately, may not be sustainable.

A cap on the small-scale technology percentage

Annual SRES liability is determined by the STP, which is set each year based on the expected number of certificates that will be created that year, plus or minus any carry-over from the year before.

An STP cap could be used to set a maximum level for the STP and thereby limit the amount liable entities (and electricity consumers) had to pay on an annual basis. It would also – over time – limit the incentive to install more systems as the price of certificates would be likely to fall if the STP cap was reached.

The main disadvantage of an STP cap is that its effectiveness depends on setting it appropriately. If it were set too high, it would not bind and therefore would not limit liability. If set too low, it could cause the price of certificates to fall dramatically, potentially disadvantaging those that had already invested on the basis of a higher expected certificate price. This might threaten the viability of some small businesses and lead to arguments to increase the cap. Setting an appropriate cap would depend, to some extent, on being able to predict future STPs. This has been notoriously difficult in the past: the Clean Energy Regulator's non-binding estimates have tended to significantly underestimate the STP. For example, early in the year the non-binding estimates for the 2012 STP was 16.75 per cent (31 March 2011) and by the end of the year it had almost doubled to 23.96 per cent (16 December 2011).

If the STP cap was not set appropriately it could either be ineffective, or cause significant disruption to the SRES market.

Discounting certificates

A discounting mechanism would apply a multiplier of less than one to each certificate, effectively discounting the number of certificates created for each megawatt hour. For example, a multiplier of 0.5 would mean that each certificate represents two MWh of renewable energy generation. A discounting mechanism could control uptake of small-scale systems under the SRES, as demonstrated in reverse by the Solar Credits multiplier.

A discounting mechanism would be unlikely to create the potential boom-bust cycles of a gigawatt hour target or an STP cap because fractional reductions below one would translate into small changes in the level of support. A discounting mechanism also has the advantage of not affecting existing investors.

The main disadvantages of a discounting mechanism relate to its implementation. Applying it on a discretionary basis would allow it to respond to changing circumstances, but would be unpredictable and potentially disruptive for industry. On the other hand, a 'set-and-forget' approach has the advantage of providing certainty but is essentially arbitrary and difficult to justify on the basis of principled analysis. The Clean Energy Council made this point, noting:

> *Implementation of the proposal to utilise average payback period as a criterion for lowering the SRES multiplier would be highly complex and problematic. If the approach were simplified, it would inevitably be perceived as unfair. (Clean Energy Council, sub.191, p.6)*

The Authority's preliminary view, as set out in its discussion paper, proposed the use of a discount mechanism to be applied at the Minister's discretion on the basis of:

- the payback period falling below ten years;
- changes in net system costs; and
- electricity prices and whether the SRES constituted more than 1.5 per cent of an average bill.

Many review participants expressed concern with this proposal. Some – such as the Ai Group – strongly supported the concept of discounting but were concerned that the proposed method of application could be too uncertain, depending on how the proposal was further developed. IPART expressed concern with the discretionary application, stating:

> *In our view, … providing the Minister with discretion to discount the number of certificates created by small-scale investors, [is] likely to significantly reduce investment certainty to small-scale investors and create further uncertainty for retailers and regulators in determining the costs of complying with the scheme. (IPART, sub.206, p.2)*

A number of stakeholders, including the REC Agents Association, opposed the application of a discount mechanism at all, considering it too extreme. These participants also argued that a discounting mechanism would put small-scale systems at a disadvantage vis-à-vis large-scale projects in the LRET.

Lowering the existing price cap

The SRES has a price cap of $40 set through the fixed clearing house price. The *REE Act* allows the Minister to lower the price cap, taking into account:

- whether the total number of small-scale technology certificates created in 2015 exceeded or is expected to exceed the equivalent of 6 000 GWh;
- any changes to the costs of small generation units and solar water heaters;
- the extent to which owners of small generation units and solar water heaters contribute to the costs of small generation units and solar water heaters;
- the impact of the clearing house price, and the number of small generation units and solar water heaters installed on the electricity market, including on electricity prices; and
- any other matters the Minister considers relevant.

To date, the Minister has not exercised this power, preferring instead to accelerate the reduction of the Solar Credits multiplier (Combet, Dreyfus 2011).

The price cap does not directly limit the number of installations; however, it does reduce the maximum price paid for each certificate and in this way may lower the overall cost faced by liable entities. If the certificate price falls, it might also affect uptake, as the return would be smaller.

There are a number of complexities regarding lowering the price cap. First, it affects investments that have already been made on the assumption that the price cap is $40. This was raised by the Clean Energy Council in its submission:

> *… if the $40 price were to be adjusted, the impact on the small scale technology market would be highly detrimental. Firstly, the value of STCs in the spot market would likely fall dramatically, as the expectation that the Clearing House will eventually come into play in a significant way over the next 12 to 24 months would be removed and this would lower estimates of the longer term value of STCs. Many investors from major banks to solar PV businesses and dedicated certificate trading businesses are holding substantial quantities of STCs. Material changes to the SRES or the Clearing House could devalue those assets and undermine the viability of those businesses. As these certificates trading businesses help to provide cash flow to PV businesses anything that harms these businesses or discourages new entrants in the STC market will harm the PV sector more broadly. At the very least it would reduce the value of their asset which is unfair to them. (Clean Energy Council, sub.12, p.23)*

On the other hand, the power to change the clearing house price cap is included clearly in the legislation and prudent investors in small-scale certificates could reasonably be expected to understand that the asset they hold is subject to this discretionary power.

Lowering the clearing house price will create transitional issues for the certificates already on the clearing house transfer list. If the decision were taken to lower the clearing house price, a decision would need to be taken regarding how to treat these certificates.

5.2.4. Phasing out the Small-scale Renewable Energy Scheme

Unlike the LRET, which ends in 2030, there is no legislated end-date for the SRES. Setting an end-date ahead of time – and establishing a clear, graduated path to it – would provide industry and investors with certainty regarding the future of support. It is also in keeping with the overall transitional nature of the RET (see Chapter 3) – as a temporary measure to provide industry support and encourage additional renewable energy generation ahead of an established, credible carbon price consistent with delivering on Australia's long-term environmental goals.

An argument can be made that the policy intent was for the SRES to end in 2020; at the time the SRES was split from the LRET, all discussion of the SRES contribution to the target was in terms of 2020 gigawatt hour generation (Wong 2010, Commonwealth Government 2010). Another possible option would be 2030, which would align the SRES with the LRET.

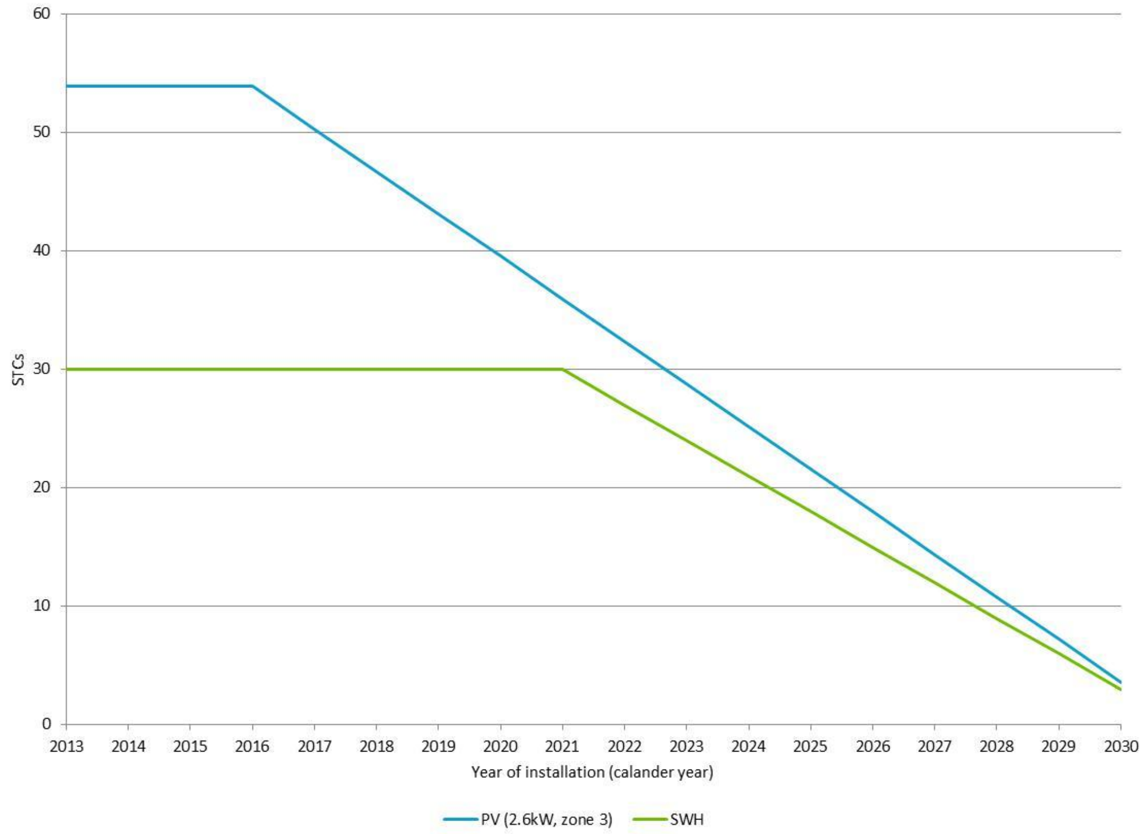
There are a number of possible ways to set an end-date to the SRES, including: reducing deeming periods so there is no subsidy past 2030, and prescribing an end-date for the scheme in the *REE Act*.

Reduced deeming

Under a reduced deeming approach, small-scale systems would only be provided with certificates for generation up to 2030. A solar PV unit currently receives 15 years' worth of certificates upfront. Reduced deeming would mean that a solar PV unit installed in 2019 would only receive 12 years' worth of certificates – rewarding generation up to and including 2030, but not beyond.

Reduced deeming would provide a predictable path to the end of the scheme. It would slowly phase out support over time, providing industry with both certainty regarding the future of the SRES and a graduated step-down that could be managed. Figure 27 illustrates how reduced deeming would affect certificate creation for an average solar PV unit and an average solar water heater.

Figure 27 Example of phase-out of deeming years on small-scale technology certificates



Source: Climate Change Authority, 2012.

A potential disadvantage of this option is that the administrative costs of providing certificates for very short periods (for example, less than five years) in the latter years of the scheme could outweigh the benefits. This could resolve itself naturally, as participants may not consider it worthwhile to apply for a small number of certificates.

No future small-scale technology percentage

The LRET ends in 2030 because the *REE Act* does not provide for any gigawatt hour targets beyond this date. The renewable power percentage (RPP) will therefore fall to zero and no further liabilities will be created. Although the SRES does not have a gigawatt hour target, a similar approach could be taken by stipulating that there will be no further small-scale technology percentage (STP) after a certain date.

The advantages of this option are that it is simple and would work effectively for either a 2020 or 2030 end date. The disadvantages are that it may provide a sudden drop in support as the STP may not fall smoothly up until the end date.

This option could be combined with reduced deeming to provide for a graduated phase-out over time to 2030, after which no further STPs would be set.

5.2.5. Conclusion

All of the proposed options have advantages and disadvantages. On balance, the Authority has assessed that the following combination is likely to provide the highest net benefit, while minimising disruption to the schemes and their participants:

- retaining separate schemes to maintain regulatory stability;
- lowering the SRES threshold for solar PV units to guard against a future boom in larger-scale installations (this essentially recombines a component of the SRES with the LRET);
- reducing deeming periods to provide a graduated and predictable phase-out of the scheme by 2030, after which no further STPs would be set; and
- retaining the ministerial power to lower the price cap in the event that there is another boom in installations of small-scale systems and a lower level of subsidy would be appropriate.

The Authority considers that while recombining the schemes would have addressed most of the issues associated with the SRES, it would also require significant regulatory change, which would affect both the small- and large-scale schemes. In light of this, the Authority considers there are less disruptive ways of addressing the issues associated with the SRES.

Similarly, while a gigawatt hour target, an STP cap or a discounting mechanism could all effectively contain the cost of the SRES, they also require significant changes and would likely result in considerable uncertainty for scheme participants. A gigawatt hour target or an STP cap could also create certificate price volatility and 'boom-bust' cycles.

Such measures would be justified if uptake of small-scale systems under SRES was likely to continue to grow rapidly. However, the factors that drove this boom (falling system costs, generous feed-in tariffs, and multipliers) are no longer at play and installations of small-scale systems are expected to stabilise and the cost of the SRES to fall. The Authority's modelling estimates that with the current policy setting in place, the contribution of SRES certificate costs to the average household bill will fall from 2.4 per cent in 2012-13 to 0.6 per cent in 2020-21 (see Table 5).

Table 5 Contribution of Small-scale Renewable Energy Scheme certificate costs to average household bill

Year	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
SRES	2.4%	1.4%	1.1%	1.0%	0.8%	0.7%	0.6%	0.6%	0.6%

Source: SKM MMA, 2012.

In these circumstances, the Authority considers that the benefits of introducing a gigawatt hour target, STP cap, or a discounting mechanism are unlikely to exceed the costs of the significant disruption these options are likely to cause. The Authority's recommendations therefore focus on mechanisms to guard against a possible future boom in installations (and consequent scheme cost), rather than on mechanisms that actively limit the number of installations.

Solar PV on commercial buildings currently constitutes a very small proportion of total installations; future growth is possible but hard to predict. Should they remain in the SRES, a boom in such installations would lead to rapid increase in compliance costs given that larger systems create more certificates. The Authority therefore recommends lowering the SRES threshold of solar PV units from 100 kW, PV systems above this threshold would be eligible under the LRET. This would still provide support to commercially-installed solar PV – but in the context of a capped scheme.

Consultation with stakeholders suggests a threshold of somewhere between 10 kW to 30 kW would be appropriate – the Authority recommends the Commonwealth Government conduct further consultations with stakeholders to determine a precise threshold. In the Authority's view, a 10 kW threshold would be an appropriate starting point for these consultations.

In addition, the Authority considers that larger systems should be subject to five year deeming similar to the current five year deeming option available to small generation units in the SRES. This will encourage better accuracy around deeming arrangements – as is appropriate for larger systems – and also would not confer an unfair advantage on PV compared with other LRET participants.

The Authority recommends that the ministerial power to lower the price cap be retained. While not ideal, it could act as an 'emergency' cost containment measure if unexpectedly high levels of installations of small-scale systems continued, driven, for example, by further falls in technology costs or the continued rise of the Australian dollar. Lowering the price cap has the advantage of being known to scheme participants as it is part of the existing scheme design. Some of the disadvantages associated with lowering the price cap – such as transitional arrangements for certificates on the transfer list – may be reduced should the Commonwealth Government adopt the Authority's recommendations regarding the clearing house – discussed in Section 5.3.1.

Finally, the Authority notes that state and territory feed-in tariffs have a significant effect on uptake of small-scale systems under the SRES. Consultation with state and territory governments indicates that feed-in tariffs are unlikely to be increased in the future. Nevertheless, greater coordination of policies would be useful. The Council of Australian Governments' Standing Council on Energy and Resources is considering the merits and options for developing guidelines for a consistent national approach to fair and reasonable feed-in tariffs for small-scale renewable generation. Any such guidelines would aim to encourage competition, provide clear rights and obligations around the terms of connection and what constitutes a fair and reasonable return for a small-scale system (Standing Council on Energy and Resources 2012). The Authority considers the Council's work based on these principles will help promote the stabilisation of the SRES.

Recommendation

R.5. The Small-scale Renewable Energy Scheme should remain separate to the Large-scale Renewable Energy Target.

R.6. The threshold for solar photovoltaic units in the Small-scale Renewable Energy Scheme should be reduced from 100 kW to, say, 10 kW. The Authority recommends the Government conduct further consultation with stakeholders to determine an appropriate threshold. Units over the small-scale threshold would be included in the Large-scale Renewable Energy Target with five year deeming.

R.7. The ministerial power to lower the price cap should be retained to provide an immediate cost containment mechanism should installations of small-scale systems boom.

R.8. The Small-scale Renewable Energy Scheme should be phased out by reducing deeming so that renewable energy generation from small-scale systems is not rewarded after 2030.

5.3. Small-scale Renewable Energy Scheme administration

There are a number of administrative issues associated with the SRES that could also be amended to improve the operation of the scheme. This section considers:

- the clearing house;
- generation returns; and

- the collection of data regarding out of pocket expenses.

5.3.1. The clearing house

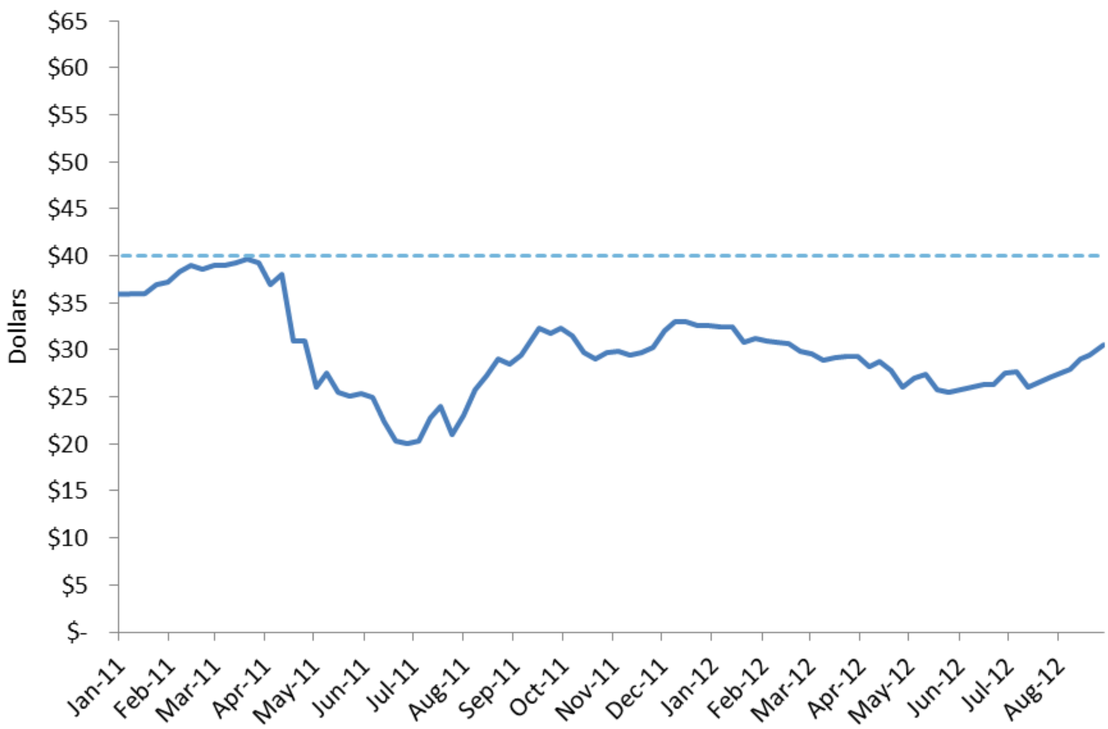
The 'STC clearing house' is a voluntary mechanism designed to facilitate the exchange of STCs between buyers and sellers (owners or agents) at a fixed price of $40. Sellers may enter their STCs on the 'transfer list'. The list clears as buyers purchase STCs from the clearing house. If there are no STCs listed, the Clean Energy Regulator will create an STC, which will be replaced with the next certificate entered on the transfer list. While the clearing house provides a set price per certificate, there is no guarantee how long it will take to sell.

The clearing house was designed to fulfil two purposes: to cap the price of certificates for liable entities (Commonwealth Government 2010) and to deliver a set subsidy of $40 per STC for households, small businesses and community groups (Department of Climate Change and Energy Efficiency 2010).

The clearing house operates as a price cap by allowing liable entities to acquire a limitless number of certificates from the clearing house for the set price of $40. The price cap role played by the clearing house is an important cost containment mechanism given the SRES has no quantitative cap.

While the clearing house has provided an effective price cap, it has failed to deliver a set subsidy of $40 per STC to owners of small-scale systems (or their agents). The clearing house is a voluntary mechanism and liable entities have chosen to acquire certificates outside the clearing house where STC spot prices are around $25 to $32 (see Figure 28). This has meant the clearing house transfer list has not cleared for 18 months (the last sale was on 25 February 2011).

Figure 28 Small-scale technology certificate spot price



Source: The Green Room – Next Generation Energy Solutions (NGES), 2012.
Note: In nominal prices.

Although the Commonwealth Government has never guaranteed a timeframe for clearance (and this is made clear on the Clean Energy Regulator's website), the existence of the clearing house has created an expectation among some non-expert participants that a $40 set price per STC is obtainable. The Authority received several submissions from individuals who had installed small-scale systems anticipating $40 per STC, but whose certificates had not yet cleared – in some cases, the individuals had waited a considerable period of time.

The Authority has considered a number of possible amendments to the clearing house that could address this issue and improve the operation of the SRES, including:

- amending the clearing house so that it is compulsory and therefore delivers the set $40;
- abolish the clearing house and use the shortfall charge as a price cap; and
- amend the clearing house to be a 'deficit sales facility'.

Amend the clearing house to be compulsory

A number of stakeholders proposed making the clearing house compulsory to '[stop] the market under-cutting [the clearing house price] and restore the price to a set $40 per STC' (Robin Morgan, sub.1, p.1).

When designing the scheme, a compulsory clearing house was considered (Commonwealth Government 2010). It was decided it should be voluntary on the grounds that it provided greater flexibility to liable entities – this remains a valid consideration. Importantly, making the clearing house compulsory would most likely increase the cost of the SRES and, given that cost is one of the primary concerns with the scheme, the Authority does not recommend this course of action.

If the objective is to establish a set subsidy for small-scale systems, other policy mechanisms – such as feed-in tariffs or rebates – would be more suitable than a certificate trading scheme. However, it is not clear that a set subsidy is needed to drive the installation of small-scale systems. Installation of small-scale systems has successfully continued, despite fluctuating certificate prices of $20 to $30 since the inception of the SRES.

Abolish the clearing house

Another option is to abolish the clearing house. This would effectively remove the 'promise' of a $40 set price, pushing all activity onto the secondary market. This would have the advantage of removing the unrealistic expectation regarding the attainment of $40 per STC in a timely manner.

Abolishing the clearing house may also have some benefits in terms of administrative savings. However, these are likely to be small. The largest cost associated with the clearing house was its establishment; its ongoing operating costs are relatively low.

At face value, abolishing the clearing house may not impact adversely on the market: there is a functioning secondary market and many householders now interact with the scheme through agents, (particularly given the clearing house does not deliver prompt payment for certificates). However, the clearing house may play a more active role should the SRES stabilise. The Clean Energy Council made this point in its submission, stating:

> *While the Clearing House has not necessarily played the role it was intended to play as part of the SRES, it is nevertheless now an important part of the scheme. The challenges in forecasting the uptake of small scale systems has limited the extent to which the clearing house has played an active role in the market to date. [The] Clearing House should remain in*

> *place and will over time play an increasing active part in the functioning of the SRES. If the Clearing House were to be changed or abolished … the impact on the small scale technology market would be highly detrimental. (Clean Energy Council, sub.12, p.23)*

Abolishing the clearing house would require potential complex transitional arrangements to be put in place for certificates currently on the transfer list.

Further, abolishing the clearing house would raise the question of how to cap the scheme price. This could be done through the shortfall charge (which could be lowered to match the tax-effective value of the clearing house price). There are, however, a number of disadvantages to using the shortfall charge as a price cap.

First, it is easier to lower the clearing house price. Lowering the shortfall charge would require an amendment to primary legislation, whereas the clearing house price can be lowered through a legislative instrument, which has a less onerous parliamentary process.

Second, the clearing house may also have advantages over the shortfall charge from a reputational perspective, which means it may be a more effective form of a price cap. Liable entities may be more willing to access a price cap in the form of set-price certificates from the clearing house than pay the shortfall change, which may carry connotations of non-compliance.

Finally, there may be benefits to the clearing house price over the shortfall charge in terms of environmental effectiveness. The 'regulator-issued' certificates are eventually replaced by real certificates representing one megawatt hour of renewable generation. Payment of the shortfall charge, however, is simply the payment of a tax and does not directly lead to any additional renewable energy generation.

On balance, the Authority does not believe there is a case for abolishing the clearing house.

Amend the clearing house to a 'deficit sales facility'

The clearing house could be amended to a 'deficit sales facility', whereby new certificates are only allowed to be entered in the clearing house when it is in deficit (that is when the Clean Energy Regulator has issued certificates to liable entities).

This would retain the clearing house as the price cap and all the associated advantages. It would, however, be clear to participants that the clearing house cannot guarantee a set price per certificate. This arrangement would essentially do away with the transfer list, certificates would clear through the clearing house on a 'first come, first served' basis as soon as the clearing house went into deficit. Participants who did not go through the clearing house would not be significantly disadvantaged because the secondary market price would most likely also be high if the clearing house were in deficit.

Of the options assessed, the Authority considers that the deficit sales facility option would most likely provide the greatest net benefit. It would allow the continued operation of the clearing house as a price cap, while making it clear that participants cannot expect to receive $40 per certificate in a timely fashion. Such an amendment would also allow the clearing house price to be more easily amended as there would not need to be transitional arrangements put in place for certificates on the transfer list. This option would be easy to implement and have low administrative costs.

RECOMMENDATION

R.9. The clearing house should be amended to a 'deficit sales facility' whereby certificates would only be placed in the clearing house when it is in deficit.

5.3.2. Generation returns

Section 23F of the *REE Act* requires any registered person that creates more than 250 certificates in a calendar year to lodge a 'solar water heater and small generation unit return' to the Clean Energy Regulator. The *REE Regulations* dictate what information must be included in the return. The growth in the solar PV market and the addition of the clearing house has led to more participants, particularly households, becoming liable to submit returns.

The solar water heater and small generation unit return is intended to provide the Regulator with quantitative and qualitative data such as:

- the number of systems and certificates the registered person created; and
- if any applications for certificates were failed by the Regulator and, if so, how many and why.

Nevertheless, the Authority understands that most of the information that is submitted as part of the above arrangements is already available to the Clean Energy Regulator through the REC Registry. Furthermore, the REC Registry provides more current and accurate details of a registered person or agents' activity than the generation returns.

The Clean Energy Regulator has advised the Authority that the time taken for a registered person to complete a return varies, depending on their level of activity and the quality of their record keeping, from 30 minutes to several hours. In addition, it is estimated that it will take the equivalent of half a year for a fulltime employee at the Regulator to assess and respond to the 600 returns due to be received in 2012. Accordingly, there appears to be a clear administrative burden associated with generator returns.

The REC Agents Association commented that the generation return may be a useful method for determining a fit and proper person for the purposes of the REE Act and should be maintained:

> *Agents should be required to demonstrate that they are a "Fit and Proper Person" in their annual generation return. In the annual return they should be required to declare that they have met the requirements of the new provisions. These Agents should not be able to create certificates until such time that they have submitted their generation return and declared that they are not in breach of these provisions. (REC Agents Association, email correspondence, November 2012)*

However, consultation with the Clean Energy Regulator suggests its assessment of the fit and proper test will not depend on information from generation returns.

The Authority's view is that the legislative requirement to produce a return should be removed on the grounds that the administrative costs are not justified given there does not appear to be a clear benefit from collecting the information required in the generation return.

RECOMMENDATION

R.10. The requirement to submit a solar water heater and small generation unit return should be removed from the *Renewable Energy (Electricity) Act 2000* (Cth).

5.3.3. Out of pocket expenses

One of the items the Minister must take into consideration when reducing the clearing house price is the contribution system owners make towards the cost of their system.

Regulation 19G of the *REE Regulations* requires that the net cost of the system (total cost of the system and installation, less the benefit from the small-scale technology certificates) must be provided to the Clean Energy Regulator at the time certificates are created in the REC Registry. This information must be published on the Regulator's website every quarter.

Many of the parties that create certificates are the same parties who install systems. Accordingly, there may be an incentive for these operators to provide the Regulator with a high estimate of the out-of-pocket expense to reduce the possibility of the clearing house price being reduced.

The Authority's view is that this information would be more effectively and efficiently collected through appropriate surveys.

RECOMMENDATION

R.11. The requirement to provide the out-of-pocket expense data for a small generation unit installation should be removed from the *Renewable Energy (Electricity) Regulations 2001* (Cth).

CHAPTER 6. LIABILITY AND EXEMPTION FRAMEWORK

This chapter considers the liability framework for the Renewable Energy Target (RET), including which entities are liable, the calculation of individual liability, the surrender timetable for certificates and the shortfall charge. It also explores the exemption arrangements, including the self-generator exemption and the partial exemption for emissions-intensive, trade-exposed (EITE) industries.

6.1. The liability framework

The RET creates demand for renewable energy by requiring certain entities to surrender a set number of certificates – each equal to one megawatt hour (MWh) of renewable energy generation for compliance purposes – each year. If an entity does not surrender a sufficient number of certificates, it must pay an administrative penalty (a shortfall charge). The scheme also creates a number of exemptions from this liability – for EITE businesses and self-generators.

The liability framework determines which entities must acquire and surrender certificates. The *Renewable Energy (Electricity) Act 2000* (Cth) *(REE Act)* defines liable entities as those that make a 'relevant acquisition of electricity', where a relevant acquisition refers to electricity acquired from the wholesale market (for example, from the National Electricity Market) or where an end-user acquires electricity directly from a generator. In practice, liable entities are primarily electricity retailers. An acquisition is not relevant if the electricity was delivered on a grid with a capacity of less than 100 megawatts (MW).

Individual liability is determined by applying a percentage (set annually by the Minister) to an entity's electricity acquisitions for that year. Entities acquit their liabilities by surrendering the required number of certificates to the Clean Energy Regulator by February of the following year, with interim quarterly surrenders required under the SRES. If a liable entity does not surrender a sufficient number of certificates required to acquit it's RET liability, it must pay the shortfall charge.

6.1.1. Liable entities and calculating individual liability

As described above, an acquisition of electricity is not liable under the RET if the grid from which the electricity was acquired has a capacity below 100 MW. The Renewable Energy Sub Group's 2012 report to the Council of Australian Governments' *Review of Specific RET Issues* explains the rationale for these settings, noting:

> *To minimise costs of compliance and administration, liability under the RET is imposed on wholesale acquisitions of electricity, mainly by retailers who are best placed to manage RET liabilities … To reduce compliance and administrative costs, grids of less than 100 MW capacity are exempt from liability. (Renewable Energy Sub Group, 2012, p.41)*

The Authority's view is that increasing the grid generation threshold, for example, to match growth in population and aggregate electricity demand or to leave additional renewable capacity out of the calculation (as suggested by the Power and Water Corporation (sub.137, p.2)) could be inequitable as similar communities could be treated differently, depending on when their grid sizes grew.

The Authority's view is that the liability definitions and thresholds generally appear to be functioning effectively and strike a reasonable balance between comprehensiveness and administrative simplicity. Liability and threshold arrangements have been in place since the commencement of the Mandatory Renewable Energy Target (MRET) in 2001 and liable entities are accustomed to them and have established systems and practices in place for compliance.

RECOMMENDATION

R.12. There should be no changes to the primary point of liability or the size threshold for coverage of grids.

6.1.2. Opt-in liability arrangements

A number of stakeholders proposed allowing large electricity users to opt-in to manage liability under the RET for the electricity they consume. For instance, the Australian Industry Greenhouse Network submitted that an opt-in scheme would provide for:

- *Market liquidity: through increasing the number of buyers and (possibly) sellers that are covered under the RET, leading to lower cost of compliance and efficient market outcomes*
- *Flexibility: for energy users to evaluate the most cost efficient solution to manage their obligations under the RET. Large energy users should be able to evaluate how to best manage their aggregated liabilities to minimise the net cost to their business. (Australian Industry Greenhouse Network, sub.164, p.6)*

Stakeholders supporting opt-in arrangements also identified other potential benefits. The Climate Markets and Investment Association submitted that:

> *Market participants have already started decoupling electricity and REC costs during the development of Power Purchase Arrangements (PPA). However, the current arrangement which mandates the wholesale purchaser of electricity to manage the RECs for all liable entities makes decoupling more difficult to agree. The ability for liable entities to opt-in would remove this complexity. (Climate Markets and Investment Association, sub.94, p.2)*

The Association also noted that:

> *The limited number of wholesale market participants impacts the liquidity of the RET. The ability for liable entities to opt-in would create greater market liquidity and also provide project developers a greater range of participants with which to agree a PPA. (Climate Markets and Investment Association, sub.94, p.2)*

The additional flexibility provided by opt-in arrangements may have benefits from an economic efficiency perspective. In some circumstances, electricity suppliers may have a reduced incentive to seek out opportunities for least-cost compliance with RET obligations as they are able to pass-through RET costs to consumers. Allowing electricity consumers to opt-in would allow the party that has the clearest incentive to minimise costs of RET compliance to source and purchase certificates. This should encourage cost-effective compliance and reduce the overall costs of the RET. For similar reasons, opt-in arrangements have been allowed in other certificate-based schemes, such as the carbon pricing mechanism and the New South Wales Greenhouse Gas Reduction Scheme (GGAS).

In terms of costs, opt-in arrangements would lead to increased administrative and compliance costs associated with measurement, reporting and verification. It would also potentially increase uncertainty for existing liable entities regarding their own liability. These costs could be at least partly addressed through the design of the opt-in arrangements. A sufficiently high participation threshold should be set to ensure that the number of additional participants is manageable. Also, a sufficient period of notice of intention to opt-in should be required to provide certainty for existing liable entities. Finally, if a party has opted-in, then it should be clear that that party alone is responsible for compliance, with no recourse to the original retailer in the event of non-compliance.

On balance, the Authority considers that the benefits of providing for opt-in liability arrangements are likely to outweigh the costs if appropriately designed.

The Authority notes that key design features that need to be put in place for an opt-in scheme would include:

- specification of which entities are eligible to opt-in for example, size threshold (specified in terms of electricity consumption), plus metering requirements;
- deadlines for opting in (or out again, but not within a compliance year), and notification arrangements for electricity suppliers;
- administrative processes to create a liability to surrender certificates for the relevant supply of electricity for the consumer, and removal of liability for that supply from the electricity supplier;
- requirements for measurement, reporting and verification of electricity consumption by the opted-in entity; and
- processes for the surrender of units by the opted-in entity.

A number of electricity users and retailers have commented that the model for opt-in for large electricity users under the GGAS was effective (see Box 7). For instance, Origin Energy Ltd submitted that:

> *[Opt-in] arrangements appear reasonable. Origin would welcome further engagement in the design of the opt-in arrangements to ensure that they are efficient for all parties involved. From a retailer's perspective one of the key considerations is the notice period given regarding changes of retailer. We note that the large user provisions in NSW GGAS have worked reasonably well. (Origin Energy Ltd, sub.213, p.7)*

Box 7 Greenhouse Gas Reduction Scheme opt-in arrangements

Under GGAS, large consumers of electricity were allowed to opt-in to assume scheme obligations for meeting emissions intensity benchmarks from liable electricity suppliers. To measure the amount of electricity consumption that is opted-in the GGAS used metering points with national metering identifiers administered by the Australian Energy Market Operator. The GGAS administrator received reports of annual electricity consumption at the relevant meters from both the electricity user and the retailer. In practice, both parties relied on electricity sales data, and resolution of any discrepancies did not prove difficult. The GGAS had around 32 default liable entities and 12 opted-in participants, and administration of reporting and verification under the GGAS was estimated to take approximately one month for two full-time staff.

Several stakeholders also highlighted the importance of consultation on the detailed design features of an opt-in scheme to ensure that it is effective and taken up by potential participants. The Australian Industry Greenhouse Network submitted that:

> *… we recommend a thorough consultation process be carried out to determine an efficient RET opt-in scheme design that avoids duplication and minimises the administrative burden on both the end user and supplier/retailer to maximise value and uptake. (Australian Industry Greenhouse Network, sub.164, p.6)*

Experience with the development of opt-in schemes for natural gas users and other large fuel users under the carbon pricing mechanism by the Department of Climate Change and Energy Efficiency suggests that, while conceptually relatively straightforward, opt-in schemes can entail considerable complexity in practice.

The Authority considers that further analysis and consultation by the Government will be important to establish the detailed design features of an opt-in scheme, and that the GGAS opt-in model provides an appropriate starting point for this detailed design work. In developing the opt-in approach it will be important to ensure that it is effective for large electricity users and retailers, while maintaining the environmental integrity of the RET and ensuring administrative costs are efficient. Some of the key issues that the Authority considers will need to be addressed are outlined in Box 8.

Box 8 Key design issues for Renewable Energy Target opt-in

Threshold: Setting a minimum size threshold for electricity users eligible to opt-in is likely to be an effective way to limit the number of participants. This would reduce administrative costs and enhance the workability of an opt-in scheme. The GGAS allowed for opt-in by large electricity users with over 100 gigawatt hours (GWh) of annual electricity consumption, including at least one site with over 50 GWh. The GGAS had 12 participants opting-in for New South Wales and the Australian Capital Territory and relatively low administration costs. However, some large electricity users have submitted that the GGAS threshold is too high and would exclude facilities that could effectively opt-in to manage obligations.

The Authority considers that in setting a threshold it will be important for the Government to strike an appropriate balance between allowing large consumers to manage their own costs more efficiently and the increased administrative burden associated with verifying opt-in arrangements and increased numbers of participants in the RET.

Notice Period: Providing an adequate notice period for opt-in will be important to minimise costs for both the Clean Energy Regulator and electricity retailers. Liable retailers will require sufficient time to cross-check information relating to metering points and to make adjustments to billing systems when a customer opts-in to manage their own liability under the RET. The Clean Energy Regulator will also need time to process applications and verify information. The GGAS functioned effectively with a 6 month notice period, and a requirement that opt-in be for full compliance years.

Measurement and verification of electricity consumption: Effective measurement and verification arrangements are important to ensure environmental integrity and to provide certainty of obligations for opt-in participants and other liable entities. Among other things, losses on distribution networks would need to be accounted for to ensure equivalent treatment for retailers and firms that opt-in.

RECOMMENDATION

R.13. Large electricity consumers should be permitted to opt-in to assume direct liability for Renewable Energy Target obligations. The Commonwealth Government should consult further with stakeholders to develop a detailed approach to opt-in that is efficient for both large electricity users and retailers. The Authority considers that the New South Wales Greenhouse Gas Reduction Scheme opt-in model would be an appropriate starting point for this detailed design work.

6.1.3. Calculating individual liability

The annual Large-scale Renewable Energy Target (LRET) and Small-scale Renewable Energy Scheme (SRES) targets are divided among liable entities on the basis of their reduced acquisitions of electricity. Reduced acquisitions relate to the electricity acquired on grids above 100 MW capacity, minus any reduction in liability (in megawatt hours) which is provided in partial exemption certificates (see Section 6.5.1). The annual targets are set as a percentage which is multiplied by an entity's reduced electricity acquisitions in the compliance year, in order to determine the number of certificates that must be surrendered. The percentages are known as the renewable power percentage (RPP) for the LRET and the small-scale technology percentage (STP) for the SRES, and are explained in more detail below.

Large-scale Renewable Energy Target

The RPP is required to be set annually no later than 31 March in the *Renewable Energy (Electricity) Regulations 2001* (Cth), and applies to the entire calendar year in which it is set. When determining the RPP, the Minister must take into consideration:

- the LRET gigawatt hour target for that year;
- the estimated total electricity sold on liable grids for that year;
- any surplus or deficit of certificates from previous years; and
- the amount of all partial exemptions.

Once the RPP is announced and partial exemption certificate (PECs) are received by liable entities, they are able to estimate their accumulated liability for the LRET at any point in the compliance year.

The RPP for 2011 was 5.62 per cent (approximately 10 400 000 LGCs) and for 2012 is 9.15 per cent (approximately 16 763 000 LGCs). The default RPP in 2013 is 10.42 per cent (approximately 19 088 000 LGCs). Annual fluctuations in the RPP are due largely to changes in the annual LRET target, which are prescribed in the *REE Act*.

Small-scale Renewable Energy Scheme

The STP is also required to be announced by 31 March of the compliance year, but is calculated somewhat differently to the RPP, as the SRES scheme has an uncapped target with a quarterly surrender of certificates (see Section 6.2 for surrender timing). The STP is largely based on the expected number of certificates to be created in the compliance year, adjusted for any differences between the estimated and actual certificates from the previous year, so that the STP tracks certificate creation.

Under SRES, a liable entity must surrender a set percentage of its STCs each quarter. As the actual electricity acquisitions for the compliance year are not known in the first three quarters, an estimate is used to determine how many STCs must be surrendered, based on the previous year's liable electricity acquisitions multiplied by the STP for the compliance year. The actual SRES liability is trued-up in the fourth quarter when the actual compliance year's liable electricity acquisitions are known.

Flexibility is provided if a liable entity believes their liable acquisitions this compliance year will be sufficiently different to last year's actual acquisitions. If desired, the liable entity can apply to the Clean Energy Regulator to have a proposed amount, instead of the previous year's liable acquisitions, used to determine quarterly surrender requirements in the first three quarters (with true-up still occurring against actual acquisitions in the fourth quarter). This revised estimate can only be provided once per compliance year. To prevent a liable entity from deliberately underestimating their STC surrenders in the first three quarters, penalties in the form of quarterly shortfall charges can be applied by the Clean Energy Regulator retrospectively to quarters in which the actual liability for the compliance year exceeded the proposed amount by more than ten per cent.

The STP for 2011 was 14.80 per cent and for 2012 is 23.96 per cent. The non-binding estimate for 2013 is 18.76 per cent, equivalent to 34 457 000 STCs. STP fluctuations are due to changes in the forecast number of certificates that are expected to be created and adjustments for any difference (surplus or deficit) between the forecast and actual certificate creation figures from the year before. Certificate creation in 2011 was greater than expected, meaning the 2012 STP had to be set higher to account for the resulting surplus.

6.1.4. Timing of publication of the renewable power percentage and small-scale technology percentage

In submissions from stakeholders, a number of liable entities and large energy users proposed changing the timing of the publication of the RPP and STP, from 31 March of the compliance year, to before the commencement of the compliance year. These stakeholders noted that earlier publication of the percentages would reduce risks, facilitate planning for compliance with liabilities, and allow consumers to enter into price pass-through arrangements with electricity retailers prior to the commencement of the year. For instance, Qenos Pty Ltd stated that:

> *LRET and SRES liability is not finalised until 31 March each year. This makes it more difficult for a company to accurately determine its likely RET costs and introduces greater risk for liable entities. This higher risk generally results in higher costs, via the imposition of risk premiums of RET liability. This risk could be reduced, and companies would be able to better manage their RET obligations if the relevant percentages were able to be declared at or before the beginning of each calendar year. (Qenos Pty Ltd, sub.60, p.5)*

Similarly, the Major Energy Users Inc. stated that:

> *Setting the RPP 3 months into the year in which it applies, provides no ability for incorporation into cost budgets. It would be more use if the RPP was set prior to the start of the year in which it applies to allow consumers to build the cost into its future budgets. (Major Energy Users Inc., sub.103, p.20)*

The timing of the RPP and STP requires balancing certainty for industry participants with the accuracy of the percentages. The RPP and STP are based on forward estimates of a number of factors – including the estimated amount of electricity that will be acquired in relevant acquisitions and the estimated amount of all partial exemptions. They also rely on some inputs from previous years, such as the surplus or deficit of STCs. The earlier the RPP and STP are set, the less accurate they are likely to be and these inaccuracies will need to be accounted for in setting the next year's percentages.

The RPP is able to be predicted with a relatively high degree of accuracy ahead of the compliance year, because the RPP does not follow certificate creation and the interim LRET targets are published within the *REE Act*. The STP is harder to predict with accuracy, as it involves the estimation of more variables, with a key area of uncertainty being the forward estimate of the number of STCs likely to be created in the compliance year. This factor is inherently difficult to estimate, regardless of timing.

The Clean Energy Regulator advised that there would be only a small loss of accuracy if the RPP was set earlier, provided this was not before November preceding the compliance year. An earlier announcement of the STP would be expected, however, to result in a less accurate estimate of the number of certificates expected to be created in the following compliance year. It would also result in a longer lag time between over and under surrendered certificates from previous years flowing through to the STP, due to less data being available. The overall effect of an earlier announcement of the STP is therefore greater certainty for liable entities ahead of the compliance year, but potentially wider variations in the STP between compliance years, as corrections from previous years flow through.

The Authority sees benefit in the percentages being announced before the commencement of the compliance year. Such a change would allow a liable entity to be able to estimate its cumulative LGC liability throughout the compliance year with a higher degree of accuracy, and to be more informed when managing its certificate purchases. An earlier announcement of the STP would also allow a liable entity to estimate the number of certificates it must surrender for the whole of the first quarter of the compliance year, based on its previous year's reduced acquisitions.

Most stakeholders that responded to the Authority's preliminary view that the RPP and STP should be set earlier were supportive of the approach. Australian Power and Gas submitted that:

> *APG strongly supports the Authority's view to set the renewable power percentage and small-scale technology percentage ahead of the compliance year…*
>
> *By imposing a requirement on the Clean Energy Regulator… to set both the RPP and STP prior to the start of the compliance year (suggested by 1 December of the previous year) will greatly assist retailers with the management of their liabilities under the Schemes as well as their budgeting of certificate costs and negotiations in wholesale arrangements.*
> *(Australian Power and Gas, sub.188, p.2)*

The Authority's view is that it is desirable for the percentages to be announced by 1 December of the previous year. In light of this recommendation, the Government may also wish to consider whether to continue setting the RPP and STP in regulations, which can have relatively long lead times, or whether another instrument such as a determination, may be preferred to set the RPP and STP.

RECOMMENDATION

R.14. No changes be made regarding the process for calculating individual liability.

R.15. The relevant renewable power percentage and small-scale technology percentage should be required to be set prior to a compliance year, and preferably by 1 December of the preceding year.

6.2. Certificate surrender

Liable entities acquit their annual obligation by surrendering the required number of certificates to the Clean Energy Regulator.

Under the LRET, surrender occurs annually as part of a liable entity's annual 'energy acquisition statement', which must be submitted on or before 14 February. The statement allows the Clean Energy

Regulator to confirm that the entity has surrendered the appropriate number of certificates to meet its obligations. If the liable entity does not surrender the number of certificates required, a shortfall charge applies to the outstanding amount.

Surrender occurs quarterly under the SRES. The surrender is weighted toward the first quarter with a surrender requirement of 35 per cent of the STCs (due 28 April), followed by 25 per cent in the second and third quarters (due 28 July and 28 October respectively). The last quarter is around 15 per cent of the STCs (due 14 February) although this may vary as the liable entities' actual electricity acquisitions are known by this time and there is a need to true-up in this quarter. According to the *Enhancing the Renewable Energy Target Discussion Paper*, the rationale for this approach was to provide more regular cash flow to small-scale certificate holders (Commonwealth Government, 2010). This was considered necessary as, if certificates cleared at a set price through the clearing house, there would be no impetus for liable entities to make regular acquisitions of small-scale certificates.

The timing of surrender affects liable entities and certificate holders in opposite ways. Any cash flow benefit to certificate holders is potentially at the expense of liable parties. There are also higher administrative costs as the liable entity must demonstrate compliance four times a year.

In submissions to the issues paper, some stakeholders advocated for more frequent LGC surrender, on the basis that it would improve market liquidity. Meridian's submission stated that:

> *Forward prices for LGCs, with LGCs primarily being sold forward or through long-term off-take arrangements, tend to be set in a manner that reflects current spot LGC prices. Where the LGC spot price is suppressed or inflated during period of low liquidity, the LGC forward price will be similarly suppressed or inflated. Market participants with cheap access to cash can drive spot price outcomes through relatively small trades, in a manner which moves forward prices, in order to achieve more favourable pricing on larger contracts for forward delivery. For example, a well-positioned participant might deflate (inflate) spot prices in order to buy (sell) large forward volumes at deflated (inflated) pricing.*
>
> *Amending the LRET such that LGCs are surrendered on a quarterly basis (with an annual shortfall assessment in the same way that STCs are surrendered) would eliminate these anomalies and market inefficiency. (Meridian Energy Australia, sub.159, pp.14-15)*

Qenos, however, advocated for less frequent surrender of STCs, on the basis that it increased compliance costs (Qenos, sub.60, p.5). Qenos' submission also advised that requirements to determine quarterly surrender based on the previous years' consumption can create difficulties where electricity consumption varies significantly from year to year.

The Authority made a draft recommendation in its discussion paper that the current surrender timing (quarterly for SRES and annual for LRET) should be maintained. Feedback from stakeholders on the discussion paper has been generally supportive of the Authority's justifications for maintaining the current regime. The Clean Energy Council advised:

> *Having consulted with a cross sector of the PV industry the very strong response was that a shift to annual surrender periods would have a strongly detrimental effect on the industry by hurting cash flow, particularly to smaller businesses. While some in the industry would like more frequent surrender periods, all agreed that the current quarterly surrender periods stuck a good balance between compliance costs and cash flow, and subsequently that no change to the current regime was necessary. (Clean Energy Council, email correspondence, November 2012)*

Meridian Energy Australia wrote:

> *While Meridian stands by its suggestion [to increase LGC surrender to quarterly]…, it respects the Authority's conclusion that "the potential for additional compliance costs for quarterly surrender of LGCs" dilutes the benefits of a change. (Meridian Energy Australia, sub.211, p.2)*

The Authority's final view is that the current surrender arrangements should be maintained.
The Authority also notes that recommended changes to the announcement of the STP (R.15) may help to reduce some of the compliance cost burdens of liable entities under the SRES, as they will have greater certainty of their first quarter liability earlier in the compliance year and may therefore be able to manage certificate purchases in a more economically efficient way.

RECOMMENDATION

R.16. The current arrangements for surrender of certificates (annual surrender for the Large-scale Renewable Energy Target; quarterly surrender for the Small-scale Renewable Energy Scheme) should be maintained.

6.3. Refund of over-surrendered certificates

Currently, any certificates that have been surrendered in excess of a liable entity's actual liability are automatically held-over by the Clean Energy Regulator and are used to offset that entity's liability in future years. Origin Energy raised concerns with the current provisions that prevent the Clean Energy Regulator from refunding over-surrendered certificates, particularly in cases where a liable entity ceases to trade but cannot recover the value of over-surrendered certificates. Origin Energy's submission stated that:

> *Provisions in the LRET and SRES restrict or prevent the Regulator from returning surrendered certificates. In LRET and SRES any excess of certificates surrendered can be carried forward to offset future liabilities. However where a company ceases to trade "accepted" certificates cannot be recovered resulting in a financial loss to the company. (Origin Energy, sub.69, p.14)*

Over-surrender of certificates is more likely under the SRES than under the LRET because a liable entity must surrender certificates based on the previous year's liable acquisitions (or another estimate). A liable entity may therefore have over-surrendered certificates in a year in which they cease to trade because their estimated liability differs from their actual liability in a compliance year. This situation cannot be avoided without risking additional costs being accrued by the liable entity, as a shortfall charge may be applied if certificates are under-surrendered. By comparison, as the LRET scheme has annual certificate surrender, the liable entity knows its actual liability before it is required to surrender certificates in the February following the end of the compliance year.

The Authority considers that it is equitable to refund over-surrendered certificates in cases where a liable entity ceases to trade, or to transfer over-surrendered certificates where a liable entity is acquired by another entity which takes on a RET liability. Such a change would benefit liable entities by providing them with assurance that the value of over-surrendered certificates would not be lost if they ceased to trade. This assurance may be important if a liable entity is deciding between a possible over-surrender based on last year's reduced acquisitions, or providing the Clean Energy Regulator with a proposed amount on which to base SRES quarterly surrenders, which may attract retrospective quarterly shortfall charges if actual acquisitions are higher than the proposed amount. The precise features of the refund arrangements should be developed in consultation with stakeholders.

RECOMMENDATION

R.17. The Clean Energy Regulator should be able to refund over-surrendered certificates to a liable entity that ceases to trade, or to transfer over-surrendered certificates if a liable entity is acquired by another entity which takes on a Renewable Energy Target liability.

6.4. Shortfall charge

If a liable entity does not surrender the number of certificates required under the LRET or the SRES, a shortfall charge applies to the outstanding amount. The shortfall charge for both the LRET and SRES is fixed at $65 per MWh. Costs incurred by purchasing certificates are tax deductible, while the payment of the shortfall charge is not. Therefore, liable parties could purchase certificates up to a (tax effective) price of around $93, assuming a company tax rate of 30 per cent, before they were financially worse off than paying the shortfall charge.

The shortfall charges are not indexed, and therefore fall in real terms over time. This was a deliberate policy decision, reflecting the nature of the RET as a transitional measure to bridge the gap between fossil-fuel and renewable energy costs in the short- to medium-term. It is expected that as the cost of renewable energy technologies decline, and the carbon price increases, it will allow renewable energy technologies to compete in their own right.

Stakeholders that commented on the level of the shortfall charge in their submissions had varied opinions on whether the current shortfall charge was appropriate. The Clean Energy Council, Climate Markets and Investment Association, and Windlab Systems Pty Limited were all of the opinion that the current shortfall charge was appropriate. Infigen Energy further advised that:

> *The current tax effective shortfall penalty price of $92.86 [per] MWh is appropriate and sufficient to enable the 41 000 [GWh] renewable energy target to be achieved – as long as investors and the industry have confidence that the LRET target will not be reduced or stretched out. (Infigen Energy, sub.111, p.6)*

The Authority also received a number of submissions suggesting the current shortfall charge was either too high or too low. Major Energy Users Inc. stated in its submission that:

> *Historically, forecasts for the cost of providing renewable energy in the future show that renewable energy could cost much the same as non-renewable generation by 2030. This implies that the future cost of LGCs could fall from current levels. On this basis, the shortfall charge is probably too high. (Major Energy Users Inc., sub.103, p.20)*

By comparison, CleanSight Pty Ltd, LMS Energy Pty Ltd and Evans and Peck advocated for a higher shortfall charge which is increased annually to account for inflation so that in real terms the level of the shortfall charge stays the same.

Whether the shortfall charges are set at the appropriate level depends on their desired role. The RET shortfall charge potentially performs two functions:

- first, as an administrative penalty for liable parties that do not meet their obligations to surrender certificates; and
- second, as a price cap to limit the overall cost of a scheme or mechanism.

If the charges are set very high they will not operate as a price cap in practice as it will rarely be more financially attractive to pay the charge than to purchase certificates.

If the shortfall charges operate as a price cap, they have the benefit of reducing price uncertainty for liable entities and ensuring the costs of the scheme are contained. It also makes explicit the policy response in the event of extreme pricing outcomes. For example, if the price rises, there will become a point where it is undesirable to continue to impose the cost of the scheme and a price cap provides an explicit indication of where that point is.

The disadvantage is that the amount of renewable energy generated is reduced if liable entities choose to incur shortfall charges rather than purchasing certificates from eligible generators.

To date, the price of certificates has never risen above $93 and therefore the shortfall charges have only been used when entities have mismanaged their liability or lacked sufficient funds to purchase certificates. Even if the price of certificates were to rise above $93, entities may choose to acquire certificates, rather than pay the shortfall charges, for reputational reasons.

At its current level, the shortfall charge operates more as an administrative penalty, rather than a price cap. It is high enough to dissuade entities from accessing it on a regular basis. However, it also provides a 'safety valve' that can be accessed in unforeseen circumstances (for example, in the event of a short-term lack of supply of certificates or finance).

The modelling work commissioned by the Authority indicates that the price of certificates is not expected to increase to a level where the LRET shortfall charge would operate as a price cap, except under scenarios where there is no carbon price or electricity demand is significantly lower than currently anticipated (see Appendix D). In response to the Authority's draft recommendation to retain the shortfall charge, Sinovel wrote:

> *Sinovel is of the opinion that the shortfall charges should not be touched. The current shortfall charges are demonstrably high enough to stimulate new generation and with technology and scale gains likely to offset the reduction in resource quality over time this [is] likely to always be the case. The argument for stability over change has already been made in regards to other recommendations. (Sinovel, sub.219, p.3)*

The Authority's view is that the shortfall charge is set at an appropriate level given the current policy context. However, in the event that the carbon price or electricity demand is significantly lower than currently anticipated, there is a risk that the shortfall charge would not be high enough to encourage compliance, in which case the 2020 target of 41 000 GWh would not be met. The Authority will consider these issues in its 2016 review, or earlier if circumstances warrant.

RECOMMENDATION

R.18. The current settings for the shortfall charges should be maintained. However, the level of the shortfall charge should be reconsidered by the Authority as part of its 2016 review of targets beyond 2020, or earlier if circumstances warrant.

6.5. Exemptions

There are two forms of exemptions under the *REE Act*. The first is a partial exemption for EITE activities; the second relates to self-generation (that is, where the end-user and generator are the same entity).

The broader the base for liability, the smaller the impact for any individual liable party. For this reason, it is generally more efficient and equitable to keep exemptions to a minimum.

The exemption framework does not affect the environmental effectiveness of the RET, because the number of certificates required to be surrendered under the scheme does not reduce by the extent of the exemptions. Instead, the exemptions have the effect of reducing or removing liability from some electricity users, and redistributing that liability to other entities that remain liable. Each exemption under the RET scheme is considered in more detail below.

6.5.1. Emissions-intensive, trade-exposed activities

Businesses carrying out eligible EITE activities may apply annually for a PEC under the RET. These exemptions were introduced in 2009 when the RET was expanded, and took force in 2010. A PEC application must be made to the Clean Energy Regulator by 30 March (or by 29 April for certain EITE activities).

The general rationale for providing assistance to EITE activities is that these businesses are competing in an international setting where their competitors do not face a similar impost. EITE businesses are unable to pass on the additional cost of the RET to their customers, to remain competitive, and must absorb the additional cost of the RET. This may cause EITE businesses to move the activity to a country that does not have a RET (or other such cost imposition), which is undesirable from an Australian industry perspective.

The partial exemption framework under the RET is similar to, but not the same as, the Jobs and Competitiveness Program under the carbon pricing mechanism. The information and data required to determine the assistance are largely the same – for example, the same list of EITE activities applies and the energy and production data required is the same. The resulting exemption, however, is calculated differently. This is primarily because the RET exemption focuses on electricity use, while the Jobs and Competitiveness Program focuses on emissions.

The RET partial exemption framework works by first identifying EITE activities. Eligible trade-exposed activities are assessed for their overall emissions intensity on the basis of historical data, regardless of the extent to which those emissions are related to electricity use. Under the RET, activities that are classified as highly emissions-intensive receive an assistance rate of 90 per cent, while activities that are assessed as moderately emissions-intensive receive an assistance rate of 60 per cent. There are currently more than 30 eligible EITE activities, including aluminium smelting, integrated production of lead and zinc, manufacture of newsprint, carton board manufacturing and petroleum refining.

An EITE business can apply to the Clean Energy Regulator for a PEC. The Clean Energy Regulator calculates the value of the PEC taking into account the assistance rate and a range of other inputs including:

- electricity use per unit of output for the activity – each activity has a specified electricity baseline, the value of which is predetermined from historical data and is set in the Regulations;
- output – the quantity of relevant product is submitted to the Clean Energy Regulator by the EITE organisation every year; and
- proportion of electricity use from a given site that is related to the EITE activity and thus could be eligible for a PEC – this is only relevant if multiple activities or processes are carried out on the one site.

A PEC is awarded to an EITE business as a volume of electricity (in megawatt hours) for which they are not liable under the RET. The volume of partial exemptions is significant. In 2011, partial exemptions of around 27.5 million MWh of electricity were exempted from RET liability, equal to approximately

13 per cent of the total relevant acquisitions of electricity for the RET in 2011. This equates to an exemption worth approximately $184 million at the average 2011 price of $38.80 per LGC and $30.30 per STC. EITE exemptions result in increased costs for other RET liable entities, because they must share the RET liability for the electricity exempted in the PECs. As a rough guide, dividing the value of the 2011 partial exemptions by the reduced number of liable acquisitions (estimated to be 180 million MWh), the exemption would have been expected to add approximately $1.02 per MWh to the price of non-exempt electricity consumption.

The existence and level of the emissions-intensive, trade-exposed exemption

The Authority received over 20 formal submissions plus additional feedback regarding the current level of the EITE partial exemption. A number of the submissions stated that the RET places a substantial burden on EITE industries that are struggling to remain viable in current economic conditions, and emphasised the importance of continuing, or expanding, the current exemptions for those industries to maintain viability. For example, the Australian Aluminium Council stated that**:**

> *…even with the existing exemptions, RET costs the aluminium industry approximately $80 million per annum or $40 per tonne of aluminium at a time when the Australian aluminium industry is loss making and the viability of most facilities is under question and requiring severe cost reduction strategies in order to survive. (Australian Aluminium Council, sub.73, p.8)*

Conversely, a small number of submissions supported reviewing exemptions and reducing, or removing, them if appropriate. For instance, the Australian Network of Environmental Defender's Office New South Wales submitted that:

> *Both the EITE partial exemption and the 'self-generator exemption' should be reviewed, with a view to further limiting or phasing out these exemptions, and increasing their transparency. (Australian Network of Environmental Defender's Office NSW, sub.141, p.3)*

Treatment of the Mandatory Renewable Energy Target for emission-intensive, trade-exposed exemptions

As currently framed, the partial exemption only applies to an EITE entity's liability above the original MRET – EITE businesses are fully liable for their share of RET costs for the first 9 500 gigawatt hours of renewable energy created under the RET (and have been since the commencement of the MRET in 2001). The partial exemption for EITE industries was announced in 2009 in the context of the then proposed Carbon Pollution Reduction Scheme.

The purpose of the partial exemption above the first 9 500 GWh target was to recognise that EITE industries would be affected by a carbon price in the context of other cost pressures, such as the global recession (Commonwealth House of Representatives 2009). While legislators provided EITEs with a partial exemption from the liability associated with the expanded RET, they considered it was reasonable to require all businesses to make some contribution towards renewable energy generation (Commonwealth House of Representatives 2009). This position was reiterated by the Senate Standing Committee on Environment, Communications and the Arts, which held an inquiry into the *Renewable Energy (Electricity) Amendment Bill 2010* and found that:

> *In relation to the proposition that EITE activities should receive exemption for their liabilities under the former MRET, there was no evidence presented to the inquiry that the industries were significantly or disproportionately disadvantaged by that scheme. On that basis, there*

would seem to be no particular reason why they should now be exempted from liability for their share of the former target. (Commonwealth Senate, 2010, paragraph 4.17)

However, given the concerns expressed by the aluminium and cement industries and the emissions intensity and export oriented nature of the aluminium industry in particular, the committee would expect that the matter of the exemptions for EITE activities will be covered in the 2014 statutory review of the scheme. (Commonwealth Senate, 2010, paragraph 4.19)

The Authority received feedback from EITE industries and peak bodies that advocated for the extension of partial exemptions for EITE industries to the MRET liability. Advice from the Australian Aluminium Council stated:

…the RET imposes significant costs on our industry today, in a commercial environment where the low aluminium price and high Australian dollar make facilities extremely vulnerable to the imposition of additional costs. (Australian Aluminium Council, sub.177, p.1)

The Authority recognises that the MRET proportion of the RET imposes significant costs to EITE industries, particularly the aluminium industry, which has the highest electricity acquisitions and accounted for 65 per cent of the partial exemptions awarded in 2012. Assuming an STC price of $32 and an LGC price of $48.26 (used in the Authority's modelling), the MRET related costs on EITE industries would be approximately $66 million in 2012. In principle, the justifications for EITE industries receiving a partial exemption (being higher costs imposed by the carbon price and international competitiveness concerns) apply to the MRET component as they do to the expanded RET. The trade effectiveness of Australia's EITE industries will be influenced by all policies and inputs that increase the costs of EITE production, including the MRET liability.

The Authority also recognises that extending the partial exemption arrangements to the MRET will result in higher RET costs for all other liable entities, because they would need to pick up those costs in order for the target to still be met. Based on the STC and LGC prices estimated above, the cost of the RET for all liable electricity would increase by approximately $0.36 per MWh. The extent of the costs and benefits of such a change in EITE liability require careful consideration in the context of international competitiveness for EITE industries and electricity costs for all electricity users, which the Authority considers cannot be conducted comprehensively within the timing of the RET review.

The Jobs and Competitiveness Program is the EITE industry assistance measure under the carbon pricing mechanism, and is due to be reviewed by the Productivity Commission in 2014-15. As the rationale for the RET EITE partial exemption and the method of calculating its value is based on the Jobs and Competitiveness Program, the Authority considers that it would be more appropriate if the Productivity Commission also considered the level of RET EITE assistance arrangements as part of the Jobs and Competitiveness Program review. The existence and level of the RET EITE exemption (including the MRET liability) are best assessed in the context of carbon price assistance, as the Jobs and Competitiveness Program and EITE exemption measures work together to provide a level of protection against carbon leakage, whereby Australian industries move offshore to avoid the burden of greenhouse gas reduction policies.

Following the release of the discussion paper, the Australian Aluminium Council raised concerns that the proposal that the Productivity Commission review the EITE exemption under the RET in 2014-15 was 'too late'. Their feedback stated:

Our initial submission highlighted that the RET imposes significant costs on our industry today, in a commercial environment where the low aluminium price and high Australian dollar *make facilities extremely vulnerable to the imposition of additional costs. There is potential that significant damage will be caused to the sustaining investment in, and even ongoing operation of, Australia's aluminium smelters and alumina refineries before the proposed review in 2014-15.*

…we ask that the final report recommend the EITE exemption be extended to cover the MRET component from 2013. This change could, if necessary, then be reviewed more broadly in 2014-15 by the Productivity Commission as per the original recommendation. (Australian Aluminium Council, sub.177, p.1)

Similar sentiments were raised by CSR:

CSR is disappointed that this has not been addressed in this review, where electricity intensive industries suffer a considerable burden from RET when international commodity prices are extremely low and competing economies do not have such Government imposts. The matter should be addressed now, not in two years. (CSR, sub.195, pp.2-3)

On this issue, the Authority notes that the *Securing a Clean Energy Future* policy statement notes that 'once the carbon pricing mechanism has been released, firms may make a request to the Government to have the impact of the mechanism on their sector assessed' (Commonwealth Government, 2011, p.112). The Government has since released guidelines which set out when such requests will be referred to the Productivity Commission and the terms of reference for the reviews. The guidelines state that the aim of a Productivity Commission review is to:

…establish whether the introduction of the carbon pricing mechanism, taking into account associated assistance arrangements, is having a materially adverse and unexpected impact on the competitiveness of the industry that the firm is operating in, that is likely to persist in the medium to long term. (Commonwealth Government 2012)

In order for the Government to refer an industry assistance review to the Productivity Commission, the industry is required to provide evidence of adverse impacts as a result of the carbon pricing mechanism, with such evidence able to include, but not limited to, 'analysis demonstrating that the direct or indirect carbon costs arising from the carbon price mechanism comprise a significant proportion of revenue (or value added), and a demonstrated inability to either pass-through these costs to customers nor take action to abate them' (Commonwealth Government 2012).

The Authority considers that the relevant considerations for EITE assistance under the RET are much the same as under the carbon pricing mechanism, as the purpose of both EITE assistance measures is to reduce the impact of the schemes on the competitiveness of EITE industries. Along with the recommendation for the Productivity Commission to consider RET EITE assistance as part of the Jobs and Competitiveness Program review, the Authority's view is that the guidelines for whether an industry can request an earlier review of the Jobs and Competitiveness Program should also take into consideration evidence of adverse impacts of the RET on the competitiveness of the EITE industry, when determining whether to refer the matter to the Productivity Commission. This would provide EITE industries that are concerned about the level of assistance provided under the RET a possible recourse to have their assistance levels reviewed sooner.

RECOMMENDATION

R.19. The level of the emissions-intensive, trade-exposed exemption under the Renewable Energy Target should be considered by the Productivity Commission as part of its broader review of the Jobs and Competitiveness Program.

R.20. The Commonwealth Government should take into consideration the impact of the Renewable Energy Target on the competitiveness of an emissions-intensive, trade-exposed industry in any request to the Productivity Commission's review of the level of industry assistance under the carbon pricing mechanism and the Renewable Energy Target.

6.5.2. Technical amendments to the emissions-intensive, trade-exposed partial exemption framework

The Authority has considered a number of technical amendments to the operation of the EITE partial exemption framework, including flexibility regarding the use of PECs and alignment of reporting requirements under the PEC scheme and the Jobs and Competitiveness Program.

Partial Exemption Certificate flexibility

As previously described, the exemptions for EITE businesses are issued in the form of PECs, which remove RET liability for the volume of electricity (in megawatt hours) which is specified in the PEC. EITE businesses are not usually liable entities under the *REE Act*, so the PEC also nominates a liable entity (typically the EITE business's electricity retailer), against which the exemption can be recognised.

Because the electricity retailer's annual RET liability is reduced by the volume of electricity specified in the PEC, it is assumed that the full reduction in liability is passed through to the EITE customer. In reality, however, the value of the PEC is negotiated between the EITE business and its electricity retailer, and may be influenced by assumptions regarding the price of renewable energy certificates, as well as any differences in bargaining power. There is therefore a risk that a liable entity does not pass the full value of the exemption through to the EITE business. Such a situation could undermine the objective of providing the EITE assistance, which is to reduce the RET burden of the EITE business, not the electricity supplier.

A number of submitters requested that PECs be made 'tradeable' in some way. The Australian Industry Greenhouse Network submitted that:

> *One option to ensure the full opportunity value of PECs is realised is through access to an open market – potentially by formally linking the value of a PEC to the value of a LGC. This will lead to more efficient price discovery, avoid value destruction and allow the intent of the PEC to be met. (Australian Industry Greenhouse Network, sub.164, p.6)*

Although many submissions requested that PECs be treated in the same way as certificates, PECs operate differently from certificates. Certificates can be surrendered to meet obligations under the RET, whereas a PEC reduces the overall amount of generation acquired by a retailer that is subject to RET liabilities, rather than directly meeting RET obligations. Consequently, PECs and certificates are not directly interchangeable. Furthermore, if PECs could be used to meet liabilities in the same way as certificates, this would reduce the amount of renewable generation that is achieved by the RET, which would reduce the environmental effectiveness of the scheme.

The Authority's view is that an EITE business could potentially obtain greater value for their PECs if they could be traded with any liable entity, rather than just the electricity retailer that sells electricity to the relevant EITE firm. This approach would create a market for PECs, with multiple sellers and buyers, and would allow liable entities to compete for PECs based on their willingness to pay. By doing so it could reduce the effect of any differences in bargaining power between an EITE business and their electricity retailer, as the EITE business would have the option to not trade their PECs with their retailer if they believed that could get better value elsewhere.

The Authority included a draft recommendation in its discussion paper to introduce tradeability of PECs. The draft recommendation was generally well received, particularly by EITE industries and their peak bodies. The Australian Aluminium Council advised:

> *The Council supports the Authority's recommendations that large electricity consumers should be able to opt-in to assume direct liability for RET obligations and that the Partial Exemption Certificates should be tradable. These initiatives would strengthen the market-based, least-cost aspect of the RET, within the policy's other limitations. (Australian Aluminium Council, sub.177, p.2)*

Some stakeholders advised that PEC tradeability, while a good idea to improve flexibility for large energy users, may not be necessary if large energy users can opt-in to manage their own RET liability. In such cases, a liable entity which is also an EITE business may choose to offset it's RET liability using its own PECs. Notwithstanding that this may occur, the Authority considers that PEC tradeability remains important in its own right, as the threshold for opt-in may exclude some EITE businesses from managing their own RET liability. Some EITE businesses may also find it more economically efficient to trade their PECs irrespective of whether they have opted-in, particularly if their liability in a compliance year is less than the value of their PEC, which is based on the previous financial year's production.

The Authority does not consider that there are material costs associated with making PECs tradeable. However, the Authority acknowledges that there may be some current contracts between electricity suppliers and EITE businesses that do not allow for pass-through of RET related costs to the EITE customer. While these contracts are expected to be few in number, PEC tradeability may impose costs on the electricity supplier if their EITE customer chooses to trade their PECs with a different liable entity or requests payment for the PECs, even though no RET costs were ever being passed on. In such cases, the electricity supplier would be required to pay for the costs of the RET for the liable electricity acquisitions, with no reduction in liability that would otherwise be provided by PECs. This may result in a significant increase in RET costs for the electricity supplier, and a windfall gain for the EITE customer.

Under the carbon pricing mechanism, the *Clean Energy Regulations 2011* require a minimum pass-through rate of the carbon price between an electricity retailer and certain very large energy users, before the large energy user is eligible to receive free carbon units. The average pass-through of carbon pricing mechanism related costs need to be more than 0.7 carbon units per MWh before the large energy user is eligible to receive free carbon units. To demonstrate compliance, the EITE business and its contracted electricity supplier are required to provide the Clean Energy Regulator with a written statement that the pass-through rate is expected to exceed the minimum threshold for the life of the contract or until 30 June 2021 years, whichever is earlier.

The Authority considers that an approach to ensuring that PECs are not tradeable in circumstances where EITEs are not actually bearing the costs of the RET should be developed.

The Authority recognises that there may need to be some administrative changes to issuing and surrendering PECs, to ensure their trading is efficient and transparent, and to assist liable entities to demonstrate compliance as easily as possible. Those changes would be expected to incur some additional administrative costs for Government. On balance, however, the Authority's assessment is that the benefits of allowing additional flexibility for EITE entities outweigh the administrative costs.

RECOMMENDATION

R.21. In cases where the RET costs are passed through to emissions-intensive, trade-exposed businesses, partial exemption certificates should be tradeable, and thereby able to be used by any liable entity to reduce liable electricity acquisitions.

Alignment of Jobs and Competitiveness Program and partial exemption certificate processes

Currently EITE entities are required to submit separate applications to the Regulator to receive PECs under the RET and to receive free carbon units under the Jobs and Competitiveness Program. Applications are due by 31 October of the relevant carbon pricing mechanism (financial year) compliance year, and RET applications are due by 30 March of the RET (calendar) compliance year.

The requirements for data used in the Jobs and Competitiveness Program and PEC applications are similar. Both PEC and Jobs and Competitiveness Program applications require provision of information about the amount of production in the previous financial year. Although PEC allocations are made on a calendar year basis and free carbon units are allocated on a financial year basis, both processes use production information from the last completed financial year (that is, both PEC allocations for the 2013 calendar year and Jobs and Competitiveness Program allocations for the 2012-13 application year rely on production information from the 2011-12 financial year). The PEC application also requires additional information about the amount of liable electricity consumed at the site in the previous year.

Auditing and assurance requirements for PEC and Jobs and Competitiveness Program applications are generally the same. However, in some cases where an application is in relation to a new site or a significant expansion to an existing site, entities are able to use estimates of future production. In these cases more stringent audit and assurance requirements are applied to the estimates for PEC allocation than those applied to Jobs and Competitiveness Program allocations.

A number of submitters requested that EITE processes for the Jobs and Competitiveness Program and RET be aligned to reduce compliance costs. For instance, Amcor Packaging Australia submitted that:

> *All EITE businesses must apply to the Clean Energy Regulator for [PECs] for each EITE activity, based on prior year's actual production. The application for assistance must be audited by a registered auditor as per the REC Regulations.*
>
> *Now that the carbon pricing mechanism has been introduced with a similar [Jobs and Competitiveness Program] application procedure, the application process for the 2 forms of assistance should be harmonised and streamlined so only one application and one 3rd party audit of the energy and production data is required. (Amcor Packaging Australia, sub.55, p.5)*

The timing differences between PEC and Jobs and Competitiveness Program applications mean that it is unlikely that a single application could be made for both. The key driver of timing differences is the date by which liabilities can be determined for the RET, which cannot be done accurately until after the setting of the RPP and STP. Even if the date for publication of the RPP and STP is brought forward to December before a compliance year, as proposed by the Authority, this will not be sufficiently early to allow for a single application. It is unlikely that liable entities would wish to take the alternative approach of delaying decisions on Jobs and Competitiveness Program free carbon unit allocations to allow a single application to be made.

As much of the information used is the same between the applications, however, it should be possible to streamline the two application processes to minimise duplication of work and allow sharing of information between applications. A potential limitation that may need to be addressed is that the eligible applicants for the RET and Jobs and Competitiveness Program will often be different entities, which may create legal impediments to sharing information between applications. In addition, the concept of a 'site' at which electricity is consumed that is used as a basis of RET allocation is not exactly the same as a 'facility' that is used for allocation under the Jobs and Competitiveness Program, and there may be benefits to matching these two definitions to align the scope of information to be given in applications.

Opportunities also exist to streamline audit and assurance processes between the Jobs and Competitiveness Program and PEC applications. In particular, the audit and assurance requirements under the RET and the Jobs and Competitiveness Program for estimates of future production could be matched, as there do not appear to be any reasons for more onerous requirements to be applied under the RET. Consistent with the improvements recommended above for application processes, there may also be opportunities to seek permission for the sharing of data between the audit processes where different legal entities are involved in providing the data, and to removing differences between the definition of site and facility to align the scope of audit and assurance requirements. The cost savings for consolidating audit requirements where possible are likely to provide a noticeable reduction in compliance costs for EITE businesses.

In response to the discussion paper and preliminary views of the Authority, Rio Tinto and CSR advocated greater alignment where it would reduce administrative burden. CSR submitted:

> *All efforts to remove red tape and streamline processes are supported. (CSR, sub.195, p.3)*

The Authority understands that the Clean Energy Regulator is already examining a number of the opportunities under the current legislation for the proposed alignment identified above, and encourages the Government to implement administratively efficient options.

RECOMMENDATION

R.22. The Commonwealth Government should consider opportunities for efficiencies through the alignment of application processes and data requirements for emissions-intensive trade-exposed industries under the Jobs and Competitiveness Program and Renewable Energy Target.

6.5.3. Self-generator exemptions

The second form of exemption under the RET applies to entities that generate their own electricity. To be exempt, a self-generator (on a grid of greater than 100 MW capacity) must:

- produce and use the electricity for themselves with no take-off from a third party; or
- in cases where the self-generator is the primary, but not the only, user, the electricity must be used within a one kilometre radius of its production by the entity that generated it.

The self-generator exemption has been included in the MRET since its commencement in 2001. It was retained with the expansion of the RET and the inclusion of the EITE exemption in 2009.

Limited information is available on the amount of self-generation that occurs in Australia, as parties that fall under the self-generator exemption are not required to report the volume of electricity produced under the *REE Act*. The Explanatory Memorandum to the *Renewable Energy (Electricity) Bill 2000* estimated the impact of self-generation to be 'between 4-5 [per cent] of generated electricity, with up to

75 [per cent] of this electricity being consumed internally (that is, by the self-generating business itself)' (Commonwealth Government, 2000, p.8). While it is difficult to accurately estimate the true impact of self-generation, electricity produced by self-generators would only comprise a small proportion of the total electricity generated in Australia.

The Authority's preliminary view, as outlined in the discussion paper, was that the self-generation exemption imposes higher RET costs on other liable entities, and is therefore undesirable from a first principles basis. EITE industries, which have the greatest exposure to higher electricity costs that cannot be passed onto customers without reducing their competitiveness, are already protected from the full impacts of the RET through partial exemptions. EITE industries therefore do not, of themselves, appear to require a further self-generation exemption. The Authority also found that the original justification for including the self-generation exemption was unclear – publicly available documentation on the policy's development did not set out the rationale for the original inclusion of the self-generation exemption, except to say that self-generation may use more efficient technologies.

The Authority's discussion paper provided a draft recommendation that the self-generation exemption should be retained for currently exempt self-generators, but that the exemption should not be extended to new self-generation projects. Considerable feedback was provided by stakeholders on this draft recommendation, and further issues were identified regarding the effect of repealing the exemption for new self-generators. These issues are addressed below.

Environmental considerations

Several stakeholders commented on the fact that large-scale self-generation typically produces fewer emissions than coal-based electricity generation, and creating a RET liability for new self-generators would significantly reduce the economic benefits of investing in those less emissions intensive technologies. In its response to the discussion paper, AGL advised:

> *The [Climate Change Authority] proposes to remove the exemption from RET liability for new self-generation on the grounds that there is no strong case for this exemption to exist particularly given the carbon price will encourage less emissions-intensive self-generation where it is cost-effective to do so.*
>
> *The considerable uncertainty that currently exists around the future of the carbon price discourages significant investment in and the development of low emissions-intensive energy generation. With this uncertainty largely muting the price signal that the carbon price would otherwise create, cost-effective, low emissions-intensive self-generation is strongly incentivised by the exemption from RET liability that current exists. (AGL, sub.181, p.2)*

The Major Energy Users Inc. further advised that:

> *Self-generation is most commonly focused on maximising the efficiency of conversion of the fuel used (thereby reducing carbon emissions) and maximising efficiency of energy use is a state policy of all State and Federal governments. Applying the RET to self-generation will make such projects less commercially viable (even non-viable) and perversely reduce the ability of enterprises implementing actions to achieve what the entire process of efficiency targets and carbon emissions reduction. Therefore applying the RET to self-generation is a self-defeating exercise. (Major Energy Users Inc., sub.210, p.14)*

Stakeholders raised concerns that investment in cogeneration technologies in particular would not occur if the self-generation exemption was not available to new self-generators. Cogeneration technologies capture waste heat from onsite electricity production and use that heat for other industrial purposes, such as to heat water. Cogeneration technologies are typically high cost electricity generation investments. Stakeholders advised that cogeneration technologies would never be taken up if RET liability applied to the electricity produced by those units, because it would further reduce the economic benefits of investing in the technology, despite its high energy efficiency outcomes.

The Authority considers that it would be a perverse outcome if the application of the self-generation exemption prevented the uptake of lower emissions technologies, reducing the environmental effectiveness of the RET.

Threshold issues in relation to the self-generation exemption

Removing the self-generation exemption would involve substantial administrative complexities and therefore costs. Although conceptually straightforward, implementation of the self-generator exemption would require substantial amendments to the operation of the *REE Act* and its administration by the Clean Energy Regulator.

As described previously, no RET liability is currently imposed on an entity which is connected to a grid above 100 MW capacity that consumes its own generation with no off-take, or is the primary consumer of the self-generation and consumes the electricity within one kilometre of where it is produced. Based on this definition, electricity produced from small generation units such as household or commercial solar photovoltaic (PV) is covered by the self-generation exemption. This means that removing the self-generation exemption would automatically impose a RET liability on new small-scale generation units, unless the *REE Act* explicitly stated otherwise. Other new medium to large solar and other generators which would have otherwise obtained the self-generation exemption would also be liable for the RET.

Currently, the self-generation exemption is effective at constraining the number of liable entities to those which are large electricity users or acquirers (such as electricity retailers). This reduces the administrative burden of the RET, because the many small self-generators (such as household PV) and other medium to large commercial generators are not required to manage their own RET liability.

The Authority considers that applying RET liability to electricity produced by household PV units and other small self-generators is undesirable, due to the relatively high administrative costs that would be imposed on those parties, and the additional costs to government of administering the scheme to those parties if they were considered liable entities. Therefore, any repeal of the self-generator exemption for new self-generators would need to include a threshold on the size of the generation unit or amount of electricity produced. The Authority considers that the development of such a threshold would require considerable analysis to determine its effects on the parties who may become liable for the RET. The choice of threshold would also invariably involve some degree of arbitrariness, particularly around which parties are 'just in' versus 'just out'.

There would also be increased costs for both the Clean Energy Regulator and potentially liable entities to monitor and enforce the threshold and new liability requirements.

On balance, the Authority considers that, given the small proportion of electricity estimated to be produced by self-generators, and complications regarding the setting of an appropriate threshold to determine which new self-generators would need to be assessed for the exemption, it is likely to be more environmentally effective and economically efficient if the self-generation exemption continued in its current form.

Self-generator offtakes

As previously discussed, to be eligible for the self-generator exemption on a grid above 100 MW capacity, the self-generator must not provide any offtakes to third parties, or must be the primary consumer of the electricity generated and consume that electricity within one kilometre of where it was generated.

In submissions to the issues paper, several stakeholders raised concerns that the current definition of self-generation prevents any offtakes for third parties. The Australian Aluminium Council submitted that:

> *In many resource projects there are related services (e.g. emergency services, telecommunications) or communities that have few alternatives for electricity other than the self-generated electricity supply for the resource project. The company is left with a perverse incentive to either incur a significant RET liability (by supplying electricity to the services and communities), or seek to save costs by disconnecting related services that use a minor amount of electricity. (Australian Aluminium Council, sub.73, p.6)*

This concern was reiterated by the Chamber of Minerals and Energy of Western Australia (sub.106, p.2).

The Authority considers that, while it is not an objective of the RET to ensure electricity is provided for remote community purposes, it is economically inefficient for small organisations in remote locations to develop their own electricity generation sources when a self-generator can supply the incidental electricity at low cost and lower emissions. It is also a perverse social and policy outcome if services that benefit the community, particularly emergency services, are not established or must incur higher costs due to self-generators not being able to provide incidental electricity offtakes. Notwithstanding this position, the Authority acknowledges that any change to allow electricity offtakes while retaining the self-generation exemption should be limited and transparent. Providing a wide definition of allowable offtakes would reduce the equity of the RET by extending exemptions to other electricity users, to the detriment of those liable under the RET.

The Authority therefore recommends that the Department of Climate Change and Energy Efficiency, in consultation with the Clean Energy Regulator and affected stakeholders, develop an approach for defining when incidental offtakes in remote locations may be allowed without disqualifying the self-generator from the exemption it would otherwise receive. Considerations for allowable offtakes may include the size of the offtake relative to the amount of electricity generated by the self-generator, the purpose of the offtake, and the remoteness of the location.

RECOMMENDATION

R.23. The self-generation exemption should continue in its current form.

R.24. Arrangements should be developed to allow for incidental electricity offtakes under the self-generation exemption which provide community benefits in remote locations.

CHAPTER 7. ELIGIBILITY

This chapter considers the eligibility of sources under the Large-scale Renewable Energy Target (LRET) and technologies under the Small-scale Renewable Energy Scheme (SRES), with specific regard to the eligibility of waste coal mine gas and biomass from native forests under the LRET, and whether additional technologies including displacement technologies should be eligible under the SRES.

7.1. Eligibility framework and accreditation of power stations under the Large-scale Renewable Energy Target

Certain eligibility, registration and accreditation requirements must be met before certificates can be created under the Renewable Energy Target (RET) scheme. For the LRET, the energy source must be listed as “eligible” under the *Renewable Energy (Electricity) Act 2000* (Cth) *(REE Act)*, the owner (or nominated person) must be registered with the Clean Energy Regulator, and the power station must be accredited.

The LRET takes a ‘list’ approach to eligible sources. There are currently 19 eligible renewable energy sources listed in the *REE Act* including hydro, wind, solar, geothermal-aquifer, ocean, wave, certain biofuels and biomass sources, and landfill and sewage gas. Additional renewable sources may be added by regulations.

The *REE Act* specifically states that fossil-fuels and materials or fossil-fuel waste products derived from fossil-fuels are not eligible renewable energy sources. This effectively means that these sources cannot be added through regulations; to do so would require an amendment to the *REE Act*. Although the RET is designed to promote renewable energy, there is one waste product derived from fossil-fuels, waste coal mine gas, that is included as an eligible source until the end of 2020.

A number of submissions supported the list approach as an appropriate method of providing the basis for accrediting power stations. Further, those who commented on the approach in response to the discussion paper were also supportive. The Authority agrees that the list of eligible sources is extensive and allows for a variety of technologies to be deployed.

The Australian Geothermal Energy Association has commented that the definitions for two currently eligible sources, geothermal-aquifer and hot dry rocks, are out of date and should be changed to hot sedimentary aquifer and hot rock respectively. In the discussion paper, the Authority noted two considerations with regards to whether the current definitions should be changed:

- whether the Clean Energy Regulator can accredit power stations based on current definitions with the view that they are broadly similar, as this would not require any legislative change; or
- whether an amendment to the *REE Act* may be required, or if new definitions can be added through regulations, which may be a simpler way of updating the definition.

The Clean Energy Regulator has advised the Authority that it would interpret the current definitions to include hot sedimentary aquifer and hot rock. If greater clarity was required on application for accreditation, the Clean Energy Regulator also advised that this could be done using existing provisions in the *REE Act* that allow for regulations to be made to clarify eligible sources.

The view of the Authority is, therefore, that existing definitions for sources used for geothermal energy are satisfactory and no changes need to be made to the *REE Act* to incorporate new definitions.

7.1.1. Registration and accreditation process

The accreditation process establishes that a given power station is eligible to create large-scale generation certificates. The accreditation process is outlined in Box 9. The Authority has considered whether the process is robust and effective, accessible, and timely.

Requiring one point of contact ensures efficient communication throughout the application process and minimises processing time. Pre-approval arrangements provide flexibility for power stations that are in development or are seeking financial support on the basis that they will be approved.

The timeframes for approving applications are set out in legislation, which provides a level of confidence for applicants. The Clean Energy Regulator advised the Authority that decisions on some power stations can take longer than six weeks, however any delays are usually due to verifying supporting documentation.

One objective of the *REE Act* is that renewable energy generated is ecologically sustainable. The requirement for applicants to provide evidence that their power station conforms to planning and environmental laws ensures that accredited renewable power stations relate to this objective.

Registration and accreditation fees are clearly set out in regulations, and are listed according to the size of the power station and related accreditation requirements. This approach is equitable for applicants, ensuring that they only pay for the cost associated with their circumstances.

The Clean Energy Regulator advised the Authority that it had not had any significant issues accrediting eligible power stations to date. Comments received by the Authority in response to the discussion paper supported the accreditation process.

Box 9 Establishing a power station under the Large-scale Renewable Energy Target

The Clean Energy Regulator is responsible for accrediting power stations under the LRET, and provides a step by step process on its website for applicants.

The Clean Energy Regulator requires one point of contact throughout the accreditation process, and applicants must register a nominated person prior to applying for accreditation. Applicants can register online, and a nominal registration fee of $20 applies.

A registered person may apply for a power station to be accredited based on renewable sources listed in the *REE Act*. Applicants can apply for accreditation by downloading relevant forms from the Clean Energy Regulator's website. An application fee applies, and varies depending on the size of the power station and complexity of the accreditation process.

The applicant is required to specify the components of the electricity generation system that make up the power station. The Clean Energy Regulator applies boundaries around the power station and determines which components are included in the power station, using guidelines outlined in regulations.

The Regulator is required to make a decision on an application within six weeks of it being properly made. Once accredited, LRET power stations may create large-scale generation certificates. Provisional accreditation is also available for projects in development to assist developers secure appropriate financing.

The accreditation process also establishes a power station's baseline. The *REE Act* was designed to encourage additional renewable energy generation. Therefore, large-scale generation certificates are only issued for renewable generation above the existing generation at the time the Mandatory Renewable Energy Target (MRET) was established. The baseline is generally the average amount of electricity generated over the 1994, 1995 and 1996 calendar years. For power stations established after 1 January 1997 the baseline is zero.

As part of the accreditation process, applicants must provide evidence that their proposed power station conforms to State and Federal regulations including environmental laws. For example, applicants applying for accreditation for power stations using wood waste must meet additional eligibility requirements and are provided additional assessment criteria for this resource.

The Authority considers that the existing LRET eligibility and accreditation arrangements are appropriate, and ensure that power stations are established in accordance with relevant regulations and are registered to create large-scale generation certificates.

RECOMMENDATION

R.25. No change is necessary to the list of eligible sources or the accreditation process for the Large-scale Renewable Energy Target.

7.1.2. Adding additional non-renewable or non-generation technologies to the Renewable Energy Target

A key issue for the review is whether there are additional energy sources that should be made eligible. As discussed below, numerous submissions requested that eligibility be extended to either:

- non-renewable (but low emissions) generation sources, such as new waste coal mine gas projects or cogeneration projects using waste industrial heat, originally created from non-renewable sources; or
- additional 'displacement' technologies, which generate no electricity themselves, but displace the use of electricity.

In both cases, proponents argue that using such technologies will reduce greenhouse gas emissions from the electricity sector, in accordance with one of the objectives of the *REE Act*. Purely from an environmental effectiveness point of view, it is difficult to argue that eligibility should not be extended to these other activities.

These arguments highlight the differences between the use of a sector-based policy, such as the RET, compared with a broad-based measure like the carbon price. A chief advantage of the carbon price is that it automatically creates an incentive for all low-emissions or displacement technologies. Under the RET, however, boundaries are drawn. If they are not drawn, then the RET increasingly resembles a second broad-based carbon price – and it is difficult to see why such a mechanism could ever be justified alongside a carbon price.

Boundaries around eligibility under the RET are drawn to further the other key objective of the *REE Act* – to promote additional renewable generation. As discussed in Chapter 3, this is essentially an industry development objective, designed to promote the growth of an industry that is predicted to play a significant role in Australia's electricity supply in a carbon constrained future, and whose growth may currently be curtailed by uncertainty regarding the future of a carbon price and the credibility of governments' commitments to making long-term, deep cuts to greenhouse gas emissions.

The issue of boundaries around renewable generation eligibility is complicated by the fact that there are already exceptions to the rule – solar hot water systems (which have been included from the start of the scheme) and certain waste coal mine gas generation projects. These existing exceptions make it more difficult to argue that no further exceptions should be made, and encourage continual lobbying to this effect.

The Authority has taken the view that the RET is not a second broad-based carbon price, and eligibility should not be expanded to cover other non-generation or non-renewable technologies. The Authority's deliberations on specific matters including waste coal mine gas, wood waste from native forests and eligibility of technologies under the SRES is considered as set out below.

7.1.3. Waste coal mine gas under the Large-scale Renewable Energy Target

A key issue that has been raised during the review is the eligibility of waste coal mine gas in the LRET. Waste coal mine gas is a by-product of coal mining and is not a renewable energy source. Nonetheless waste coal mine gas was added to the RET in 2009 as a transitional measure following the cessation of the New South Wales Greenhouse Gas Reduction Scheme on commencement of the carbon pricing mechanism. In reviewing the eligibility of waste coal mine gas under the LRET the Authority has considered:

- whether to maintain eligibility for waste coal mine gas power stations that are currently eligible; and
- whether additional waste coal mine gas power stations should also be made eligible.

Eligibility for waste coal mine gas began on 1 July 2012 and is limited to seven existing waste coal mine gas power stations that were operating in 2009 and receiving support under the New South Wales Greenhouse Gas Reduction Scheme, with separate annual targets of 425 gigawatt hours (GWh) from 1 July 2012 to 30 June 2013, and 850 GWh each year from 1 July 2013 to 2020.

These targets are in addition to the LRET target of 41 000 GWh. This is to ensure that waste coal mine gas does not displace renewable generation under the scheme. This means that the inclusion of these waste coal mine gas power stations has increased the cost of the RET. As a benefit to renewable generation, any unutilised waste coal mine gas allowance is added to the LRET target each year. Waste coal mine gas cannot receive certificates for any generation above its total allowance.

EnviroGen argued that while waste coal mine gas is not a renewable energy source, it should be eligible:

> *As [waste coal mine gas] generation can be classified as a zero additional emissions source of generation achieving the same reductions in greenhouse gas emission as other renewable generators, the outcome of [waste coal mine gas] generation is similar to that of other generation which is assisted by the RET. (EnviroGen Pty Ltd, sub.44, p.6)*

Energy Developments Limited supported continuing to allow existing waste coal mine gas in the scheme, noting that waste coal mine gas has zero additional emissions (assuming the gas would otherwise have been flared) and its eligibility is consistent with one of the objectives of the *REE Act.* Conversely, a number of submissions to the issues paper (including IPART, WWF, and the Tasmanian Government) called for the removal of waste coal mine gas as an eligible source, primarily because it is not renewable. For example, the Conservation Council of South Australia submitted that:

> *The cost effectiveness of [waste coal mine gas] capture and use should be considered under fossil fuel policies not the RET…Only renewable energy should be eligible to create LRET certificates. (Conservation Council of South Australia Inc., sub.72, p.3)*

The Authority is of the view, as a general principle, that waste coal mine gas should not be an eligible source under the RET because it is not a renewable source, and that the use of waste coal mine gas for power generation should be sufficiently encouraged by the carbon price.

Eligible waste coal mine gas power plants under the RET were, however, included because it was assessed that the financial returns to these projects would have been reduced by the introduction of the carbon price compared to the returns had the New South Wales Greenhouse Gas Reduction Scheme continued. The additional revenue from the RET was therefore intended to ensure these projects were not adversely affected by the change in policy framework. The removal of these projects from the RET would mean that the Government would need to consider alternative transitional arrangements for these projects not to be made worse off. It is not clear that any alternative arrangements would cost less than maintaining the existing arrangements under the RET.

Policy-makers have placed clear boundaries on the support for waste coal mine gas under the LRET. Only existing waste coal mine gas power stations are eligible to create renewable energy certificates and (only until 2020), with separate targets that are additional to the broader LRET target. Given this contained support, the Authority recommends maintaining the current LRET arrangements for existing waste coal mine power stations.

In response to the discussion paper, Macquarie Generation opposed the provision for unutilised waste coal mine gas allowance to be added to the LRET on the basis that any waste coal mine gas allowance increases the cost of the RET and should be minimised. On this matter, the Authority does not see a material benefit in the form of cost reductions by removing the transference of unutilised waste coal mine gas allowance. The additional target was calculated on the basis of existing power station generation so it is unlikely any material proportion of allowance would be transferred in any year. In addition liable parties will have calculated their certificate requirements taking into account the additional target for waste coal mine gas.

7.1.4. Inclusion of new waste coal mine gas

Some waste coal mine gas generators have proposed allowing new waste coal mine gas projects into the RET. For example, EnviroGen supported the inclusion of new waste coal mine gas in addition to the 850 GWh allowance for existing waste coal mine gas on the basis that it 'would make a further contribution to emission reductions' and to ensure continued investment in the sector (Envirogen, sub.44, p.7).

On the other hand, while Energy Developments Limited supported the continued inclusion of existing waste coal mine gas, it did not consider that new waste coal mine gas projects should be eligible under the RET scheme:

> *… whilst support is warranted to promote the significant greenhouse gas abatement potential of new [waste coal mine gas] clean energy projects, the RET is currently not the appropriate mechanism for these new projects … (Energy Developments Limited, sub.75, p.3)*

In its *Review of Specific RET Issues*, the Renewable Energy Sub Group recommended against including new waste coal mine gas on the grounds that it would increase the cost of the RET scheme and shift the focus of the RET scheme away from renewable energy (Renewable Energy Sub Group 2012, p.67).

Including new waste coal mine gas within the overall target could potentially reduce the overall cost of the scheme if waste coal mine gas displaced more expensive renewable energy. However, since waste coal mine gas is not renewable, inclusion of further waste coal mine gas in the RET would reduce the effectiveness of the scheme in relation to its objective of promoting additional *renewable* electricity generation.

Further, if new waste coal mine gas were to be added to the RET, there is the possibility that eligibility could be extended to other non-renewable sources. Bluescope Steel stated that if waste coal mine gas continued to be eligible, it would be logical to extend eligibility to other industrial gases that can be burned to generate electricity.

Other industrial waste energy sources have been proposed for eligibility on the basis that they reduce emissions and reduce demand for grid electricity (for example, Ai Group, sub.46, p.14). For example, waste heat has been proposed as it can be used as either a displacement heat source or to generate electricity via steam turbines. As discussed in Section 7.1.2, allowing additional non-renewable waste energy sources to be eligible would undermine the objectives of the RET. Industrial gases are largely covered by the carbon pricing mechanism, which in itself provides an incentive for businesses to find the most cost effective way of minimising emissions from these gases.

Existing waste coal mine gas power stations were only included in the LRET as a transitional measure following cessation of the New South Wales Greenhouse Gas Reduction Scheme and on the commencement of the carbon pricing mechanism. There is no strong rationale for new waste coal mine gas projects to be eligible under the RET because the carbon price will provide the incentive for these projects.

RECOMMENDATION

R.26. Existing arrangements for waste coal mine gas should be maintained under the Large-scale Renewable Energy Target.

R.27. There should be no change to the *Renewable Energy (Electricity) Act 2000* (Cth) to allow for new waste coal mine gas to be eligible.

7.1.5. Wood waste from native forests under the Large-scale Renewable Energy Target

The Authority has received submissions calling for wood waste from native forests to be eligible under the RET.

Wood waste from native forests was originally eligible under the MRET, and was removed from the RET in 2011 following agreement of the Multi-Party Climate Change Committee as part of the Clean Energy Future plan (Multi-Party Climate Change Committee 2011). As part of its removal, regulations were added to provide for transitional arrangements to preserve existing eligibility provisions for power stations already accredited by the Clean Energy Regulator to use wood waste derived from native forest biomass subject to specified conditions (*REE Amendment Regulations 2011 no.5*).

Wood waste from plantation forests is eligible to generate certificates under the LRET, and this includes non-endemic native species, but must be taken from land that is cleared of native vegetation before 1 January 1990 to establish the plantation.

Under the original MRET, criteria were applied to wood waste from native forests requiring it to: comply with local government planning and approval processes, to be harvested under a Regional Forestry Agreement, and to demonstrate that the waste is genuine (that is, the native forest was logged for a higher value use and that the biomass used was a by-product of that logging) (*REE Regulations 2001*). Further to this, logging of native forests is managed under State Government forestry plans which place limits on the amount of logging activity allowed. This effectively caps the amount of wood waste that can be used for generation.

The eligibility of biomass from native forests has been a controversial issue. The 2003 MRET review received diverging submissions on the issue, and identified two options – removing wood waste from native forests from the scheme, or leaving it in but separating it from other eligible wood waste sources so that the value of RECs from plantation wood waste generation would not be affected. In support of removing the energy source, the 2003 MRET review noted that the objectives of the *REE Act* would be more easily achieved by removing such a contentious element. In support for leaving wood waste from native forests in the scheme, the 2003 MRET review noted that, at the time, there was no compelling evidence that it would alter forest management practices or accelerate the growth of logging. The Government decided to maintain the eligibility of wood waste from native forests under the RET at that time.

During the design of the enhanced RET in 2009, there were a number of submissions calling for the removal of wood waste from native forests. During the House of Representatives debate following the passing of the Clean Energy Future legislation an unsuccessful motion was put forward by Rob Oakeshott MP to block the removal of wood waste from old native growth forests from the RET (Commonwealth, House of Representatives, 2012).

Arguments supporting its eligibility are that the use of native forest biomass is a zero-carbon emissions rated energy source that replaces fossil-fuel generation and that wood waste from forests is generally burned anyway. Proponents argue that forests have a high level of regulation to ensure they are sustainably managed and there are no impacts on biodiversity by burning wood waste for electricity generation. The Australian Forest Products Association submitted that:

> *The objective of the RET is to create a guaranteed market for renewable energy therefore it should provide opportunities for all renewable energy sources, including sustainably managed natural forest biomass. (Australian Forest Products Association, sub.14, p.6)*

It also stated:

> *The harvesting of native forests in Australia is supported by an existing regulatory framework that is internationally recognised as world's best practice. (Australian Forest Products Association, sub.180, p.5)*

The main concern about the eligibility of wood waste from native forests under the RET is that it would create an added incentive to log native forests, especially if the value of electricity generation becomes higher than other uses of native forest timber and wood waste.

It is not clear that allowing wood waste from native forests would encourage further logging of these forests for electricity generation. In practice, despite its eligibility under the MRET, very few certificates were ever created from native forest biomass. There was also a market preference against these certificates, which traded at a substantial discount to other renewable energy certificates.

A higher level of forestry and environmental regulation has, however, been necessary to ensure that wood waste from native forests is harvested in an ecologically sustainable manner. The Australian Network of Environmental Defender's Offices recommended:

> *Maintaining the exclusion of native forest waste, and re-evaluating the ongoing eligibility of wood waste as a renewable energy source, and whether it should be further limited to ensure the RET does not contribute to the environmental impacts of logging – such as loss of biodiversity, loss of 'carbon sinks', and particulate pollution from burning sawmill waste. (Australian Network of Environmental Defender's Offices, sub.141, p.6)*

In terms of public interest, the protection of native forests is of high importance in Australia, which is captured in a recent report to the Commonwealth Government titled *Social Values and Considerations for Effective Reserve Management.* The report noted:

> *The social value of natural forests is more than the direct uses of their resources. Many people gain satisfaction from knowing that an area, including its landscapes, plants, animals and cultural heritage, is sustained in a certain condition. Such satisfaction can be intensely personal and simply related to the existence of an area (and hence is often termed existence value). It can also stem from a conviction that forests should be retained for future generations to appreciate and enjoy. (Independent Verification Group Report, 2012, p.3)*

An objective of the RET is to encourage additional renewable generation that is ecologically sustainable. The Authority's preliminary view set out in the discussion paper was that, without a clear process to ensure that electricity generation using wood waste from native forest would be ecologically sustainable, it should not be re-included in the RET.

Taking this view a step further, the Authority's final view is that the key issue is the *incremental* environmental impact of allowing wood waste back into the RET. If a forest would have been logged in any event, then burning the wood waste in a power station is a better environmental outcome – in greenhouse gas emission terms – than burning the waste alone or allowing it to decompose.

The Australian Forest Products Association has argued that inclusion in the RET will not lead to more logging than would have occurred in any event:

> *Waste is defined as a by-product of normal forestry operations, which are primarily are for integrated sawlog and pulpwood production and incentives for energy generation will not replace these higher value market drivers. (Australian Forest Products Association, sub.14, pp.6-7)*

The Authority recommends that the Government should consider commissioning a new study of the likelihood that the logging of native forests would increase if wood waste were an eligible fuel under the RET. If LRET eligibility is not likely to increase the rates of native forest logging, then eligibility should be reinstated, subject to appropriate accreditation processes.

RECOMMENDATION

R.28. The Commonwealth Government should explore whether the Renewable Energy Target eligibility for native forest wood waste is likely to increase the rate of logging of native forests. If it is not, then wood waste eligibility should be reinstated, subject to appropriate accreditation processes designed to ensure that no additional logging occurs as a result.

7.2. Eligibility and accreditation arrangements under the Small-scale Renewable Energy Scheme

Eligible technologies under the Small-scale Renewable Energy Scheme (SRES) are set out in the *REE Act,* which provides that ‘solar water heaters’ and ‘small generation units’ may generate small-scale technology certificates. There are three types of small generation units – solar photovoltaic (PV) with a capacity limit of 100 kilowatts (kW), micro hydroelectric systems up to 6.4 kW, and small wind turbine systems up to 10 kW. Solar water heaters are eligible if they meet relevant Australian and New Zealand standards, which cover both solar water heaters and air source heat pumps. To be eligible, a heat pump cannot have a volumetric capacity of more than 425 litres. Eligible technologies must meet certain standards.

Small-generation units must be installed by qualified technicians. The Clean Energy Council, a peak national industry body representing the clean energy sector, is solely responsible for managing the accreditation of designers and installers of small generation units under the SRES. Installers and designers of small generation units must be accredited with the Clean Energy Council in order for the owners of those systems to be eligible to create small-scale technology certificates under the SRES. In addition, solar PV and solar water heaters require accredited components, while small wind and hydro systems do not (see Table 6).

Table 6 Technology type and accreditation arrangements

Small-scale technology	Accredited installer?	Accredited components?
Solar PV	Yes	Yes
Wind	Yes	No
Hydro	Yes	No
Solar water heaters	No	Yes

Source: Climate Change Authority, 2012.

To become accredited with the Clean Energy Council a minimum level of training is required. The training is provided by registered training organisations throughout Australia. Once the required training has been completed a practical assessment of an installer's work is undertaken before full accreditation is granted. Accredited installers are required to renew their accreditation annually, and this is supported by a continuous improvement program the Clean Energy Council has introduced that installers must follow to stay up to date with developments in the industry.

The Clean Energy Council also maintains a list of solar panels and inverter products that meet relevant Australian standards. Accredited installers can only install products from this list otherwise they are in breach of the Clean Energy Council's Code of Conduct.

7.2.1. Opening accreditation to competition

Under legislation, the Clean Energy Council is the sole organisation that can accredit small generation unit designers and installers for the purposes of creating small-scale technology certificates. The appropriateness of a single accreditation body has been raised in submissions by the solar industry. The Australian Solar Council stated:

> *The Act creates a legislated monopoly for the accreditation of small-scale renewable energy technologies, ensuring that only one non-government agency has been given that power. Legislated monopolies are poor public policy, and the lack of competition appears to have resulted in some less than best practice outcomes. (Australian Solar Council, sub.62, p.10)*

In the discussion paper, the Authority's preliminary view was that accreditation should be opened up to certified bodies beyond the Clean Energy Council. The Authority suggested that introducing such competition could allow installers and designers to choose the accreditation provider that best meets their needs, rather than imposing one particular model of quality assurance. It could also help ensure that an accreditation body remains focused on enhancing the relevance, quality and value of the services for their members.

There is a risk of opening up accreditation to multiple organisations, as greater competition could drive poor outcomes for customers. This could occur if accreditation bodies competed on the basis of price at the expense of quality or rigour. In response to the discussion paper, LMS Energy noted:

> *Whilst more accreditation bodies could reduce accreditation wait times, the accreditation bodies could also have the incentive to relax the robustness of their accreditation standards in an effort to attract more business away from other accreditation bodies – resulting in a market failure. (LMS Energy, sub.208, p.6)*

In addition, it could be difficult for the Government to administer multiple accreditation bodies, as a strict set of provisions would need to be implemented to ensure that the quality of installations is maintained. In response to the discussion paper, CSR noted:

Experience with building codes enforcement and the proliferation of private assessors suggests that broadening the accreditation is likely to weaken and not strengthen accreditation based on CSR experience. Building industry enforcement of codes is now beyond the ability of Government and a "super" enforcement model is unlikely to be successful with solar. The [Clean Energy Council] should be required to strengthen its enforcement program nationally before alternative models are considered. [The] Government has only one point of contact today and that is the great strength of the present model. (CSR, sub.195, p.4)

In order to allow others to become accreditation bodies it would be necessary to have common guidelines that any accreditation body would be required to use. Common guidelines would need to ensure consistency and create a minimum quality of training. The guidelines would need to represent industry best practice and be dynamic in nature to respond to changes in the industry.

The Clean Energy Regulator would be required to put in place an effective regime to ensure that accreditation bodies are of an appropriate standard. This would need to include a transparent process by which the Clean Energy Regulator could approve and revoke an accreditation body's participation in SRES.

In addition, the RET, and consequently the Clean Energy Regulator, does not have oversight for electrical safety, which is the responsibility of relevant state and territory safety authorities. Any new accreditation bodies would need to ensure that accredited installers comply with relevant laws. It was raised in roundtable discussions that the current accreditation process managed by the Clean Energy Council provides sufficient safeguards for systems that create small-scale technology certificates.

The Clean Energy Council has advised the Authority that it seeks to continually improve its accreditation process, and has established an installer reference group which provides advice and feedback on the accreditation scheme and overall industry enhancements. The Clean Energy Council has a process in place to manage any disputes that may arise, and is currently consulting with members with the aim of improving this process.

On further investigation, at this time, the Authority considers that the potential benefits of allowing multiple bodies to accredit installers and products do not outweigh the additional administrative costs and potential risks. In addition, no organisations indicated particular interest in taking on accreditation, and the Clean Energy Council has introduced measures to improve the accreditation process.

The Authority considers that the risks associated with opening up accreditation to multiple bodies in terms of possible poor standards and higher costs of oversight, appear too large to warrant changing the current arrangements of a single national accreditation body at this time.

RECOMMENDATION

R.29. Maintain the Clean Energy Council as the sole accreditation body for installers under the Small-scale Renewable Energy Scheme.

7.2.2. Additional small-scale technologies

The two key issues to be considered in the review relating to additional small-scale technologies relate to:

- the addition of new small-scale renewable generation technologies; and
- the inclusion of (existing and new) displacement technologies.

This section will discuss the addition of any new technologies into the scheme generally, displacement technologies both currently eligible and the proposition of adding new displacement technologies.

As the RET scheme has progressed, new small-scale technologies have been added to the scheme, and more recently new technologies have been proposed for inclusion.

The Regulatory Impact Statement attached to the Explanatory Memorandum of the Bill to split the RET identifies the RET Review as a possible mechanism for recommending the addition of new technologies. As part of recommendations from the Regulatory Impact Statement, the review would also consider a framework for determining eligibility under the RET, particularly for small-scale technologies.

The Authority has considered if, in principle, new small-scale technologies should be considered for inclusion in the RET and, if so, what framework should be used to assess potential technologies. It has then considered if there are currently any new technologies that could be considered for inclusion.

The scheme was originally intended to be technology-neutral as a way of ensuring the target was met at the lowest possible cost, and that the mix of technologies used to generate energy from renewable sources could evolve over time.

The uncapped nature of the SRES means that cost minimisation is no longer automatic: additions of new technologies could potentially add to the cost of the scheme as new technologies would not necessarily displace existing small-scale technologies, but may be deployed in addition to them. This will always mean that a judgement would need to be made when adding new technologies to the scheme.

The addition of new technologies was considered in the Renewable Energy Sub Group's *Review of Specific RET Issues* to the Council of Australian Governments in 2012. The review recommended that no new small-scale technologies should be eligible, on the basis that the SRES is uncapped, so any additional small-scale technologies would add to costs for electricity consumers. The extent of uptake of these new technologies was highly uncertain, and hence so was the potential impact on consumer prices.

It is also important to consider any implications eligibility arrangements might have on competition. For example, if a new small-scale technology was developed that would directly compete with those small-scale technologies that are eligible; it would be at a competitive disadvantage if it was not also made eligible.

The Authority is of the view that, in principle, new small-scale technologies should be allowed to be included in the SRES. It may already be possible to add new technologies, as there is a general provision under the *RRE Act* for the Minister to include by regulations “emerging renewable energy technologies” in the RET scheme.

It is not clear, however, that this provision applies specifically to small-scale technologies under the SRES or whether it is sufficient to allow for the addition of small-scale renewable and displacement technologies under the SRES. The Authority is of the view that the Government should consider whether a new regulation making power is necessary for the *REE Act* to explicitly allow for the addition of new small-scale technologies.

An alternative approach would be to include any new small-scale technologies into the LRET. The advantages of this approach are that it would not add to the overall cost of the RET and it would be easier to add technologies by regulations.

The Authority proposes that new small-scale technologies could be considered by the Minister on a case by case basis for inclusion in the SRES, and that a framework to guide the decision could be developed, based on the following considerations:

- is the proposed technology currently not eligible (that is, is it truly a new type of technology);
- does the proposed technology generate renewable energy;
- is the proposed technology a small-scale technology; and
- is the proposed technology commercially ready.

In addition, a judgement would need to be made taking into account the likely cost implications of making the technology eligible and any competitive distortions of not making the technology eligible. A clear process taking into account the above considerations would effectively assist proponents of new small-scale renewable energy technologies for proposing their technology for eligibility under the SRES. The Minister could receive proposals for new technologies directly or refer them to the appropriate accreditation body for detailed consideration and advice.

While the Authority recommends that new small-scale technologies should be allowed to be included, no new technologies that would satisfy the above criteria have been proposed to the Authority. The only new technologies that have been proposed are displacement technologies and are discussed in the following section.

RECOMMENDATION:

R.30. New small-scale technologies should be considered on a case by case basis for inclusion in the Small-scale Renewable Energy Scheme.

R.31. No additional new small-scale technologies should be made eligible in the Small-scale Renewable Energy Scheme at this time.

7.2.3. Displacement technologies

Displacement technologies are alternative forms of energy generation that displace electricity consumed from the grid. For example, a solar water heater uses the sun to directly heat water, without the need for a solar PV electricity generation system to convert the suns energy into electricity that would create heat through electrical resistance.

There are two technologies eligible to create small-scale certificates under the SRES are displacement technologies – solar water heaters and heat pumps, both of which have been eligible since the MRET was established. Solar water heaters were historically the most popular small-scale technology under the RET; however, they were overtaken by solar PV units in 2010 (see Chapter 2).

Since the establishment of the SRES, displacement technologies have made up a small amount of deemed certificates that have been created. In 2012, heat pumps and solar water heaters accounted for 1.1 per cent and 4.7 per cent of small-scale technology certificates generated, respectively.

In some submissions, it has been proposed that other displacement technologies should be eligible under the SRES, such as ground sourced heat pumps. Arguments for including displacement technologies include that they provide similar benefits to small-scale electricity generation technologies, and that they compete directly with those technologies.

Conversely, a number of submissions have called for removing displacement technologies from the RET. The main arguments against the inclusion of displacement technologies in the RET are that they are not electricity generation technologies, that they increase the cost of the scheme for consumers, and that they should be supported through other incentives outside of the RET. A group of individual participants submitted that the inclusion of displacement technologies does not reflect the policy intent of the RET:

> *As the RET was developed as a means to achieve the Commonwealth commitment to "at least 20 [per cent] of Australia's electricity from renewable sources by 2020", displacement technologies would not be included in this definition. (Hallenstein et al, sub.19, p.20)*

One objective of the RET is to encourage additional electricity generation from renewable sources. Including displacement technologies in the SRES raises a question about whether the objective is to add electricity generation only or also to displace electricity use. If the SRES remains uncapped, additional technologies including displacement technologies could increase the cost of the RET. Moreover, the policy objective of the RET to drive renewable electricity generation is diluted by adding additional displacement technologies.

There may also be overlaps with energy efficiency schemes. Some states and territories have energy efficiency certificate schemes (commonly known as 'white certificate schemes') in place, some of which cover solar water heaters and heat pumps (see Table 7). These schemes are certificate trading schemes similar in form to the RET, except that each certificate relates to an amount of energy saved, rather than renewable energy produced.

Table 7 Current state-based energy efficiency schemes

State/territory	Energy efficiency scheme in place?	Coverage of renewable water heaters?
New South Wales	Energy Efficiency Scheme (ESS)	No
Victoria	Victorian Energy Efficiency Target (VEET)	Yes
Queensland	No	No
South Australia	Residential Energy Efficiency Scheme (REES)	Yes
Western Australia	No	No
Australian Capital Territory	Energy Efficiency Improvement Scheme (from 1 January 2013)	Yes
Tasmania	No	No
Northern Territory	No	No

Source: Climate Change Authority, 2012.

The Commonwealth Government is also considering whether it should seek to implement a national energy efficiency white certificate scheme (a National Energy Savings Initiative), which would subsume existing state-based schemes. If it were implemented, a National Energy Savings Initiative would be a more obvious home for displacement technologies (new and existing) than the RET.

In its *Review of Specific RET Issues*, the Renewable Energy Sub Group recommended against the addition of two new technologies – geothermal ground-source heat pumps and solar-assisted cooling systems – on the grounds they were displacement technologies. The Renewable Energy Sub Group recommended that:

> *[these technologies] would be better suited for support under an energy efficiency scheme rather than a scheme that is primarily designed to support renewable electricity generation. (Renewable Energy Sub Group 2012, p.35)*

In response to the discussion paper, the Gas Industry Alliance submitted that:

> *… a simple proactive option would be to remove solar and heat pump water heaters from the SRES and include them, together with gas water heaters in a new national water heater replacement scheme. (Gas Industry Alliance, sub.201, p.2)*

The Authority is also aware that existing displacement technologies compete with electric and gas water heaters, but still at much higher equipment costs. Electric water heaters are being phased out in most states and territories, and the inclusion of renewable forms of water heating in the SRES supports this transition. While gas competes with electric water heaters and renewable water heaters that are eligible under the SRES, it is not readily available in all parts of Australia. Supporting renewable water heaters either through the RET or through other incentives also encourages the take up of these technologies in gas-exclusive areas.

The Authority considers that existing displacement technologies should remain in the SRES, and should be phased out if and when a national energy efficiency scheme that would cover them is established. Similarly, if the broader regulatory framework that applies to these technologies at the state and territory level changes in the future, so that any of these technologies no longer needs the RET to encourage uptake, then the technology should be phased out of the RET.

The Authority considers that additional displacement technologies should not be added to the SRES. While it is recognised that this potentially places these technologies at a competitive disadvantage to existing displacement technologies, they do not contribute to the objective of the *REE Act* of additional generation of electricity from renewable energy sources, and given the uncapped nature of the SRES their inclusion would increase the cost of the scheme to consumers.

RECOMMENDATION

R.32. Existing arrangements for displacement technologies should be maintained.

R.33. No change should be made to the *Renewable Energy (Electricity) Act 2000* (Cth) to allow additional displacement technologies.

CHAPTER 8. DIVERSITY

This chapter considers the current mix of renewable energy generation and diversity of renewable energy access to the Renewable Energy Target (RET). It explores whether there is a case to amend the RET to promote a more diverse range of renewable energy technologies through the scheme.

8.1. Diversity of access and uptake

As discussed in Section 7.1, access to the RET scheme is provided to a wide range of renewable sources and additional sources can be added by regulations. Given that a strong level of 'diversity of access' already exists in terms of legal access, the Authority has focussed on reviewing the diversity of technologies deployed.

The RET is a market based scheme with a technology neutral approach that encourages the deployment of the lowest cost technologies. From an economic efficiency perspective, this approach encourages competition between technologies and minimises costs to consumers.

While the scheme includes a range of renewable generation technologies, the ability of each potential technology to participate in the wholesale market and generate certificates depends on its market readiness and competitiveness. The Large-scale Renewable Energy Target, by design, does not preference higher cost technologies over lower cost alternatives. Beyond Zero Emissions highlighted this in its submission to the issues paper:

> *The RET aims to deploy renewable technologies at lowest cost through a market mechanism. By definition, the lowest cost technologies will be deployed, in direct contrast to the need to develop a suite of technologies. Due to this market focused, least-cost design, the RET cannot address the barrier of cost difference between technologies. (Beyond Zero Emissions, sub.104, p.15)*

Under the Small-scale Renewable Energy Scheme, however, Solar Credits have been used to promote the deployment of particular small-scale technologies (see Chapter 5).

8.1.1. Current mix of renewable generation capacity

New generation under the RET has primarily come from large-scale wind, which accounted for around 18 per cent of total installed renewable generation capacity in 2012 (see Chapter 2, Figure 1). There has also been a significant increase in the uptake of small-scale solar photovoltaic (PV) systems and solar water heaters under the Small-scale Renewable Energy Scheme, with solar PV systems providing approximately 2 gigawatts of generation capacity or around 11 per cent of installed renewable capacity in 2012, according to the Clean Energy Regulator. Further, the proportional contribution of hydro to total renewable generation has reduced from over 80 per cent in 2000-01 to around 34 per cent in 2012.

When the Mandatory Renewable Energy Target commenced operation in 2001, it was projected that biomass (particularly bagasse, the waste from sugar cane milling) would account for most of Australia's additional renewable electricity generation by 2010 (Commonwealth, 2000). However, this did not eventuate because the cost of wind generation fell faster than expected to become the most competitive technology, and almost all new generation required to meet the targets has come from wind and small-scale solar technologies.

Acciona submitted:

> *Wind for the time being remains the lowest cost technology. However… a range of other technologies including solar PV and concentrating solar thermal are experiencing dramatic reductions in cost. (Acciona, sub.85, p.4)*

Given the decline in costs for wind and solar PV is projected to continue, they appear likely to remain the lowest cost technologies and therefore dominate new investment to 2020 – but there are no guarantees this will be the case.

8.2. Desirability of greater diversity

Participants have suggested that the RET design should be changed to promote a more diverse range of renewable energy technologies and have suggested some options to this end (see Section 8.3). The main arguments for greater diversity are to support:

- the development of a particular renewable industry sector;
- the development of higher cost technologies that may become lower cost in the long-term; or
- the achievement of a higher renewable energy target once the capacity for existing renewable has been exhausted.

It is not clear that amendments to the RET are likely to be the most appropriate policy response if greater diversity of renewable technologies is necessary or desired. The Authority notes that measures to promote diversity within the RET alter the scheme from a technology neutral approach that favours the lowest cost technologies to one that favours particular technologies that may not meet the RET's policy objectives or do so at a higher cost.

In its submission, the Clean Energy Council argued that changes to the RET to promote diversity risks harming investor confidence in the scheme and could jeopardise the industry's ability to deliver on the target. It noted that:

> *… a production based incentive such as the RET is often of little value to technologies that face a range of challenges and funding hurdles before they reach production stage of their development. (Clean Energy Council, sub.12, p.25)*

In addition, the Major Energy Users Inc submitted:

> *If a new technology is developed that provides a lower cost option than the current technologies, then this should be allowed, but not receive greater incentives. (Major Energy Users Inc., sub.103, pp.28-29)*

The Grattan Institute (2012) examined measures within climate change policies to promote diversity of low-emissions technologies and noted that approaches to low-emissions technology development, including green certificate schemes such as the RET, do not naturally promote technology diversity.

The Authority considers that a change in its design to encourage a more diverse range of renewables would only be in the public interest if:

- there are market failures impeding the uptake of some renewable technologies that are not being addressed by other policies, and these can be efficiently dealt with through changes to the RET (Section 8.2.1); or
- a change to the renewable energy mix and a resulting change to the RET is a cost-effective way to ensure energy independence, reliability and security is maintained (Section 8.2.2).

8.2.1. Market failures

As for other technologies, market failures can potentially reduce private incentives to conduct research and development. Beyond the RET scheme, there is a range of measures at the national, state and territory level to support the development and deployment of renewable energy technologies, such as research and development tax credits, grant funding and financing (see Chapter 3).

The Australian Renewable Energy Agency is specifically designed to support research, development, and demonstration and address the market failures that might result at these earlier stages of the innovation chain. It will provide early-stage grant and financing assistance for projects that strengthen renewable energy and energy efficiency technologies and make them more cost competitive.

The Australian Renewable Energy Agency is providing almost $750 million for 31 renewable technologies and measures in bioenergy, geothermal, wave, solar thermal and solar PV across the various stages of renewable energy technology innovation. (The Australian Renewable Energy Agency total budget is $3.2 billion).

Regarding the deployment of market ready technologies, there may be information failures that increase perceptions of risk among financiers. It may be harder or more costly to secure finance for technologies that are not well understood.

The Clean Energy Finance Corporation has been established to overcome capital market barriers that hinder the financing, commercialisation and deployment of renewable energy, energy efficiency and low emissions technologies. The Clean Energy Finance Corporation is designed to bridge any gap between technology which is ready for deployment, but is not currently able to commercially source the requisite level of finance.

The Australian Conservation Foundation noted the contribution the Clean Energy Finance Corporation will have in promoting diversity of technologies under the RET. In its submission to the issues paper, it stated:

> *Importantly, the [Clean Energy Finance Corporation] will also drive diversity in Australia's clean energy generation mix, and therefore complement the RET (which favours wind and domestic solar investment). (Australian Conservation Foundation, sub.7, p.2)*

EnergyAustralia commented in its submission to the issues paper:

> *Greater diversity…should be delivered outside of the RET…through the funding of research and development, providing greater availability of funds to projects which have not been proven commercially viable in Australia. The funding provided to [Australian Renewable Energy Agency] and the [Clean Energy Finance Corporation] should be used to achieve diversity in RET outcomes. (EnergyAustralia, sub.102, p.11)*

The Authority considers that any perceived market failure associated with the market readiness of technologies is being addressed by government support and that no change to the RET is required.

8.2.2. Energy dependence, reliability and security

Renewable energy becomes more important for countries with growing dependence on imported energy where energy security may be an issue. As discussed in Chapter 3, a substantial net exporter of energy, Australia does not face any energy security concerns relating to dependence on imports of generation fuels.

It is possible that the intermittency of renewable energy generation could affect the stability, reliability and security of the electricity network in the future. The Commonwealth Government's *Energy White Paper* noted:

> *High levels of intermittent generation (such as wind or solar) may also pose additional operational challenges in balancing supply and demand in the system. While this is considered manageable at current and projected levels, in the longer term there may be a need for additional backup capacity or innovative system management and storage solutions. (Commonwealth, Energy White Paper 2012, p.157)*

The Australian Energy Market Operator has in place arrangements for the National Electricity Market, which are subject to ongoing refinement, that require all significant intermittent generation to participate in central dispatch processes to control the output of such generation at times when that output would otherwise violate secure network limits.

In the Western Australian South West Interconnected System, arrangements are also in place to allow the system operator the flexibility to control dispatch of intermittent generation in such a way that power system security will be preserved.

The Authority considers that it is appropriate to deal with energy reliability and security issues through energy market reforms rather than by changing the RET to encourage the deployment of more diverse, and relatively less intermittent, portfolio of renewable energy technologies.

8.3. Assessment of options to promote greater diversity within the Renewable Energy Target

RET review participants have suggested that measures within the RET can be utilised to promote greater diversity, such as the use of multipliers and banding to promote particular technologies. Options for altering the RET design to promote certain technologies are discussed below, including multipliers, caps and banding.

8.3.1. Multipliers

As outlined in Chapter 5, multipliers have been used in the RET scheme to encourage the installation of small generation units such as small-scale solar panels, wind and hydro systems by multiplying the number of small-scale technology certificates that these systems would usually be able to create under the Small-scale Renewable Energy Scheme.

Multipliers can be applied to certificates from particular technologies to influence their uptake. The use of a multiplier greater than one will preference a technology – as seen with the Solar Credits multiplier under the Small-scale Renewable Energy Scheme.

Time-of-day multipliers have also been used in California to encourage the delivery of renewable energy at times of high demand.

In the small-scale scheme, any multiplier greater than one will impose additional cost on consumers as liable entities will pass-through the cost of certificates. The environmental effectiveness of the scheme is also reduced because the additional certificates created have not been backed by actual generation. The Australian PV Association submitted:

> *[multipliers have] reduced the effectiveness of the RET by creating large amounts of "Phantom" certificates, with no associated renewable energy generation. It also flooded the renewable energy certificate market, making it difficult for larger projects to be built. (Australian PV Association, sub.101, p.10)*

In its submission, Hepburn Wind proposed that multipliers should be applied to large-scale generation certificates to support community based renewable energy projects to help them compete with larger commercial projects (Hepburn Wind, sub.56, p.5). Hepburn Wind further suggested that community projects could be capped to manage their development.

The Authority considers that multipliers should not be reintroduced to the RET. Multipliers reduce the environmental effectiveness of the RET, encourage a more expensive generation mix, and in the uncapped SRES, add to the costs borne by consumers. If the Commonwealth Government wanted to encourage particular project types, such as community wind farms, it could do so in other, more transparent means (such as grant funding).

Similarly, encouraging generation that supplies energy at peak periods is a matter for energy market design more broadly, and piecemeal approaches in the RET risk creating unanticipated distortions.

8.3.2. Caps

A cap could be used to limit the total amount of generation from a particular technology. Once the cap has been reached, support would not be given to any additional generation from that technology and the deployment of other technologies could increase.

There could also be perceived equity issues regarding how a cap might be applied. For example, if it operated on a 'first-in, first-served' basis – it would preference first movers. Caps are likely to be difficult to administer, since future output is uncertain.

Further, if a cap was combined with a band between two technologies to discourage one while promoting another, it would present a collective risk that the lower cost technology will be suppressed while the higher cost or emerging technology may not be able to meet the target.

8.3.3. Banding

Banding sets a quota of total generation for each technology and is one method to encourage diversity. By assigning particular targets to different technologies, banding allows those technologies the space to evolve without the potential of being crowded out by other technologies that are cheaper in the short term. In practice, the Small-scale Renewable Energy Scheme operates as a band within the RET – in effect it provides a separate incentive for small-scale systems.

In its submission to the issues paper, WWF proposed that the RET should include banding, as it will support the development of renewable energy that becomes low cost energy in the longer term:

> *Banding or weighting the RET will give less developed/more costly resources a leg up to develop and bring down their cost curves…banding mechanisms [are] also useful for economic efficiency as a means of phasing industries out of the RET as they become competitive in the open electricity market. (WWF, sub.129, p.12)*

The Authority considers that reasons for supporting technologies, such as those proposed by the WWF, could be more effectively addressed by policies outside of the RET. This would not create additional administrative burden or risk to the target being achieved.

If banding involves both a minimum and a maximum quota for each banded technology, it faces all of the difficulties associated with caps with additional problems associated with minimum targets. If minimum targets are not achieved, then the overall target would not be met. Banding affects the economic efficiency of the scheme by potentially forcing more expensive technologies into the mix, increasing the overall costs to energy consumers.

The Clean Energy Council stated in its submission:

> *Banding requires a level of foresight and prediction into the specific timelines and capabilities of emerging technologies that is near impossible to do accurately … [for example] if the RET were banded to provide a band for a particular technology, it may be that this technology would not be technically capable of delivering that scale of deployment in the timeframe required. This would put achievement of the 20 per cent target at risk. (Clean Energy Council, sub.12, p.25)*

The geothermal industry has argued for banding to be applied to geothermal technology to allow it to contribute to the RET without being 'crowded out' by predominantly lower cost technologies. In its submission, the Australian Geothermal Energy Association recommended:

> *… setting aside a reasonable proportion of the incentive offered through the RET scheme to support emerging technologies as they enter the commercialisation phase. (Australian Geothermal Energy Association, sub.52, p.4)*

However, in a report by the Australian Bureau of Agriculture and Resource Economics and Geoscience Australia (2010) it was noted that:

> *There are uncertainties in the outlook for geothermal power over the next two decades. A major uncertainty is the cost of electricity production as the technology has yet to be proven commercially viable. Present estimates show a wide range in the cost of geothermal electricity generation, reflecting the current pre-commercial stage of the industry, as the cost of electricity generation is highly dependent on future technology developments and grid connection issues. The geothermal industry in Australia is progressing, with proof-of-concept having been attained in one project and expected to be achieved in at least two others within one to two years. Several pilot projects are expected to be completed within five years. (ABARE and Geoscience Australia, 2010, p.205)*

8.4. Conclusion

The RET allows a diverse range of technologies to generate certificates. The current mix of generation capacity reflects technologies that have been deployed at the lowest cost.

Any measure within the RET to promote diversity, such as expanding the use of multipliers, or introducing banding or caps, will increase the cost of the scheme to society overall and to consumers, and, in some cases, may reduce the scheme's environmental effectiveness. The Authority considers that the current approach should continue and that the current level of diversity of access is appropriate.

Other policy initiatives, particularly the Australian Renewable Energy Agency and the Clean Energy Finance Corporation, are better placed to promote diversity.

RECOMMENDATION

R.34. No change should be made to the Renewable Energy Target framework to promote diversity.

APPENDIX A RECOMMENDATIONS

Key recommendations

- The frequency of scheduled scheme reviews should be amended from every two years to every four years, so that the next scheduled review would be in 2016 (R.1).
- The form of the Large-scale Renewable Energy Target should continue to be expressed in legislation in terms of a fixed gigawatt hour level (R.2) and the existing Large-scale Renewable Energy Target of 41 000 GWh and interim targets should be maintained in their current form (R.3).
- Given the uncertainty currently surrounding a number of policy issues – which, hopefully, will be clarified somewhat over the next few years – the Renewable Energy Target review in 2016 would be an appropriate time to consider adjustments to the targets beyond 2020 (R.4).
- The Small-scale Renewable Energy Scheme should remain separate from the Large-scale Renewable Energy Target (R.5), but be amended in the following ways:
  - The threshold for solar photovoltaic units in the Small-scale Renewable Energy Scheme be reduced from 100 kilowatts to, say, 10 kilowatts. The Authority recommends the Commonwealth Government conduct further consultations with stakeholders to determine an appropriate threshold. Units over the small-scale threshold would be included in the Large-scale Renewable Energy Target, with five year certificate deeming (R.6);
  - The Ministerial power to lower the price cap should be retained to provide an appropriate cost containment mechanism should installations of small-scale systems accelerate unsustainability (R.7);
  - The Small-scale Renewable Energy Scheme should be phased out by reducing deeming so that renewable energy generation from small-scale systems is not rewarded after 2030 (R.8); and
  - The clearing house should be amended to a ‘deficit sales facility’ whereby new certificates would only be placed in the clearing house when it is in deficit (R.9).
- Large electricity consumers should be permitted to opt-in to assume direct liability for Renewable Energy Target obligations. The Commonwealth Government should consult further with stakeholders to develop a detailed approach to opt-in that is efficient for both large electricity users and retailers. The Authority considers that the New South Wales Greenhouse Gas Reduction Scheme opt-in model would be an appropriate starting point for this detailed design work (R.13).
- In cases where the Renewable Energy Target costs are passed through to emissions-intensive, trade-exposed businesses, partial exemption certificates should be tradeable, and thereby able to be used by any liable entity to reduce liable electricity acquisitions (R.21).

Other recommendations

- To better manage liability, the relevant renewable power percentage and small-scale technology percentage should be set prior to a compliance year, and preferably by 1 December of the preceding year (R.15).
- In regard to the arrangements for emissions-intensive, trade-exposed entities:

  - the level of the exemption for these entities under the Renewable Energy Target should be considered by the Productivity Commission as part of its broader review of the Jobs and Competitiveness Program (R.19);
  - the Commonwealth Government should consider the impact of the Renewable Energy Target on the competitiveness of an emissions-intensive, trade-exposed industry in any requests to the Productivity Commission's review of the level of industry assistance under the carbon pricing mechanism and the Renewable Energy Target (R.20); and
  - the Commonwealth Government should consider opportunities for efficiencies through the alignment of application processes and data requirements for emissions-intensive trade-exposed industries under the Jobs and Competitiveness Program and Renewable Energy Target (R.22).
- The Commonwealth Government should explore whether the Renewable Energy Target eligibility for native forest wood waste is likely to increase the rate of logging of native forests. If it is not, then wood waste eligibility should be reinstated, subject to appropriate accreditation processes designed to ensure that no additional logging occurs as a result (R.28).
- The Clean Energy Regulator should be able to refund over-surrendered certificates to a liable entity that ceases to trade, or to transfer over-surrendered certificates if a liable entity is acquired by another entity which takes on a Renewable Energy Target liability (R.17).
- The requirement to submit a solar water heater and small generation unit return (R.10) and the requirement to provide the out-of-pocket expense data for a small generation unit installation (R.11) should be removed from the *Renewable Energy (Electricity) Regulations 2001* (Cth).

Recommendations to maintain existing arrangements

- In the Authority's judgement many aspects of the existing arrangements are operating satisfactorily and no changes are recommended in respect of the following:
  - the primary point of liability or the size threshold for coverage of grids (R.12) or the process for calculating individual liability (R.14);
  - the current arrangements for surrender of certificates (annual surrender for the Large-scale Renewable Energy Target; quarterly surrender for the Small-scale Renewable Energy Scheme) (R.16);
  - the current settings for the shortfall charges (the level of the shortfall charge should be reconsidered by the Authority as part of its 2016 review of targets beyond 2020, or earlier if circumstances warrant (R.18));
  - the self-generation exemption (R.23) (but it is proposed that arrangements be developed to allow for incidental electricity offtakes under the self-generation exemption which provide community benefits in remote locations (R.24));
  - the list of eligible sources or the accreditation process for the Large-scale Renewable Energy Target (R.25);
  - the present eligibility arrangements for existing waste coal mine gas (R.26) and new waste coal mine gas (R.27);
  - the existing arrangements for displacement technologies (R.32) or to allow additional displacement technologies in the Renewable Energy Target (R.33); or
  - to promote diversity (R.34).

- The Clean Energy Council should be maintained as the sole accreditation body for installers under the Small-scale Renewable Energy Scheme (R.29).
- New small-scale technologies should be considered on a case by case basis for inclusion in the Small-scale Renewable Energy Scheme (R.30). No additional new small-scale technologies should be made eligible in the Small-scale Renewable Energy Scheme at this time (R.31).

APPENDIX B LETTER FROM THE MINISTER TO THE CLIMATE CHANGE AUTHORITY CHAIR

Minister for Climate Change and Energy Efficiency
Minister for Industry and Innovation

Mr Bernie Fraser
Chair
Climate Change Authority
GPO Box 1944
MELBOURNE VIC 3011

Dear ~~Mr Fraser~~ Bernie

I write to you concerning the Climate Change Authority's statutory review of the Renewable Energy Target (RET) scheme.

I first of all would like to take the opportunity to once again thank you for agreeing to lead the Authority and note the very important role it has to play in advising the Government on the operation of the key components of the Clean Energy Future plan. I intend writing to you again in the near future to set out the Government's expectations generally in relation to the role the Authority, its relationships with the Government and Department of Climate Change and Energy Efficiency, and issues of corporate governance, communication and financial management.

As you are aware, the Authority's first significant task is to review and report on the operation of the RET scheme (the Review) before the end of 31 December 2012. The parameters of the Review, including its scope, consultation requirements and timelines, are set out in Section 162 of the *Renewable Energy (Electricity) Act 2000*. This includes the requirement that the Climate Change Authority's recommendations cannot be inconsistent with the objects of the Act.

The Government recognises that renewable energy will play a crucial role in a clean energy future. As such, promoting innovation and investment in harnessing our abundant renewable energy resources is a key element of the Clean Energy Future plan.

The RET scheme, as an integral part of the Government's plan, is designed to deliver the Government's commitment that the equivalent of at least 20 per cent of Australia's electricity supply will come from renewable sources by 2020. Renewable energy investors have been assured by the Government of our ongoing commitment to this target, to provide confidence for their investment decision making.

The RET scheme will work alongside the carbon price, the Australian Renewable Energy Agency and the $10 billion Clean Energy Finance Corporation (CEFC) recently established through legislation, to speed up the deployment of renewable energy technologies, helping smooth Australia's transition to a clean energy future. These policies and institutions are intended to be mutually supportive and work together to enhance clean energy outcomes for all Australians.

In the long term, transformation of our electricity supply to renewable and low emissions sources is essential to cutting our national emissions and remaining competitive in a carbon constrained world. The carbon price will drive investment in clean energy sources such as

Parliament House, Canberra ACT 2600 Tel 02 6277 7920 Fax 02 6273 7330 solar and wind. However in the near term, the RET is intended to complement the carbon price by accelerating the deployment of market-ready renewable technologies at least cost through a technology-neutral, market based scheme. It will also help diversify our energy mix which is currently highly reliant on emissions-intensive coal-fired generation.

Under the RET scheme, and its smaller precursor which commenced in 2001, over 300 power stations have been accredited, increasing renewables-based generation by around 5 times, albeit off a small base. In terms of small-scale renewable energy systems, over 600,000 rooftop solar photovoltaic (PV) installations and 700,000 solar and heat pump water heaters have also received support since 2001.

The Government has recently made policy changes to the RET to improve its operation. In mid-2010, the RET was separated into two components - the Large-scale Renewable Energy Target (LRET) and the Small-scale Renewable Energy Scheme (SRES) - to provide greater certainty for large-scale renewable energy project investors, households and installers of small-scale renewable energy systems. The Solar Credits mechanism under the SRES boosts upfront support for eligible solar PV systems by multiplying the number of tradable certificates able to be created. The multiplier reduces over time, reflecting declining costs of small-scale solar PV.

In response to unsustainable growth in small-scale solar, driven by declining system costs, the strong Australian dollar and economy, and incentives such as state and territory feed-in tariff schemes, the Government has brought forward the phase-out of Solar Credits by two years to mid-2013. These changes were aimed at maintaining a balance between supporting households with the upfront cost of installing solar panels, the impact on electricity prices, and the sustainable development of the industry.

In light of the above, the Government is continuing to monitor the efficiency of the SRES and the clearing house which operates to cap the price of certificates in the small-scale market. In addition, the Government considers that it is important the requirements relating to the creation of small-scale technology certificates ensure that only systems of appropriate quality are supported with regard to compliance with State and Territory legislation, relevant Australian standards and industry practice. This framework also needs to take into account the responsibility of State and Territory Governments and industry accreditation schemes have for electrical safety and quality matters.

The Government is also interested in how the RET, as a market-based scheme, is performing in terms of encouraging generation of electricity from a range of renewable sources and how it is influencing the long-term development of the industry to assist the transition to a low emissions economy at least cost. The Government is conscious that the RET needs to provide investment certainty and predictability for investors long lived assets. It also needs to deliver renewable energy outcomes at least cost to electricity consumers. In this context, I note that some renewable energy industry stakeholders have expressed the view that the statutory requirement for the Authority to review the RET scheme every two years is inappropriate and contributing to uncertainty for investors.

Regarding the Government's broader activities in this area, you will be aware that COAG has prioritised a review of Government climate change programs to look at whether they are complementary to a carbon price and are effective, efficient and do not impose duplicative reporting requirements. The Select Council on Climate Change (SCCC), which I chair, has developed an approach to this review and is due to report to COAG by

2

8 February 2013. My Department will draw on the findings of the CCA RET Review to assist with completing the COAG Review of complementary measures.

At a meeting on 4 May 2012, the SCCC also agreed that the report of the recently completed *COAG Review of Specific RET issues* be conveyed to the CCA to inform its considerations. COAG commissioned this review in April 2008 in agreeing the design of the RET scheme. As Chair of the SCCC, I attach a copy of the report in accordance with the SCCC agreement.

In closing, I look forward to receiving the Authority's report of the Review and would encourage the Authority to contact the Department of Climate Change and Energy Efficiency and the Clean Energy Regulator as appropriate should you require any further context or information.

Yours sincerely

GREG COMBET

APPENDIX C CONSULTATION

Throughout the Renewable Energy Target (RET) review, the Climate Change Authority (the Authority) consulted with a wide range of interested parties, including energy retailers, energy users, environmental and welfare advocacy groups, the renewable energy industry and individuals.

To assist the consultation process, the Authority released an issues paper and a discussion paper. The issues paper (released 20 August 2012) explained the RET scheme and requested feedback from stakeholders on particular questions. Almost 8 700 submissions were received, including two submission campaigns organised by GetUp (over 7 700 submissions) and Hepburn Wind (over 700 submissions). Submissions, including samples from the submission campaigns, are available at the Authority's website (www.climatechangeauthority.gov.au).

The discussion paper (released 26 October 2012) set out the Authority's preliminary views on key issues. The discussion paper was used as the basis for further consultation, including four stakeholder consultation roundtables held on 2 and 5 November 2012 in Melbourne and Sydney respectively. A summary of these discussions has been published on our website along with a list of the stakeholders that participated. The Authority received 54 written responses to the discussion paper. Table 8 lists the individuals and organisation that provided non-campaign submissions (which are not bound by confidentiality) to the issues paper, discussion paper, or both.

The Authority also held more than 60 one on one meetings with stakeholders over the course of the review.

Table 8 Submissions Received

100% Renewable Community Campaign	ACCIONA
Advanced Energy Consulting	AECOM Australia
AGL Energy	Ai Group
Alinta Energy	Alstom Limited
Alternative Technology Association	Amcor Packaging (Australia)
Andrew Smethurst	Andrew Yarrow
Anthony Yeates	Australian Aluminium Council
Australian Coal Association	Australian Conservation Foundation
Australian Energy Market Commission	Australian Energy Market Operator
Australian Forest Products Association	Australian Geothermal Energy Association
Australian Industry Greenhouse Network	Australian Network of Environmental Defender's Officers
Australian Paper	Australian Petroleum Production and Exploration Association
Australian Power and Gas	Australian PV Association
Australian Solar Council	Australian Solar Thermal Energy Association
Australian Sugar Milling Council	Australian Youth Climate Coalition
Barbara J Fraser	Barry Murphy

Beacons Consulting	Beyond Zero Emissions
BHP Billiton – Illawarra Coal	Business Council of Australia
Cement Industry Federation	Central NSW Renewable Energy Committee
Chamber of Minerals and Energy of Western Australia	Chevron Australia
Chris Hinchcliffe	Chris Mount
Clean Energy Council	CleanSight
Climate Action Hobart	Climate Action Network Association
Climate and Health Alliance	Climate Markets and Investment Association
ClimateWorks Australia	Conservation Council of South Australia
Continental Wind Partners and Wind Prospect	Coronium
CSR	Dandenong Ranges Renewable Energy Association
David Hamilton	David Osmond
Doctors for the Environment Australia	DUT
Energetics	EnergyAustralia
Energy Developments	Energy Networks Association
Energy Retailers Association of Australia	Energy Supply Association of Australia
Energy Users Association of Australia	Enhar
EnviroGen	Enviromate Commercial
Epuron	Eraring Energy
Ergon Energy	Eurobodalla Sustainable Devices
Evans and Peck	EvolveSmart
First Solar (Australia)	Gas Industry Alliance
General Electric	Geodynamics
GetUp	Glen Wright
Goldwind Australia	Government of Tasmania
Grattan Institute	Green Building Council Australia
Greer Taylor	Harry Suehrcke
Hepburn Wind	Hidro+ Technology
Horizon Power	Hydro Tasmania
Infigen Energy	International Power-GDF SUEZ Australia
Investor Group on Climate Change	IPART
James Kwok	James Wight
Joe Hallenstein, Hannah Clare Johnson, Scott MacKinnon, Ngaire McGaw, Fiona McKeague, Ko Oishi and Madeleine Payne	John Poppins
Julie Congdon	Kai Mildner
Keppel Prince Engineering	Lake Macquarie City Council
Landfill Gas and Power	Latrobe Valley Sustainability Group
LMS Energy	M Ballantine Industrial Electrical
Macquarie Generation	Major Energy Users Inc
Marion Cook	Mark Coster
Melanie Mildner	Meridian Energy Australia
Milan Mitic	Minerals Council of Australia

MirusWind	MT Energie
National Farmers' Federation	National Generators' Forum
New South Wales Business Chamber	Origin Energy
Pacific Hydro	Pamela Reeves
Peter Campbell	Peter Doumouras
Power and Water Corporation	Professor Ian Johnston
Qenos	QSG
Queensland Department of Energy and Water Supply	Queensland Minister for Energy and Water Supply
RATCH-Australia	REC Agents Association
REpower Australia	RES Australia
Rio Tinto	Rob Stokes MP
Robin Morgan	Rodney Lowe
Ross Garnaut	RPG Australia
Samsung C&T	Santos
Sienna Mildner	Sinovel Wind Group (Australia)
Snowy Hydro	Solar Business Council
Solar Energy Industries Association	Solar Matrix
Solex	Stanwell Corporation
Steven Boer	Sucrogen Australia
Sustainable Energy Association of Australia	Sustainable Energy Now
Sydney Water	The Children's Investment Fund Management
The Climate Group	The Climate Institute
UNION FENOSA Wind Australia	Uniting Church in Australia
Vestas Australian Wind Technology	Vic McDonald
Visy	WestGen
WestWind Energy	William Adlong
Wind Prospect	Windlab Systems
Wollongong Climate Action Network	WWF Australia
Yarra Ranges Council	

APPENDIX D MODELLING SUMMARY

Appendix D.1 Introduction

The Authority engaged SKM MMA to undertake electricity market modelling to assess the potential impacts of changes to the current Renewable Energy Target (RET) scheme on the electricity generation capacity mix and production, emissions abatement, certificate prices, resource costs, wholesale and retail electricity prices and power bills for the average household and small to medium enterprises (SMEs).

Four RET scenarios were modelled:

- existing Large-scale Renewable Energy Target (LRET) target – *reference case 1*;
- no RET from January 2013 onwards – *no RET*;
- updated 20 per cent target of 26 400 GWh in 2020 for large-scale renewable generation to reflect downward revisions to long term electricity demand forecasts, allowing for around 11 000 GWh for the contribution of Small-scale Renewable Scheme (SRES) technologies – *updated 20% target*; and
- rolling the LRET and SRES back into one target of 45 000 GWh in 2020, to occur from 1 January 2015 – *combined LRET & SRES*.

This appendix summarises *reference case 1* results compared with *no RET* and *updated 20% target* scenarios. Detailed results and assumptions for all scenarios are outlined in the SKM MMA modelling report available at www.climatechangeauthority.gov.au.

The results should be interpreted as what might happen given a set of assumptions and scenarios rather than predicting future outcomes. Indeed, the modelling exercise is based on existing regulatory and policy settings, which may change in the future.

The modelling period for the analysis was from 2012-13 to 2040-41 to ensure investments which are forecast to occur following 2020-21 take into account future revenues over the life of the investment. Reporting of results in this appendix focuses on the period 2012-13 to 2030-31.

Modelled impacts of scenarios on retail and SMEs electricity prices reported in this appendix include a suppression of wholesale prices. An analysis of impacts excluding wholesale price suppression can be found at Chapter 4.

All values from the modelling are denominated in June 2012 prices.

Where a net present value is provided, a discount rate of seven per cent has been used, consistent with recommendations from the Office of Best Practice Regulation (2010).

Appendix D.2 Key modelling assumptions

As with any modelling exercise, the modelling results are dependent on the assumptions used. Table 9 outlines the key modelling assumptions.

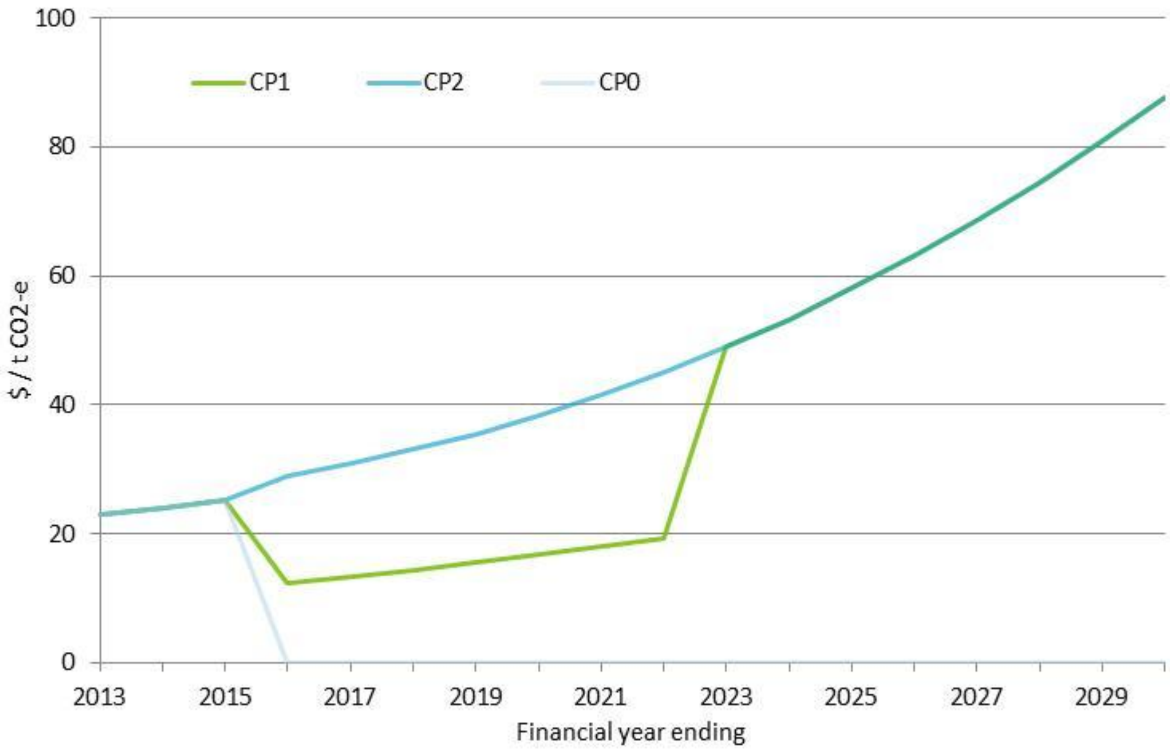
Table 9 Key Modelling assumptions

Assumption	*Reference case 1*	*Updated 20% target*	*No RET* from January 2013
Electricity demand – AEMO medium growth energy forecast	●	●	●
Carbon price – path reflects a fall in prices after the fixed price period (see Appendix D.3)	●	●	●
Regional gas prices – AEMO National Transmission development planning prices developed by ACIL Tasman	●	●	●
Technology costs - SKM MMA data drawing on BREE (AETA) and AEMO publications	●	●	●
Small-scale renewable technology penetration of around 11 000 GWh by 2020	●	●	
Small-scale Technology Certificate price that averages around $27 per megawatt hour over the period 2012 to 2020	●	●	
Updated 20 per cent target of 26 400 GWh in 2020 for large-scale renewable generation (see Chapter 4)		●	
Minimal network constraints (restrictions on power flows) within a state and development of interconnectors between state systems on the basis of market-wide economic assessment of benefits and costs	●	●	●
Baseline renewable generation of around 14 500 GWh	●	●	●

Appendix D.3 Modelled carbon price scenarios

The Authority has drawn on two of the Treasury carbon price scenarios published in *Strong Growth, Low Pollution: modelling a carbon price 2011* (SGLP) and the *SGLP Update* as points of reference for its modelling. A zero carbon price scenario was also modelled. Each of the three scenarios is described in greater detail below and illustrated in Figure 29.

Figure 29 Carbon price scenarios (nominal prices)



Source: Commonwealth Treasury and Climate Change Authority.
Note: The above carbon price scenarios are not a forecast of the expected future carbon price path.

CP1 (Reference case 1) – Combines the Treasury SGLP Update $23 scenario and Treasury SGLP 'low starting price' scenario. This scenario assumes a nominal domestic price of $23 per tonne of carbon dioxide equivalent (CO_2-e) in 2012-13 rising on average 2.5 per cent per year plus inflation over three years. The scenario assumes a transition from this price path to a fixed price of around $12 per tonne of CO_2-e in 2015-16 (this fixed price is consistent with the Treasury SGLP 'low starting price' scenario), which was part of a sensitivity analysis that assumed a domestic fixed price of $10 per tonne of CO_2-e in 2012-13 rising five per cent per year plus inflation over a fixed price period of ten years. This Treasury scenario assumed a transition from a fixed price of around $19 per tonne of CO_2-e in 2021-22 to an internationally linked scheme with a forecast global carbon price of around $49 per tonne of CO_2-e in 2022-23.

CP2 (Reference case 2) – Assumes a world with a 550 ppm stabilisation target and an Australian emissions target of five per cent cut on 2000 levels by 2020 and 80 per cent cut by 2050. This assumes a nominal starting price of $23 per tonne of CO_2-e in 2012-13, rising 2.5 per cent per year, plus inflation, before moving to a flexible international carbon price from 2015-16, projected to be around $29 per tonne of CO_2-e. This scenario was published by the Treasury in the SGLP Update.

CPO (Zero carbon price) – Assumes a nominal domestic starting price of $23 per tonne of CO_2-e in 2012-13 rising on average 2.5 per cent per year plus inflation over three years, falling to zero from July 2015.

Appendix D.4 Key sensitivities

The implications of a change in either carbon price or demand

The modelling results are particularly sensitive to assumptions relating to future carbon prices and electricity demand.

The Authority's modelling explored whether the target under *reference case 1* would be met if the carbon price fell to zero (*zero carbon price* scenario) or if demand were significantly lower than currently forecast (*low demand* scenario). The modelling suggests that if either the carbon price went to zero or electricity demand fell further than is currently forecast by AEMO, then there is a greater likelihood that the LRET target would not be met because overall wholesale prices would be lower, requiring higher certificate prices for renewable energy projects to be viable. Figure 23 in Chapter 4 indicates:

- the shortfall charge is estimated to come into play in the *zero carbon price* scenario, in which case the LRET would not be met as liable parties are likely to pay the shortfall charge rather than meet their LRET obligations – a result that is consistent with the findings of other modelling exercises (for example, AEMC 2011); and
- in the *low demand* scenario the LGC price is estimated to remain below the shortfall charge, although between 2020-21 and 2021-22 the LGC price comes close to hitting the shortfall charge which averages around $74 over this period.

Estimating the cost of abatement

The Authority has used the Department of Climate Change and Efficiency (DCCEE) methodology for estimating the cost of abatement. The DCCEE methodology uses the following formulae and uses discount rates consistent with recommendations from the Office of Best Practice Regulation (2010).

Cumulative additional net resource costs (discounted)	÷	Cumulative additional abatement	=	Resource Cost of Abatement ($/tonne)

Further detail can be found at http://www.climatechange.gov.au/publications/abatement/estimating-cost.aspx.

Key estimated impacts

The following section summarises the key estimated impacts of the different target scenarios on:

- generation of electricity from renewable sources;
- emissions from the electricity sector;
- cost to society, including resource costs; and
- households and businesses, including certificate prices, wholesale and retail electricity prices.

Reference case 1 compared to no RET

Generation of electricity from renewable sources

Comparing *reference case 1* with a *no RET* scenario reveals that over the period 2012-13 to 2030-31 there is a similarity in the level of development in new generation by 2030-31 (see Table 10).

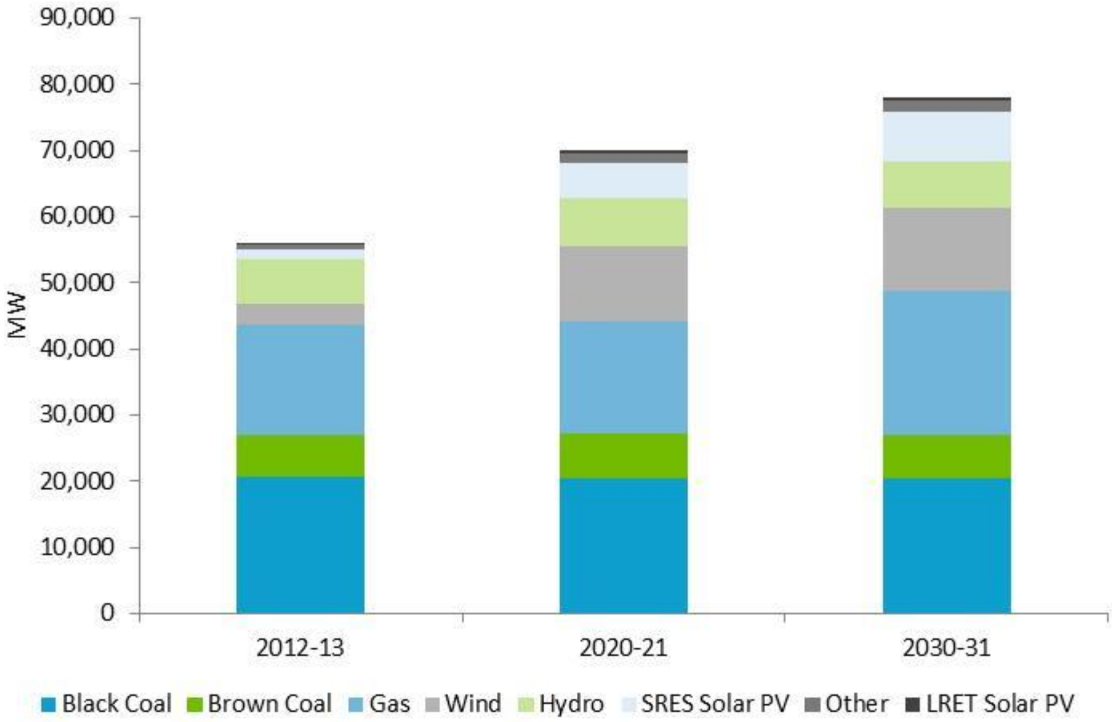
Table 10 New generation build 2012-13 to 2030-31 under *reference case 1* and *no RET* scenario

	reference case 1	*no RET* from January 2013
Renewable generation	17 244 MW (13 875 MW by 2020-21)	17 244 MW (5 043 MW by 2020-21)
Gas-fired generation	5 113 MW	4 854 MW
Coal-fired generation	24 MW	24 MW

Source: SKM MMA and Climate Change Authority, 2012.
Note: Renewable capacity excludes solar water heaters.

The existing target, however, accelerates the build of new renewable energy generation (primarily wind) in the period to 2020-21 during which the carbon price is insufficient to make the development of new renewable energy generation economically viable (see Figure 30). By the end of 2020-21, it is estimated that around 13 875 MW of new renewable energy generation capacity will be installed compared with around 5 043 MW under the *no RET* scenario.

Figure 30 Stationary electricity sector capacity under *reference case 1*

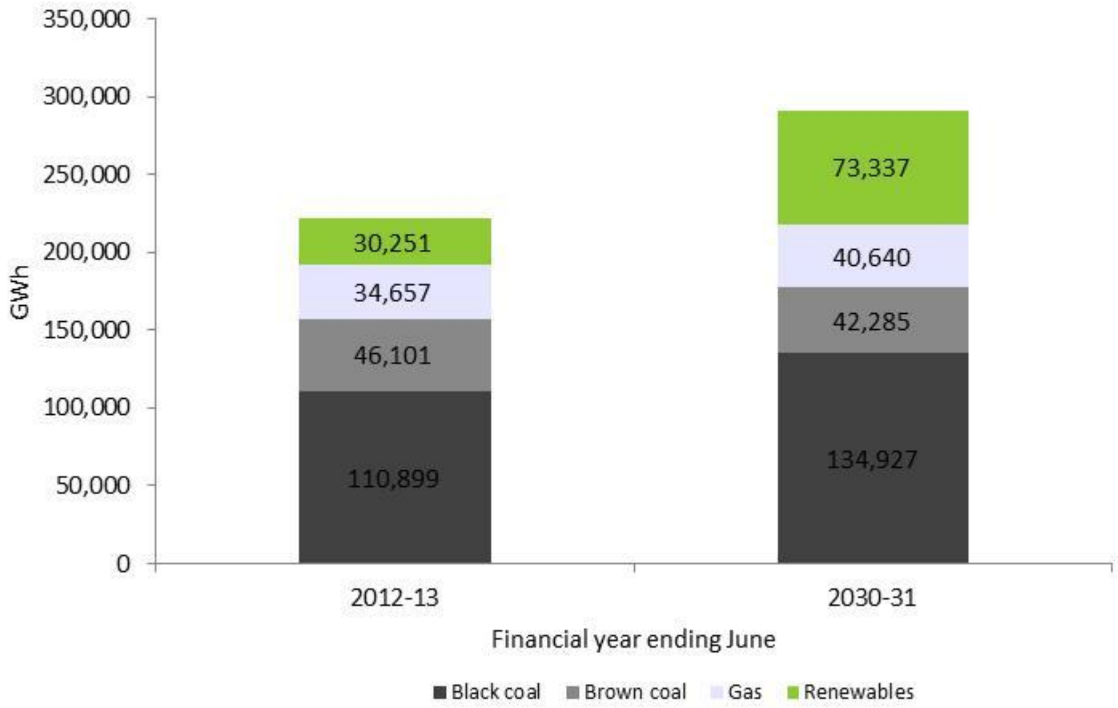


Source: SKM MMA and Climate Change Authority, 2012.
Note: 'Other' includes the following technologies; wet waste, wheat/ethanol plant, agricultural waste, bagasse, black liquor, landfill gas, municipal solid waste, sewage waste, wood/wood waste, geothermal and wave.

Figure 31 presents an overview of total generation in gigawatt hours by broad fuel category and shows the increasing share of renewable energy generation under *reference case 1*. The share of total generation from renewable energy (including an allowance for a reduction in demand due to displacement technologies) is forecast to grow from around 14 per cent in 2012-13 to around 25 per cent in 2020-21 and remain at this level in 2030-31. By comparison, under the *no RET* scenario it is estimated that renewable energy generation contributes around 13 per cent in 2012-13, around 15 per cent in 2020-21 and around 25 per cent in 2030-31.

Additional renewable energy generation displaces some fossil-fuel generation over the period modelled but the overall results for individual fuels are mixed. Over the period 2012-13 to 2030-31, for *reference case 1*, output from black-coal fired generation is estimated to increase by around 24 000 GWh while brown-coal fired generation is expected to decrease by around 3 800 GWh. Coal-fired generation remains relatively competitive with gas-fired generation over this period as real gas prices in the southern and eastern states are assumed to double by 2030-31 as they approach international price-parity levels. Brown coal-fired generation capacity is not estimated to change substantially until after 2030-31, when retirement of some brown coal-fired generation is anticipated.

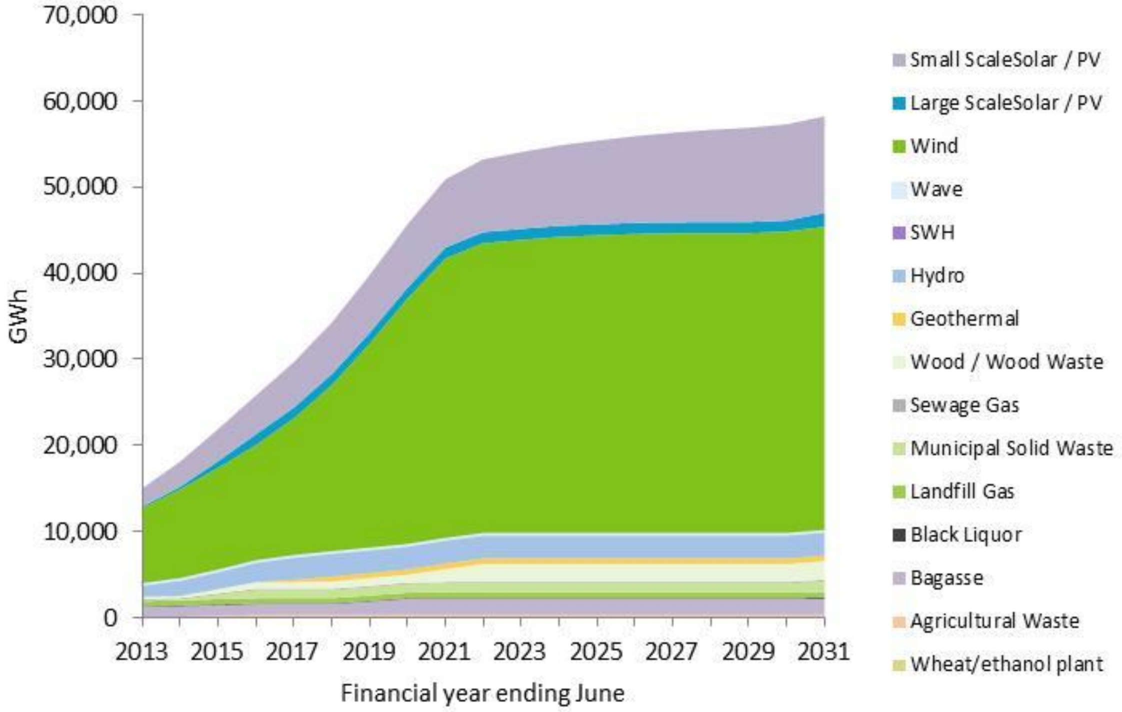
Figure 31 Total generation production mix under *reference case 1*



Source: SKM MMA and Climate Change Authority, 2012.

Figure 32 provides an estimate of the share of generation delivered by eligible renewable energy plant of different technology types. It shows that most of the additional renewable energy generation is likely to come from wind (32 433 GWh in 2020-21), with a smaller contribution from solar PV (large-scale PV generation of 1 288 GWh and small-scale PV generation of 7 933 GWh in 2020-21). Even though the carbon price is assumed to be increasing, a corresponding increase in large-scale renewable generation is not expected because neither the large-scale certificate price nor the carbon price are high enough to encourage new investment. In addition, solar water heating is treated in the modelling as an offset to demand, but its contribution is not assumed to materially change from its existing contribution in the period to 2030-31.

Figure 32 New renewable generation production mix under *reference case 1*



Source: SKM MMA and Climate Change Authority, 2012.

Emissions from the electricity sector

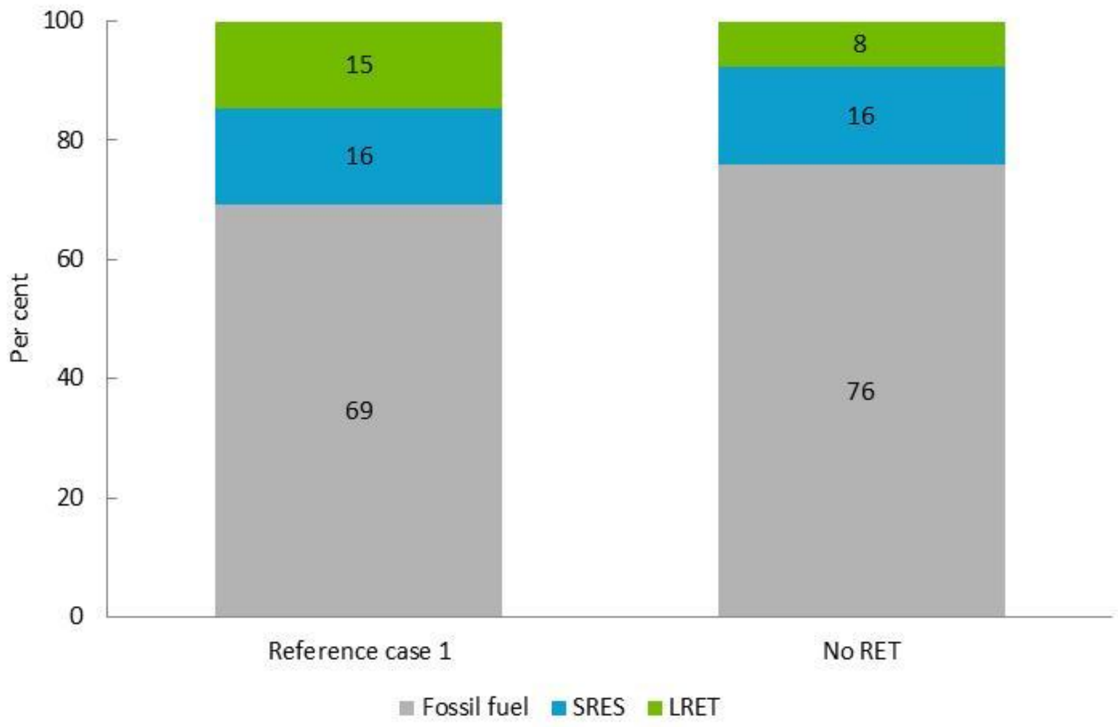
Total emissions from the stationary electricity sector over the period 2012-13 to 2030-31 are estimated to be around 3 570 Mt of carbon dioxide equivalent under the *reference case 1* scenario. It is estimated that emissions will fall over the period 2018-19 to 2020-21, reflecting increased wind generation displacing existing fossil-fuel generation. However, over the period 2012-13 to 2030-31 annual emissions are estimated to increase by nine per cent. The growth in emissions occurs because, with the renewable energy target having been met, renewable generation levels are stable from 2020-21 and fossil-fuelled generation meets any electricity demand growth through the remainder of that decade. By comparison, under the *no RET* scenario, total emissions over the period 2012-13 to 2030-31 are estimated at around 3 787 Mt of CO_2-e.

Cost to society

To understand the RET's effect on the overall cost to society, the cost of resources (capital, fuel and labour) deployed in electricity generation with and without the RET have been estimated. This approach has been taken because it is likely that in the absence of a RET that capital and operational expenditure on other generation sources will be required.

New renewable and gas-fired capacity installed over the period 2012-13 to 2030-31 to meet LRET and SRES obligations and electricity demand requirements is estimated to come at a resource cost of around $142 billion in net present value terms – noting that total resource costs represent annualised capital expenditure plus the change in overall system operating costs including reductions in fossil-fuels used. Under the *no RET* scenario, total resource cost over the same period is estimated to be around $134 billion in net present value terms, 76 per cent of which is directed at investment in the fossil-fuel sector (see Figure 33). As such, the modelling indicates that under *reference case 1* the RET will generate an additional $8.6 billion of resource investment (in net present value terms) which represents around a six per cent increase in resource costs over the period to 2030-31 when compared to the *no RET* scenario.

Figure 33 Contribution to total resource costs over the period 2012-13 to 2030-31



Source: SKM MMA and Climate Change Authority, 2012.

Cost to households and businesses

Certificate prices

The price of a large-scale generation certificate (LGC) is broadly the difference between the wholesale price of electricity and the additional revenue required to make additional renewable energy generation a financially viable prospect. Bloomberg New Energy Finance (2012) has estimated the LGC price currently required to build new capacity is around $40 to $50. A large number of LGCs are, however, traded outside the spot market in (confidential) power purchase agreements and the effective price of the LGCs is unknown.

The LGC price under the *reference case 1* scenario is estimated to remain below the shortfall charge over the period 2012-13 to 2030-31 (see Figure 23, Chapter 4). The shortfall charge is currently not indexed, and its real value falls over time in line with inflation. The LGC price is forecast to approach the tax-effective shortfall charge by 2019-20, reaching around $65 in that year, as higher cost renewable energy projects need to be developed to meet the annual targets.

It is estimated that all of the new renewable generation capacity required to meet the targets until 2030-31 would be built by 2020-21. Although there is no substantive change in large-scale renewable generation from 2020-21 to 2030-31, other market forces (for example, rising carbon prices, falling technology costs and high gas prices) are estimated to help create an environment where renewable energy development is approaching financial viability from 2030-31 onwards.

Electricity prices

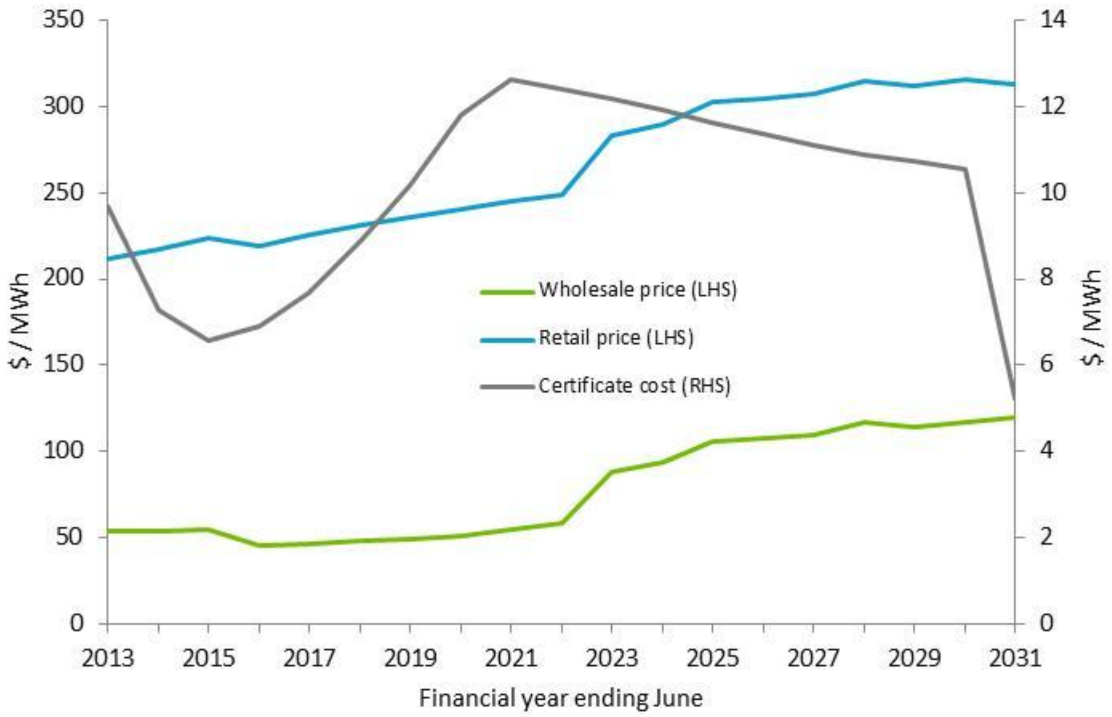
The components of the retail price as modelled include:

- wholesale prices;
- network charges (which are assumed to represent a fixed cost with some escalation in some states based on anticipated increases);
- certificate costs (a proportionate share of LGC and STC costs borne by liable parties); and
- a retail margin.

All other things being equal, the modelling estimates that the higher the large-scale renewable energy target the greater the increase in renewable energy development and the lower the wholesale price. At the same time, however, there will be a greater number of renewable energy certificates created. The net effect on energy consumer bills will therefore reflect the balance of the change in wholesale costs and change in certificate costs.

Over the period 2012-13 to 2030-31, volume weighted average wholesale electricity prices under the *reference case 1* scenario are estimated to rise from $54 per MWh to $120 per MWh (see Figure 34). The substantial upward shift in prices from 2021-22 to 2022-23 ($58 per MWh to $88 per MWh) is, however, the result of the step change in carbon prices that is assumed to occur at that time.

Figure 34 Wholesale and retail prices and RET certificate costs under the *reference case 1*



Source: SKM MMA and Climate Change Authority, 2012.

Overall movements in forecast wholesale and retail prices are quite similar under the *reference case 1* scenario, although the margin between them grows slightly because of:

- increase in RET certificate costs to 2020-21; and
- expectations of slight growth in network charges.

The expected differences in the wholesale and retail prices between the *reference case 1* and *no RET* scenarios indicate that with a RET in place, wholesale prices are lower under the *reference case 1* scenario but retail prices are higher, reflecting the wedge created by the pass-through of certificate costs (see Figure 35).

Figure 35 Change in wholesale and retail prices – *no RET* compared with *reference case 1*

Source: SKM MMA and Climate Change Authority, 2012.
Note: A positive number indicates the value is higher in the *reference case 1* scenario than in the *no RET* scenario.

Energy consumer effects

RET certificate costs are estimated to contribute an average of 3.8 per cent of the total retail costs of electricity over the period to 2030-31, which equates to around $70 per annum for the average household electricity bill, assuming annual consumption of 7 MWh (see Figure 36). Higher RET certificate costs in the *reference case 1* scenario compared to the *no RET* scenario are estimated to be largely offset by lower wholesale prices under *reference case 1*.

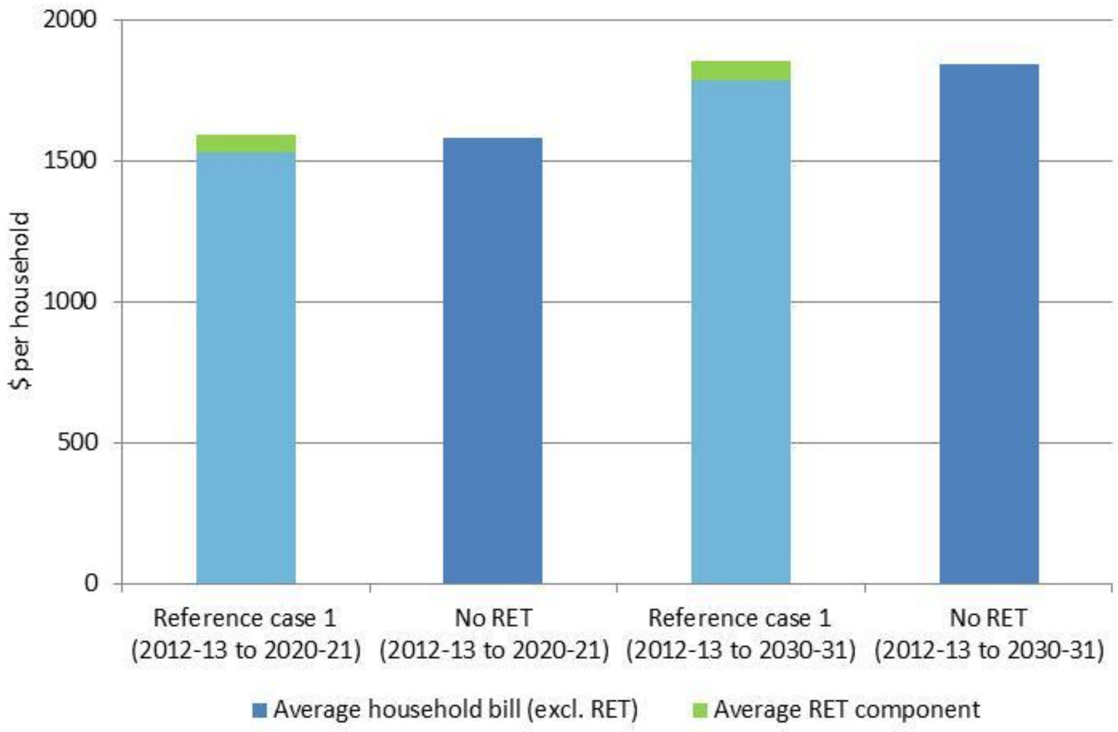
The average household electricity bill is estimated to rise through to 2030-31 at an average annual rate of 2.2 per cent under the *reference case 1* scenario. The sharpest rise coincides with the step change from 2021-22 to 2022-23 driven by the modelled carbon price. Average household bills are expected to plateau from 2024-25 reflecting lower RET certificate costs.

Average household electricity bills are forecast to be around $15 per annum higher, on average, over the period 2012-13 to 2030-31 compared to the *no RET* scenario.

Similarly, the average retail price of electricity for an average small to medium enterprise (SME), consuming 140 MWh per annum, is estimated to be slightly higher on average under the *reference case 1 and no RET* scenarios over the period 2012-13 to 2030-31 (see Source: SKM MMA and Climate Change Authority, 2012.

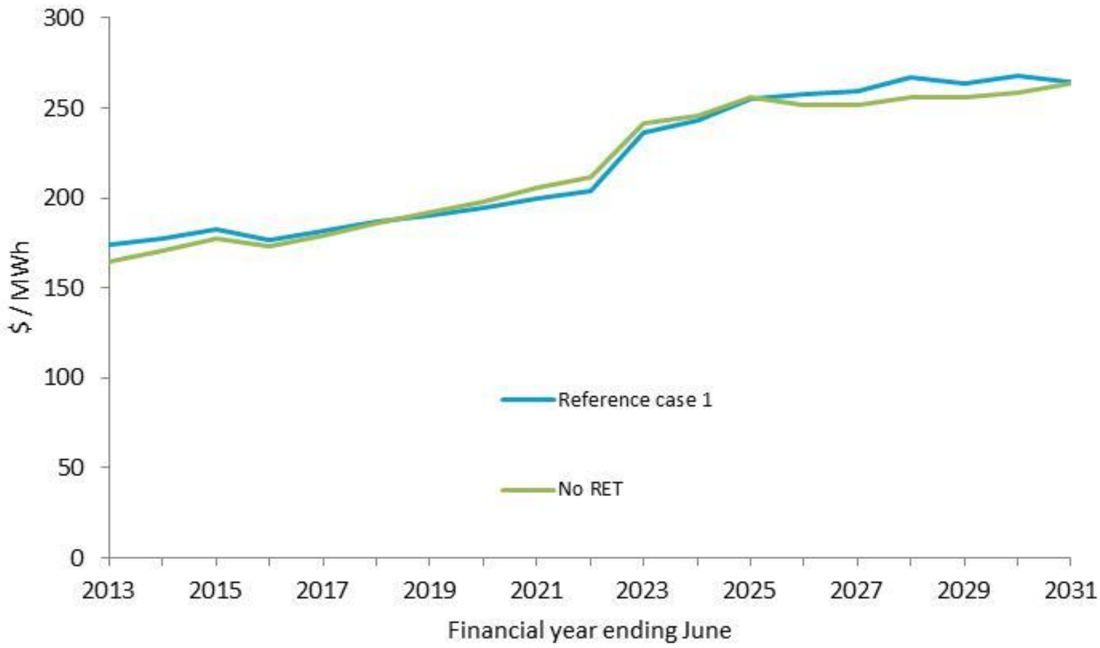
Figure 37). The average SME bill is estimated to increase by around $335 per annum on average over the period 2012-2013 to 2030-31, around $17 (or five per cent) of which is attributable to the RET.
It should be noted that the modelling indicates that SMEs face a proportionally higher RET cost for their electricity bills when compared to the average household due to the fact that SMEs on average face a lower electricity tariff (around $45 per MWh lower than households on average per annum).

Figure 36 Average annual household electricity bill



Source: SKM MMA and Climate Change Authority, 2012.

Figure 37 Commercial electricity prices under *reference case 1* and *no RET* scenarios



Source: SKM MMA and Climate Change Authority, 2012.

Reference case 1 compared to updated 20% target

Generation of electricity from renewable sources

Comparing *reference case 1* with an *updated 20% target* scenario reveals that over the period 2012-13 to 2030-31 there is a similarity in the level of new renewable generation capacity by 2030-31 (see Table 11). However, the existing target accelerates the build of new capacity (primarily wind) in the period to 2020-21, during which the carbon price is insufficient to make renewable energy generation economically viable. By 2020-21, it is estimated that around 13 615 MW of new renewable energy generation capacity will be installed compared with around 9 053 MW under the *updated 20% target* scenario.

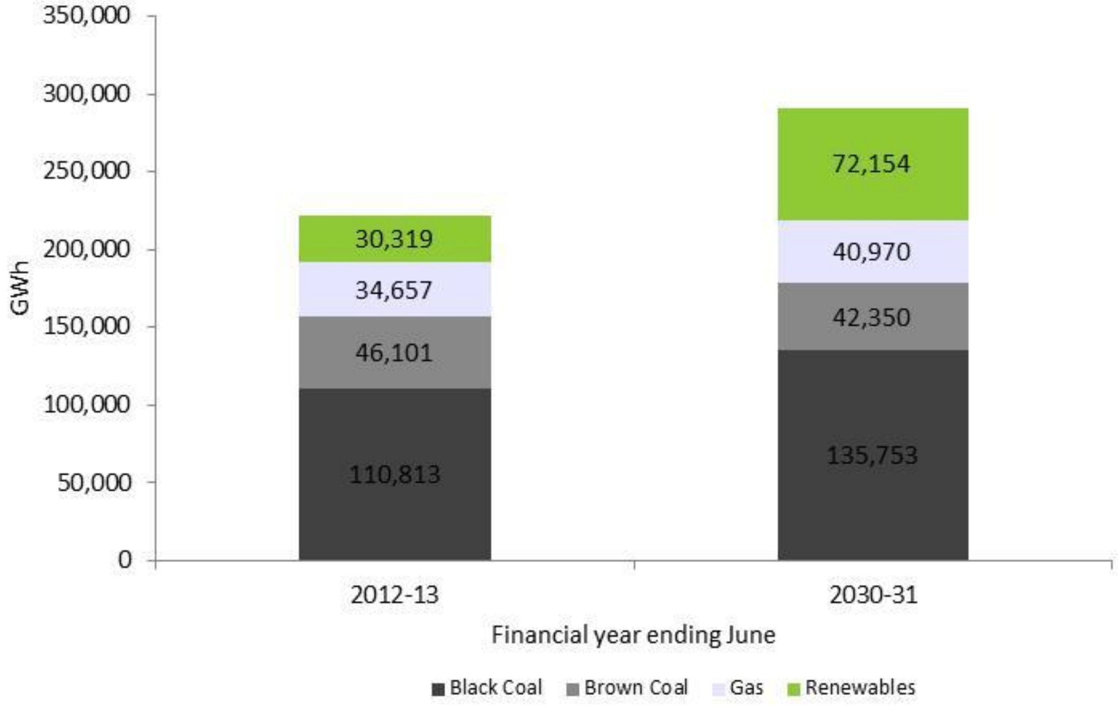
Table 11 New capacity *build 2012-13 to 2030-31 under reference case 1 scenario* and *updated* 20% scenario

	updated 20% target	*reference case 1*
Renewable capacity	16 986 MW (9 053 MW by 2020-21)	16 986 MW (13 615 MW by 2020-21)
Gas-fired capacity	4 854 MW	5 113 MW
Coal-fired capacity	24 MW	24 MW

Source: SKM MMA and Climate Change Authority, 2012.
Note: Renewable capacity excludes solar water heaters.

Figure 38 presents an overview of total generation in gigawatt hours by broad fuel category and shows the increasing share of renewable energy generation. As a share of total generation, it is estimated that renewable energy generation (including an allowance for displacement technologies) contributes around 14 per cent in 2012-13, growing to around 20 per cent in 2020-21 rising to around 25 per cent in 2030-31 under the *updated 20%* scenario. By comparison, under the *reference case 1* scenario renewable energy generation (including an allowance for displacement technologies) contributes around 14 per cent in 2012-13, growing to around 25 per cent in 2020-21 and remaining at this level in 2030-31.

Figure 38 Total generation under *updated 20% target*



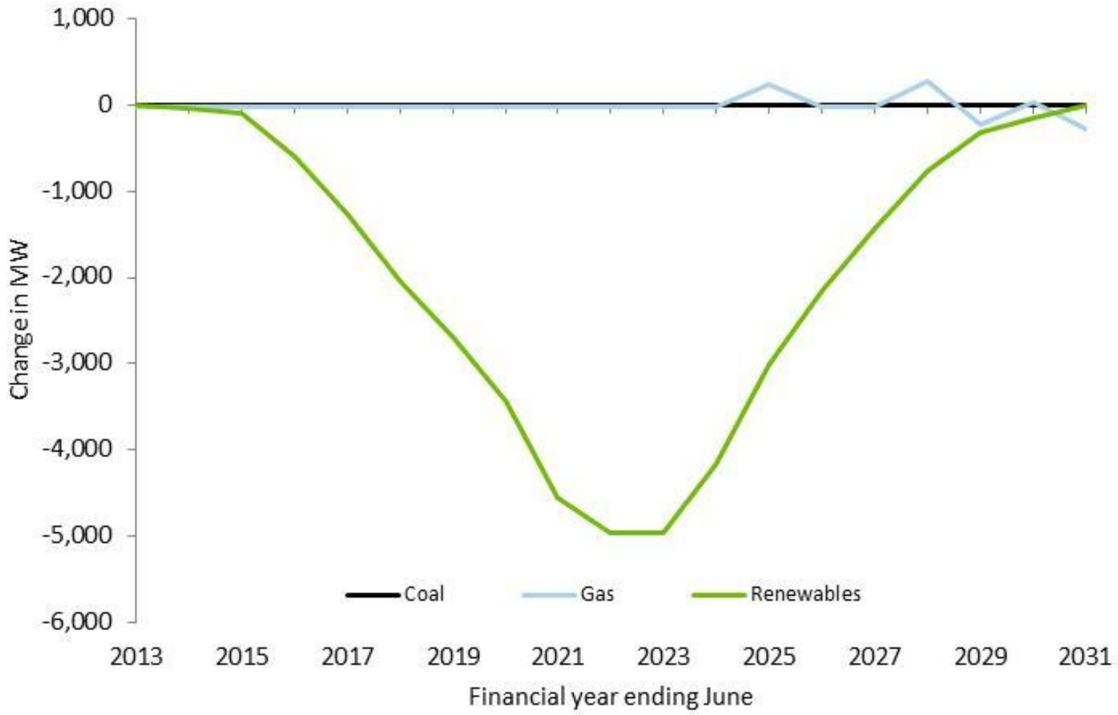
Source: SKM MMA and Climate Change Authority, 2012.

Under the *updated 20%* scenario, in the period from 2012-13 to 2030-31, output from black-coal fired generation is estimated to increase by around 24 940 GWh while brown-coal fired generation is expected to decrease by around 3 750 GWh. Coal-fired generation remains relatively competitive with gas-fired generation over this period as real gas prices in the southern and eastern states are assumed to double by 2030 as they approach international price-parity levels. Brown coal-fired generation capacity is not estimated to change substantially until after 2030, when retirement of some brown coal-fired generation is anticipated.

Generation capacity and production

Under an *updated 20% target* scenario, it is estimated there would be substantially less renewable generation capacity installed through most of the period from 2012-13 to 2030-31. By 2021-22 renewable generation capacity would be around 5 000 MW lower than under *reference case 1* (see Figure 39). By 2030-31, however, the difference is estimated to be largely eliminated, suggesting that a lower 2020 target delays renewable capacity investment to beyond 2020-21.

Figure 39 Change in generation capacity mix – *updated 20% target* compared with *reference case 1*



Source: SKM MMA and Climate Change Authority, 2012.
Note: A positive number indicates the value is higher in the *updated 20% target* scenario than in the *reference case 1* scenario.

With a lower target, generation from renewable sources is estimated to be substantially below the current settings (see Figure 38). At the peak of the differences between the two scenarios in 2021-22, under the *updated 20% target*:

- renewable energy generation is estimated to be around 14 000 GWh less (21 per cent of total renewable energy generation in that year for *reference case 1*);
- black coal-fired generation is estimated to be around 9 500 GWh more (eight per cent of total black coal-fired generation in that year for *reference case 1*);
- brown coal-fired generation is estimated to be around 4 200 GWh more (ten per cent of total brown coal-fired generation in that year for *reference case 1*); and
- gas-fired generation is estimated to be around 1000 GWh more (three per cent of total gas-fired generation in that year for *reference case 1*).

Cost to society

By transitioning to a lower RET target under the *updated 20%* scenario, the savings in resource costs is estimated to be around $4.5 billion in net present value terms over the period 2012-13 to 2030-31 (see Table 12). The modelling does not, however, assume any change to renewable development costs that might flow from increased risk premiums associated with renewable energy policy uncertainty.

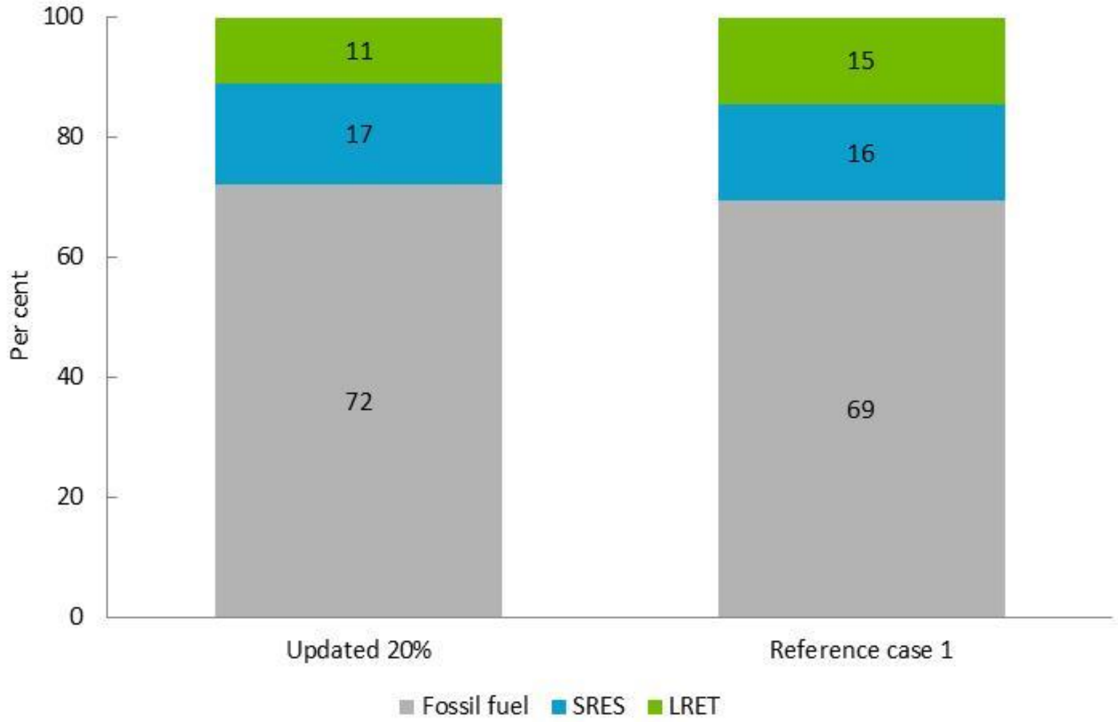
Table 12 NPV of resource cost ($ million)

	2012-13 to 2020-21	2012-13 to 2030-31
Difference between *updated 20% target* and *reference case 1*	-2 484	-4 457

Source: SKM MMA and Climate Change Authority, 2012.
Note: The discount rate used for the NPV is seven per cent.

A change in the target not only has an impact on the total investment in the renewable sector but also has a significant impact on investment in the fossil-fuel sector. As indicated in Figure 40, the proportion of total resource costs in both scenarios is dominated by the fossil-fuel sector, increasing its contribution to the total resource cost by four per cent in the *updated 20%* scenario.

Figure 40 Contribution to resource costs over the period 2012-13 to 2030-31



Source: SKM MMA and Climate Change Authority, 2012.

Emissions

Total greenhouse gas emissions are estimated to be higher in the *updated 20% target* scenario when compared to the *reference case 1* scenario. As shown in

Table 13, an additional 119 Mt CO_2-e of emissions are expected to be generated by moving to a lower, *updated 20% target* due to the higher levels of generation from fossil-fuel generation under that scenario.

On a dollar per tonne basis, the *updated 20% target* represents an abatement cost of around $38 per tonne compared to $40 per tonne under current settings.

Table 13 Emissions (Mt of CO_2-e)

		2021-13 to 2020-21	2012-13 to 2030-31
Absolute value	*reference case 1*	1 668	3 570
	updated 20% target	1 715	3 689
Change between *updated 20% target* and *reference case 1*		47	119

Source: SKM MMA and Climate Change Authority, 2012.

Costs to households and businesses

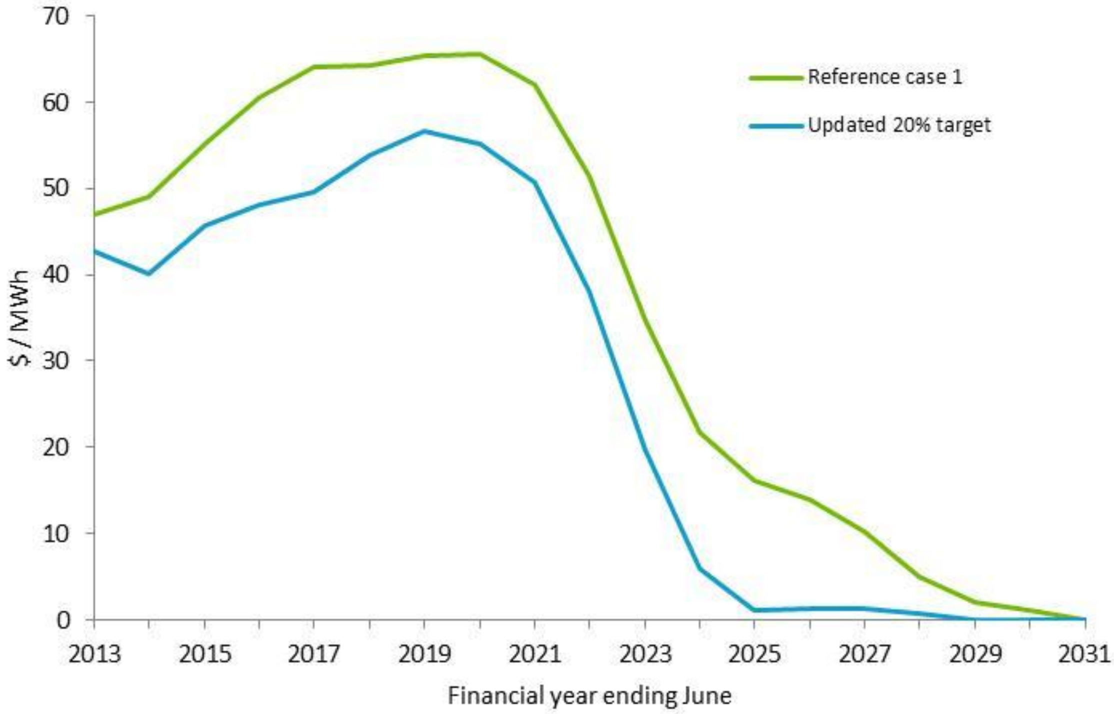
Wholesale electricity prices are expected to be generally higher under an *updated 20% target* scenario (see Figure 41). However, there is only a marginal change in retail prices for all energy consumers as the estimated fall in LGC prices (see Figure 42) reduces the required certificate cost pass-through to consumers.

Figure 41 Change in wholesale and change in retail prices – *updated 20% target* compared with *reference case 1*

Source: SKM MMA and Climate Change Authority, 2012.
Note: A positive number indicates the value is higher in the *updated 20% target* scenario than in the *reference case 1* scenario.

As a consequence of the marginal change in retail prices per unit of consumption, the impact of moving to an *updated 20% target* on the average household bill is expected to be small. SKM MMA's modelling indicates that moving from current settings to an *updated 20% target* will deliver an average annual increase in the household bill over the period 2012-13 to 2030-31 of around $0.40 per annum with retail prices averaging around the same level under both scenarios. The modelling indicates that an *updated 20%* target will deliver a decrease in the household bill of around $0.70 per annum on average over the period 2012-13 to 2020-21 and an increase of around $0.40 per annum on average over the period 2012-13 to 2030-31.

Figure 42 LGC prices – *updated 20% target* and *reference case 1*

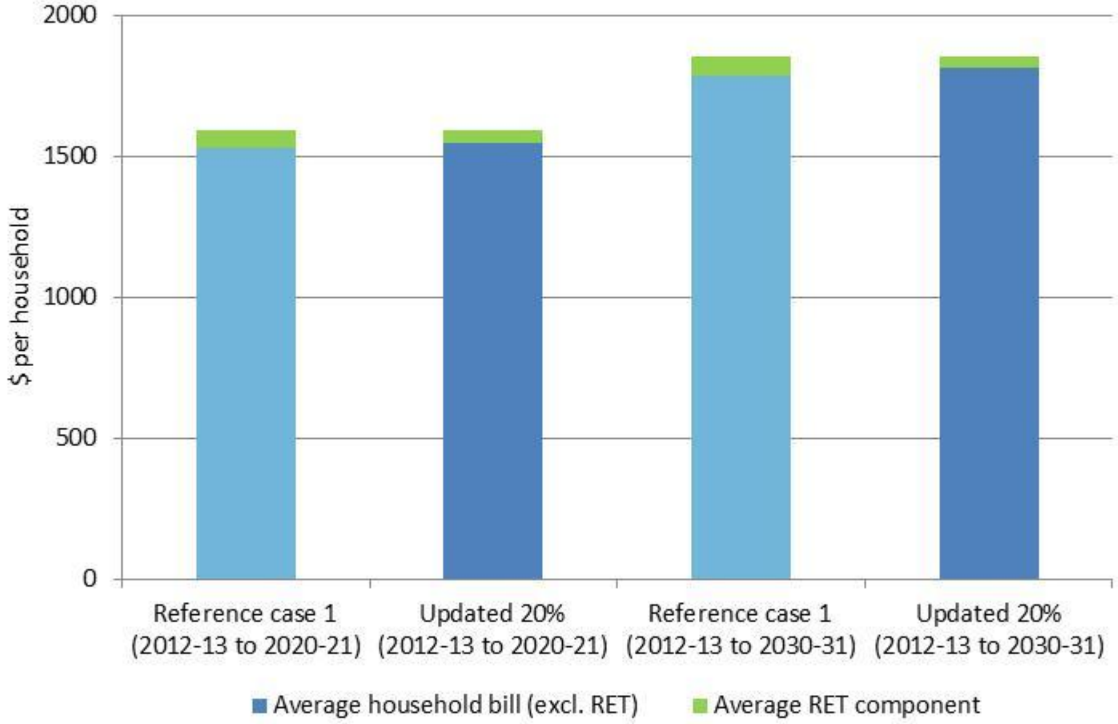


Source: SKM MMA and Climate Change Authority, 2012.

Figure 43 indicates the contribution of the RET to the average household bill over the period to 2030-31 is expected to be lower under the *updated 20% target* scenario at around $43 per household compared to around $70 per household under *reference case 1*. However the difference between the total bill cost by 2030-31 is almost zero.

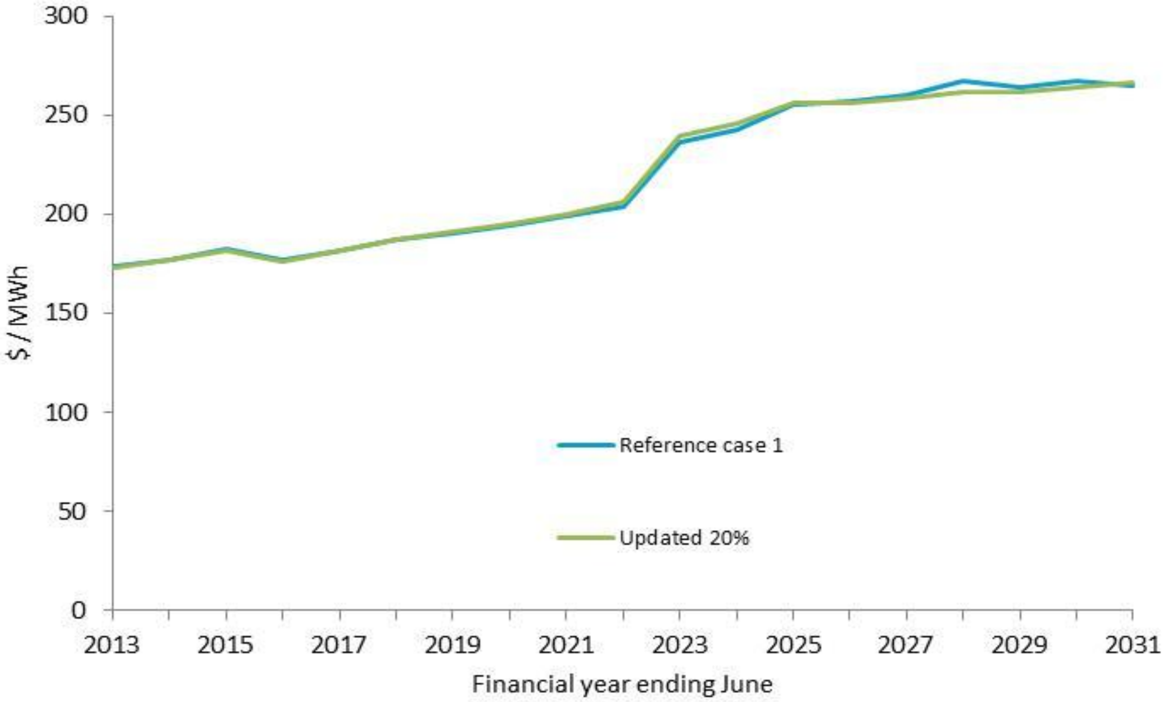
Lowering the target is also not expected to deliver significant savings to the electricity bill of an average SME. The expected retail price under the *updated 20% scenario* is estimated to be around $0.10 per MWh lower on average over the period 2012-13 to 2030-31 (see Figure 44). This represents an estimated decrease in an average SME bill of around $13 per annum on average over the period.

Figure 43 Average annual household electricity bill



Source: SKM MMA and Climate Change Authority, 2012.
Note: Assumes average household consumes 7 MWh per annum.

Figure 44 Small-to-medium average retail electricity prices under *reference case 1* and *updated 20% target* scenarios



Source: SKM MMA and Climate Change Authority, 2012.
Note: Average SME assumed to use 140 MWh per annum.

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GLOSSARY OF TERMS

Term	Acronym/ Abbreviation	Explanation
Australian Energy Market Operator	AEMO	The Australian Energy Market Operator was established in 2009 and is responsible for the operation of the National Electricity Market which includes the east and south east regions of Australia (Queensland, New South Wales, Victoria, Tasmania and South Australia).
Australian Renewable Energy Agency	ARENA	The Australian Renewable Energy Agency is an independent statutory authority established under the *Commonwealth Authorities and Companies Act 1997* (Cth), tasked with the objectives of improving the competitiveness of renewable energy technologies and increasing the supply of renewable energy in Australia.
1997 baseline		During the process of accreditation for a power station under the Renewable Energy Target, the Clean Energy Regulator determines a baseline value for generation prior to 1997 (when the scheme was first proposed). The baseline is generally calculated by using the average amount of annual electricity generated from eligible renewable energy sources in 1994, 1995 and 1996.
Bankable certificates		Renewable energy certificates for both the large-scale and small-scale market do not have an expiry date. They may be purchased and held for any length of time before they are surrendered.
Clean Energy Finance Corporation	CEFC	The objective of the Clean Energy Finance Corporation is to overcome capital market barriers that hinder the financing, commercialisation and deployment of renewable energy, energy efficiency and low emissions technologies.
Clean Energy Regulator	CER	The Clean Energy Regulator is an independent statutory authority that administers regulatory schemes relating to clean energy, including the Renewable Energy Target, the Carbon Pricing Mechanism, the National Greenhouse and Energy Reporting scheme and the Carbon Farming Initiative.
Climate Change Authority	'the Authority'	Established on 1 July 2012, the Climate Change Authority provides independent advice on the operation of Australia's carbon price, emissions reduction targets, caps and trajectories, and other Australian Government climate change initiatives.
Compliance period		A full calendar year, the period over which each annual target under the Renewable Energy Target must be achieved.
Council of Australian Governments	COAG	The Council of Australian Governments is the peak intergovernmental forum in Australia. The members of the Council of Australian Governments are the Prime Minister, State and Territory Premiers and Chief Ministers and the President of the Australian Local Government Association.
Department of Climate Change and Energy	DCCEE	The Department of Climate Change and Energy Efficiency leads the development and coordination of Australia's climate change and energy efficiency policy. It is responsible for policy advice, policy

Term	Acronym/ Abbreviation	Explanation
Efficiency		implementation and program delivery in four areas: reducing Australia's greenhouse gas emissions; promoting energy efficiency; adapting to climate change; and helping to shape a global climate change solution.
Deeming		The estimation of the amount of electricity a solar panel or small-scale wind or hydro system generates, or the electricity a solar water heater or heat pump displaces. Deeming allows the owners of these technologies to receive their entitlement to small-scale technology certificates before the system has produced or displaced the electricity.
Emissions-intensive trade-exposed	EITE	Businesses conducting specified emissions-intensive trade-exposed activities are eligible for assistance through the Jobs and Competitiveness Program under the carbon pricing mechanism and under the Renewable Energy Target scheme.
Energy Savings Initiative	ESI	Under the Clean Energy Future Plan, the Commonwealth Government committed to do further work to investigate the merits of a national Energy Savings Initiative. An Energy Savings Initiative is a market-based tool for driving economy-wide improvements in energy efficiency.
Gigawatt	GW	A measure of power (or demand).
Gigawatt hours	GWh	A measure of electricity generation / use over a period of time (or energy).
Goods and services tax	GST	The goods and services tax is a broad-based tax of ten per cent on most goods, services and other items sold or consumed in Australia.
Kilowatt	kW	A measure of power (or demand).
Kilowatt hour	kWh	A measure of electricity generation / use over a period of time (or energy).
Large-scale generation certificates	LGC	A large-scale generation certificate represents one megawatt hour of renewable energy generation.
Liable entities		Entities that make wholesale acquisitions of electricity and are required by the legislation to surrender a specified number of renewable certificates or pay a renewable energy shortfall charge.
Large-scale Renewable Energy Target	LRET	The Large-scale Renewable Energy Target encourages the deployment of large-scale renewable energy projects such as wind farms.
Mandatory Renewable Energy Target	MRET	The Mandatory Renewable Energy Target began operation in 2001. The Mandatory Renewable Energy Target had a target of 9,500 gigawatt hours in 2010 (mandated out to 2020) and interim targets that gradually increased year on year.
Megawatt	MW	A measure of power (or demand).
Megawatt hour	MWh	A measure of electricity generation / use over a period of time (or energy).
National Electricity	NEM	The National Electricity Market interconnects five regional market

Term	Acronym/ Abbreviation	Explanation
Market		jurisdictions (Queensland, New South Wales, Victoria, South Australia and Tasmania). Western Australia and Northern Territory are not connected to the National Electricity Market.
Partial exemption certificate	PEC	The *Renewable Energy (Electricity) Act 2000* (Cth) and the *Renewable Energy (Electricity) Regulations 2001* include provisions to provide partial exemption from Renewable Energy Target liability for electricity used in defined emissions-intensive trade-exposed activities. To obtain an exemption, prescribed persons may apply to the Clean Energy Regulator for a partial exemption certificate.
Renewable energy certificates	REC	The term used for renewable energy certificates generated under the Renewable Energy Target scheme prior to 2011.
Renewable Energy (Electricity) Act 2000 (Cth)	*REE Act*	The legislative framework for the Renewable Energy Target scheme.
Renewable Energy (Electricity) Regulations 2001 (Cth)	*REE Regulation*	The detailed rules and provisions of the Renewable Energy Target scheme.
Renewable Energy Target	RET	The Renewable Energy Target operates in two parts – the Small-scale Renewable Energy Scheme and the Large-scale Renewable Energy Target.
Renewable Energy Target review	RET review	The Climate Change Authority's review of the Renewable Energy Target. The review is defined in Section 162 of *the Renewable Energy (Electricity) Act 2000* (Cth).
Renewable power percentage	RPP	The renewable power percentage establishes the rate of liability for Large-scale Renewable Energy Target and is the mechanism that liable entities use to determine how many large-scale generation certificates need to be surrendered to discharge their liability each year.
Solar Credits		Solar Credits is a mechanism which increases the number of small-scale technology certificates able to be created for eligible installations of small generation units such as solar panels.
Solar photovoltaic panels	PV	Solar photovoltaic panels produce electricity by gathering and transforming the sun's energy.
Small-scale Renewable Energy Scheme	SRES	The Small-scale Renewable Energy Scheme supports the installation of small-scale systems, including solar panels and solar water heaters.
Small-scale technology certificate	STC	Certificate created by small-scale technologies like solar panels and solar water heaters.
Small-scale technology certificate clearing house	STC clearing house	The small-scale technology certificate clearing house facilitates the exchange of small-scale technology certificates between buyers and sellers at the fixed price of $40 (excl. GST).
Small-scale technology	STP	The small-scale technology percentage establishes the rate of liability for the Small-scale Renewable Energy Scheme. The small-scale

Term	Acronym/ Abbreviation	Explanation
percentage		technology percentage is the mechanism that liable entities use to determine the number of small-scale technology certificates needed to be surrendered to discharge their liability quarterly.
South West Interconnected System	SWIS	South West Interconnected System is the electricity network that services the majority of Western Australia’s population.

ABBREVIATIONS AND ACRONYMS

ACT	Australian Capital Territory
ABARE	Australian Bureau of Agricultural and Resource Economics
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ARENA	Australian Renewable Energy Agency
CDM	Clean development mechanism
CEC	Clean Energy Council
CEFC	Clean Energy Finance Corporation
CER	Certified emission reduction
CO_2	Carbon dioxide
CO_2-e	Carbon dioxide equivalent
COAG	Council of Australian Government
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cth	Commonwealth
EITE	Emissions-intensive trade-exposed
ERU	Emission reduction unit
ESAA	Energy Supply Association of Australia
ETS	Emissions trading scheme
EU	European Union
EU ETS	European Union Emissions Trading Scheme
GDP	Gross domestic product
GNP	Gross national product
GGAS	Greenhouse Gas Abatement Scheme
GST	Goods and services tax
GW	Gigawatt
GWh	Gigawatt hour
IEA	International Energy Agency
IPART	Independent Pricing and Regulatory Tribunal (New South Wales)
kW	Kilowatt

kWh	Kilowatt hour
LGC	Large-scale generation certificates
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
LRET	Large-scale Renewable Energy Target
MRET	Mandatory Renewable Energy Target
Mt	Million tonnes
MW	Megawatt
MWh	Megawatt hour
NEM	National Electricity Market
NSW	New South Wales
PEC	Partial exemption certificate
PPA	Power Purchase Agreement
ppm	Parts per million
PV	Photovoltaic
REC	Renewable energy certificate
REE Act	*Renewable Energy (Electricity) Act 2000* (Cth)
RET	Renewable Energy Target
RPP	Renewable power percentage
SCER	Standing Council on Energy and Resources
SKM MMA	Sinclair Knight Merz McLennan Magasanik Associates
SRES	Small-scale Renewable Energy Scheme
STP	Small-scale technology percentage
STC	Small-scale technology certificate
SWIS	(Western Australia) South West Interconnected System
t	Tonnes
UN	United Nations
UNFCC	United Nations Framework on Climate Change
USD	United States Dollar
WCMG	Waste coal mine gas
Wh	Watt hour

The Senate

Community Affairs References Committee

The Social and Economic Impact of Rural Wind Farms

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43rd Parliament

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ABBREVIATIONS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
COAG	Council of Australian Governments
GWh	Giga watt hour
MCE	Ministerial Council on Energy
MRET	Mandatory Renewable Energy Target
MW	Mega watt
NECA	National Electricity Code Administrator
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
NPA–EE	National Partnership Agreement on Energy Efficiency
RET	Renewable Energy Target

RECOMMENDATIONS

Recommendation 1

2.44 The Committee considers that the noise standards adopted by the states and territories for the planning and operation of rural wind farms should include appropriate measures to calculate the impact of low frequency noise and vibrations indoors at impacted dwellings.

Recommendation 2

2.58 The Committee recommends that the responsible authorities should ensure that complaints are dealt with expeditiously and that the complaints processes should involve an independent arbitrator. State and local government agencies responsible for ensuring compliance with planning permissions should be adequately resourced for this activity.

Recommendation 3

2.69 The Committee recommends that further consideration be given to the development of policy on separation criteria between residences and wind farm facilities.

Recommendation 4

2.101 The Committee recommends that the Commonwealth Government initiate as a matter of priority thorough, adequately resourced epidemiological and laboratory studies of the possible effects of wind farms on human health. This research must engage across industry and community, and include an advisory process representing the range of interests and concerns.

Recommendation 5

2.102 The Committee recommends that the NHMRC review of research should continue, with regular publication.

Recommendation 6

2.103 The Committee recommends that the National Acoustics Laboratories conduct a study and assessment of noise impacts of wind farms, including the impacts of infrasound.

Recommendation 7

3.99 The Committee recommends that the draft National Wind Farm Development Guidelines be redrafted to include discussion of any adverse health effects and comments made by NHMRC regarding the revision of its 2010 public statement.

CHAPTER 1

INTRODUCTION

1.1 This introductory chapter covers the conduct of the inquiry and provides some background to the technology and operation of wind farms and their distribution in Australia.

Terms of reference

1.2 On 27 October 2010, the Senate referred the following matter to the Committee for inquiry and report by 30 April 2011:

The social and economic impacts of rural wind farms, and in particular:

(a) any adverse health effects for people living in close proximity to wind farms;

(b) concerns over the excessive noise and vibrations emitted by wind farms, which are in close proximity to people's homes;

(c) the impact of rural wind farms on property values, employment opportunities and farm income;

(d) the interface between Commonwealth, state and local planning laws as they pertain to wind farms; and

(e) any other relevant matters.

The reporting date was subsequently changed to 23 June 2011.

Conduct of the inquiry

1.3 The inquiry was advertised in *The Australian* on 10 and 24 November 2010, on 8 December 2010 and again on 2 February 2011. The inquiry was also advertised on the Internet. The committee received more than 1000 submissions, many letters and other documents, and had access to much published information. Public hearings were held in Canberra on 25 March and 17 May, Ballarat on 28 March, Melbourne on 29 March and Perth on 31 March 2011. The Committee conducted site visits to the Waubra and Hepburn wind farms in Victoria on 28 March 2011.

1.4 The Committee thanks all those who made submissions, gave oral evidence or in other ways assisted in the inquiry.

Structure of the report

1.5 The report is structured broadly to reflect the details of the committee's terms of reference. Following a brief introduction, the Committee considers noise and any adverse health effects in Chapter 2, planning laws in Chapter 3 and property values, employment and farm income in Chapter 4.

Wind farms

1.6 A wind farm is a group of wind turbines in the same location used for production of electric power. A large wind farm may consist of several hundred individual wind turbines, and cover an extended area of hundreds of square kilometres, but the land between the turbines may be used for agricultural or other purposes. Wind farms may also be located offshore.[1]

1.7 In 2009 there were 85 Australian wind farms, 57 of which were in Victoria, South Australia and Western Australia (nineteen in each state). The capacity of all these installations amounted to 1703 MW, with 48 percent of total capacity in South Australia.[2] (In South Australia, the Australian Energy Market Operator expects that by mid-2011, conventional energy sources will generate 3699 MW while 1150 MW will be generated from wind.)[3] More wind farm developments have been approved by the various state authorities since 2009 and many more are planned.

1.8 According to an Australian Government study the wind energy industry has been the fastest growing renewable energy source, largely because it is a proven technology, and has relatively low operating costs and environmental impacts.[4] Turbines are increasing in size and may be up to 150 metres in diameter or, as one witness expressed it, 'as high as from the flag on top of the Sydney Harbour Bridge to the waterline'.[5] Bigger turbines increase the swept area of the blades and proportionally increase the wind energy captured. These turbines need to be further from each other, with implications for the area needed for each farm. Some evidence to the inquiry also suggested that the increased size of modern wind turbines could potentially intensify any health problems related to noise and vibrations.

Commonwealth responsibility

1.9 Planning and compliance issues for wind farms are matters for the state governments, although the states have devolved some of these responsibilities to local governments. Generally, proposals for wind farms of more than 30 MW capacity are

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1 *WIKIpedia the free encyclopedia* , http://en.wikipedia.org/wiki/Windmill_farm, accessed 14 April 2011.

2 *Australian Energy Resource Assessment*, Geoscience Australia and ABARE, 2010, Canberra, Chapter 9, https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70142, accessed 18 March 2011.

3 Mr David Swift, Australian Energy Market Operator, *Committee Hansard*, 17 May 2011, p. 2.

4 *Australian Energy Resource Assessment*, Geoscience Australia and ABARE, 2010, Canberra, Chapter 1, https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70142, accessed 18 March 2011.

5 Mr A G Hodgson AM, *Committee Hansard*, 31 March 2011, p. CA 17.

dealt with by the responsible state government minister. Planning and compliance issues are dealt with in detail in Chapter 3.

1.10 Incentives for the development of renewable energy, which includes wind farms, are provided by Commonwealth Government legislation, in particular the *Renewable Energy (Electricity) Act 2000*, as amended, which creates a guaranteed market for electricity generated from renewable sources. The Renewable Energy Target (RET), which is established by the legislation, is for 20 percent of Australia's electric energy to be generated from renewable resources by 2020.[6] As noted earlier, wind, as the most advanced of the current renewable energy technologies, is expected to contribute significantly to meeting the RET. It is estimated that the share of wind energy in total electricity generation will increase from 1.5 percent in 2007-2008 to 12.1 percent in 2029-30.[7] The number of wind farms in Australia therefore can be expected to increase dramatically in the next few years.

1.11 The Commonwealth also has responsibility for certain aspects of the development of wind farms, such as air safety, and it may become involved in planning processes under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999*. That Act is intended to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as matters of national environmental significance.

1.12 In accordance with the Act, the responsible minister may declare the proposed development of a wind farm to be a controlled action, which requires that an environmental assessment be made of the impacts of the controlled action. The minister then may or may not approve the controlled action under the EPBC Act.

1.13 Additionally, if a proposal for a wind farm were to include development on Crown Land, the provisions of the Commonwealth *Native Title Act 1993* would apply.

1.14 Commonwealth Government agencies with research interests in health and the sciences may contribute to understanding issues related to the development of wind power and wind farms. CSIRO, the National Health and Medical Research Council (NHMRC) and the National Acoustics Laboratories (NAL) were able to assist the Committee by providing evidence to the inquiry. The NHMRC produced a document in 2010 on wind turbines and health and in June 2011 convened a scientific forum on

6 Senate Environment, Communications and the Arts Legislation Committee, *Renewable Energy (Electricity) Amendment Bill 2010 [Provisions]; Renewable Energy (Electricity) Charge) Amendment Bill 2010 [Provisions]; Renewable Energy (electricity) (Small-scale Technology Shortfall Charge) Bill 2010 [Provisions]*, June 2010, Commonwealth of Australia 2010, p.1.

7 *Australian Energy Resource Assessment*, Geoscience Australia and ABARE, 2010, Canberra, Chapter 9, https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70142, accessed 18 March 2011.

wind farms and human health.[8] NAL is the research division of Australian Hearing, a statutory authority under the Commonwealth Department of Human Services. NAL undertakes scientific investigations into hearing, hearing habilitation and rehabilitation and the effects of noise on people, including the prevention of hearing loss.[9]

National Wind Farm Development Guidelines

1.15 The Commonwealth Government is also involved in the process for the development of wind farms through the Council of Australian Governments (COAG). The Environment Protection and Heritage Council (EPHC) of COAG has released draft *National Wind Farm Development Guidelines* 'to complement existing planning and development processes, taking into consideration that these are best practice guidelines, and are not mandatory'.[10] Publication of the draft guidelines followed from an EPHC report on impediments to responsible wind farm development, which was made in response to 'growing community concerns'.[11] The Commonwealth's role in the development of the guidelines is limited to the Department of Climate Change and Energy Efficiency providing the chair of the relevant intergovernmental working group.[12]

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8 *Wind Turbines and Health: A Rapid Review of the Evidence*, July 2010, Australian Government, National Health and Medical Research Council.

9 National Acoustics Laboratories: http://www.nal.gov.au/current -research-profile.shtml (accessed 21 June 2011).

10 *National Wind Development Guidelines DRAFT*, Environment Protection and Heritage Council of the Council of Australian Governments, July 2010, p. 1.

11 *National Wind Development Guidelines DRAFT*, Environment Protection and Heritage Council of the Council of Australian Governments, July 2010, p. 1.

12 Mr Andrew Bailey, First Assistant Secretary, Renewable Energy Efficiency Division, Department of Climate Change and Energy Efficiency, *Committee Hansard*, 25 March 2011, p. CA 5. See Chapter 4 for more information on the development of the Draft Guidelines.

CHAPTER 2

NOISE AND ANY ADVERSE HEALTH EFFECTS

Wind farm noise

2.1 Wind turbines convert wind energy to rotational energy and acoustic energy. The rotational energy produces electricity; the acoustic energy produces sound.

2.2 According to a report commissioned by the Clean Energy Council (the Sonus Report), which was submitted in evidence by the Council, and which was quoted by a number of witnesses, 'the acoustic energy generated by a wind turbine is of a similar order to that produced by a truck engine, a tractor, a large forklift or a range of typical earthmoving equipment. However, a wind turbine is a stationary source that operates in conjunction with other turbines in a generally windy environment, is located high above the ground and has different noise characteristics compared to these other noise sources'.[1]

2.3 Sound attenuates with distance, in general at a rate of 6 dB per doubling of distance. A number of factors influence the attenuation of sound, including terrain, vegetation, buildings and atmospheric conditions. The pitch (frequency) of the sound is also a factor. Low frequency sound attenuates at about half the rate as higher frequencies.[2] Noise standards in different jurisdictions in Australia and overseas take these factors into account in setting minimum distances between wind farms and dwellings.

2.4 The Sonus Report identified two sources of noise from a turbine – mechanical noise from the gear box and generator and aerodynamic noise. The aerodynamic noise, which is produced by the rotation of the turbine blades through the air, dominates.[3]

2.5 Witnesses described this aerodynamic noise in different ways, but most agreed that it is characterised by 'swish' and 'thump'. A British acoustic consultant, Mr Dick Bowdler, who has specialised in wind farm noise since 1993, submitted that the dominant characteristic of turbine noise that cannot be mitigated completely is amplitude modulation or AM. He provided the following information:

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1 *Wind Farms Technical Paper, Environmental Noise*, Prepared for Clean Energy Council, November 2010, Sonus Pty Ltd, Adelaide, South Australia, p. 6. Note: Some of the data and conclusions reached in this report have been criticised by Dr Hanning, *Submission 955*, pp 41-42.

2 *Public Health Impacts of Wind Turbines*, Minnesota Department of Health, Environment Health Division, May 2009, p. 23.

3 *Wind Farms Technical Paper, Environmental Noise*, Prepared for Clean Energy Council, November 2010, Sonus Pty Ltd, Adelaide, South Australia, p. 7.

> All modern large turbines exhibit AM and this has been explained by Oerlemans ... when the observer is close to the turbines and at greater distances in specific directions. The effect is merely the directivity and Doppler amplification of the noise. Upwind or downwind of the turbine this reduces quite rapidly with distance but Oerlemans has shown that it can project over longer distances in the cross wind directions. This is what is often called “swish”. If it is present in the noise at a receiver, the noise is perceived as being more annoying than if the noise has no modulation. It can become impossible not to notice the noise.[4]

2.6 Mr Bowdler informed the Committee that there appears also to be another type of AM:

> It is sometimes called thump on the basis that some people including Salford University, van den Berg and me have suggested that it has a faster rise time than the swish described by Oerlemans ... It is also frequently perceived indoors which may be understandable if it is around the same frequency as the weak resonance region of double glazing units.[5]

2.7 A report by Delta, a Danish acoustics consultancy, for the Danish Energy Authority found that the lower frequencies dominate indoors 'as here the changes in the lower part of the spectra will be perceived to a higher degree than outdoors'.[6]

2.8 Less technical descriptions of the sound made by wind turbines varied from 'like a jet that never lands' to 'the noise made by a distant refrigerator'.

2.9 The noise produced by a wind farm may be different from that produced from individual turbines. Under steady wind conditions the noise from a wind farm may be exacerbated by synchrony among noises from more than one turbine. It has been suggested that if the dominant frequencies of different turbines vary by small amounts, an audible beat or dissonance may be heard.[7]

2.10 Wind turbines produce sound at a range of frequencies, from high to very low, including very low frequencies that are not normally audible to the human ear. These low frequencies are called infrasound. It was asserted that infrasound is not a significant feature of modern wind farms[8] but, according to Mr William Huson, an

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4 *Submission 218*, pp [2], [3]. *Note*: Mr Bowdler has been a noise consultant for 40 years. He has been a Fellow of the [UK] Institute of Acoustics since 1977.

5 *Submission 218*, pp [2], [3].

6 *Low frequency noise from large wind turbines*, Delta, http://www.madebydelta.com/delta/Business_units/TC/Services+by+technology/Acoustics/Low+frequency+noise/Low+frequency+noise+from+large+wind+turbines.page, Summary, accessed 16 May, 2011.

7 *Public Health Impacts of Wind Turbines*, Minnesota Department of Health, Environment Health Division, May 2009, p. 14.

8 See, for example, *National Wind Farms Development Guidelines – Draft*, July 2010, Environment Protection and Heritage Council, Adelaide, SA, p. 9.

acoustics consultant, that assertion is not true,[9] and an official UK Advisory Group has found that infrasound is present.[10]

2.11 An Italian study found that infrasound from wind turbines may be detected at some distance from the turbines:

> Among these [low frequencies], the most energetic is that at frequency 1.7 Hz which, under particular conditions (i.e., low cultural noise and strong wind) can be clearly observed at epicentral distances as large as 11 km. At this particular frequency, waves depict a complicate pattern of attenuation with distance, characterised by a marked decrease in the decay rate for ranges larger than 2500–3000 m.[11]

2.12 There was evidence that the design of modern turbines has resulted in less noise. While this may be true of turbines of similar capacities, there was evidence that the noise from a typical 0.5 MW turbine in 1996 was 100 dB(A), but that a typical 3MW turbine in 2011 produces 107 dB(A).[12] (Planned industrial wind farms in Australia, for example, the Moorabool wind farm, usually incorporate turbines of this capacity.)

2.13 Dr Alan Watts of the Carcoar Medical Centre submitted that :

> Small increases in the diameter of a wind turbine's rotor area can lead to substantial increases in the effects of wind speed (because the area of a circle is (πr^2) which thus results in an exponential increase in the production of sound waves (specifically infrasound or low frequency vibration). This is a problem with modern wind turbines where increasing size will potentially cause intensifying infrasound related health problems.[13]

2.14 A great deal of information was submitted about the effects of the noise produced by wind farms on individuals living in close proximity to them. A number of persons who were living within one kilometre or so of functioning wind farms submitted that their quality of life had been diminished. The Committee also received many accounts of adverse health effects in submissions and during its hearings. A significant number of submissions gave actual accounts of serious symptoms of ill health that witnesses said occurred after wind turbines began operating in close proximity to their residences.

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9 *Submission 759*, pp 5–6.

10 *Health Effects of Exposure to Ultrasound and Infrasound: Report of the independent Advisory Group on Non-ionising Radiation*, Documents of the Health Protection Agency Radiation, Chemical and Environmental Hazards, February 2010, Health Protection Agency, UK.

11 *Seismic Noise by Wind Farms: A Case Study from the VIRGO*, Gravitational Wave Observatory, Italy. Gilberto Saccorotti, Davide Piccinini, L´ena Cauchie, and Irene Fiori, p. 18.

12 Mr Dick Bowdler, *Submission 218*, p. [6].

13 Dr A C Watts, *Submission 888*, p. 2.

2.15 However, Dr Mark Diesendorf, Deputy Director of the Institute of Environmental Studies, University of NSW, informed the committee that noise from wind farms is rarely an issue beyond 500 metres:

> Noise is rarely a problem beyond a distance of 500 m and very few dwellings in Australia are within 400 m of a large wind turbine. Licence conditions for wind farms should, and mostly do, set objective, measurable noise limits. On the rare occasions where these limits are surpassed, for example, resulting from a faulty turbine or sound propagation resulting from peculiar topography, affected residents can have the problem fixed or the offending turbine shut down.[14]

2.16 The Committee did not receive any evidence from people who are living near the turbines and who are receiving recompense for the use of their land. The reasons for this are unclear. Several witnesses claimed that the host landholders are subject to 'gag' orders under the terms of their contracts with the developers. This was denied by the industry, although the industry stated that some commercial confidentiality clauses are included in contracts during the planning stages. Mr Geiger, Managing Director, WestWind Energy, stated that:

> ... our landholders are not subject to any gag orders with regard to health or any other impacts.[15]

2.17 The Victorian Government Planning Panel that inquired into the Moorabool Wind Energy Facility found that noise limits and limits on shadow flicker do not necessarily apply to host dwellings because 'such dwellings are effectively part of the wind farm'.[16]

Quality of life issues

2.18 Wind farms introduce into rural environments sounds, and levels of sound, that had not been present in the environment before the advent of the wind farms. These sounds may be perceived as intrusive and detrimental to the amenity of people affected by them. The Sustainable Energy Association of Australia stated that '...much of the significance of this issue...appears to arise from a change in the noise environment and this change has had some amenity impact'.[17] However, the Association stated that noise concerns are able to be met under existing guidelines and regulatory regimes.[18]

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14 *Submission 204*, p. 4.

15 *Committee Hansard*, 29 March 2011, p. CA 84.

16 Moorobool Wind Energy Facility Permit Application 20091012877, Panel Report, September 2010, p. 6.

17 Mr Neil Prentice, Advisory Services Manager, Sustainable Energy Association of Australia, *Committee Hansard*, Canberra, 31 March 2011, p. CA 3.

18 *Committee Hansard*, Canberra, 31 March 2011, p. CA 3.

2.19 CSIRO informed the committee that:

> ... changes in noise inputs in a residential landscape are important even if they are not linked with identifiable health impacts. The perceived tranquillity of the local landscape for the local population is often highly valued. The introduction of a new sound, from which the surrounding residents receive no direct benefit, heavily impacts on their acceptance and support of the technology.[19]

2.20 In Mr Bowdler's opinion, the major factor that determines the impact of a new noise source is perception. Referring to the UK experience with wind farms Mr Bowdler stated that if people feel that they are not being treated fairly, they will perceive, rightly or wrongly , that:

> Their lives will be blighted by these developments
>
> They will gain no benefit
>
> They pay subsidies in the form of Tax
>
> They pay more for electricity
>
> Developers make all the money.[20]

2.21 Mr Bowdler concluded that 'The result is that that people believe that government and developers are covering something up. This merely reinforces the views of those people who already believe that there is something mysterious about wind farm noise'.[21]

2.22 One witness, who has 30 wind turbines within two kilometres of his home, the nearest 600 metres away, stated that:

> The types of noises that we experience depend on wind direction. The noises range from a doof-doof noise, like you would hear from a subwoofer at a party down the street, to a constant jet rumble. We can also hear the generator noise, like a fridge when it fires up—that electrical sound—and at times a whooshing noise, like a stick being swung through the air quickly. These noises are not just for a minute or two but can go on all night, not to mention the day. On average, we would say that we have interrupted sleep at least three to four nights a week and on some occasions up to five ..., this has been since they [the turbines] have been commissioned. I have tried to escape from the continuous noise by relocating to one of the four bedrooms in the house, only to be awakened by the noise from other turbines. My wife actually goes to sleep with ear plugs in. This continuous interruption to and lack of sleep has enormous impact on our lives, our business and our

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19 'Wind energy comes of age - California and Denmark', *Energy Policy* (19) 8:756–767, p. 763. Gipe, P. (1991), Quoted in CSIRO, *Submission 579*, p. 4.

20 Mr Dick Bowdler, *Submission 218*, p. [6].

21 Mr Dick Bowdler, *Submission 218*, p. [6].

> future. Last week the noise could be heard over the television inside the house.[22]

2.23 Mr Dean, a farmer whose properties are near the Waubra Wind Farm, informed the Committee that his family was so badly affected that they had to move to Ballarat, but that he had to return to his farm from time to time:

> I tried to stay away from the farm as much as I could but I had to make a dollar somehow so we went back. Every time I went back if the turbines were going it would probably take me 10 days to get over it.[23]

Noise standards

2.24 Governments attempt to meet noise problems associated with wind farms by applying standards that are intended to ensure that the sound levels do not exceed certain limits and that the amenity of the people living in proximity to the wind farms is not unnecessarily adversely affected. The standards apply in the development planning process and in compliance measures on completion of the turbines.

2.25 The Clean Energy Council stated that the standards applied in Australia are among the most stringent in the world[24] but, as the Sonus report commented:

> Regardless of the stringency of the base noise level or the available masking effect of the ambient environment, wind farm standards and guidelines are not established to ensure inaudibility.[25]

2.26 The setting of wind farm noise standards is a matter for the state or local government authorities. Different jurisdictions apply different standards e.g. Government of South Australia Wind Farms Environmental Noise Guidelines July 2009, New Zealand Standard NZS 6808: 2010 Acoustics – Wind Farm Noise. The different standards do not vary greatly from one another. Base noise levels (generally 35dB(A)) and background noise limit margins (5 dB(A)) are specified. The *Australian Standard 4959 – 2010 Acoustics – Measurement, prediction and assessment of noise from wind turbine generators* does not appear to be applied in any jurisdiction, although the EPHC draft guidelines suggest that it should form the base for any noise assessment.[26]

2.27 Sonus reports that the standards and guidelines include the following:

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22 Mr Stephen Coleman, *Committee Hansard*, 28 March 2011, p. CA 46.

23 Committee Hansard, 28 March 2011, p. CA 10.

24 Mr MJ Warren, Chief Executive Officer, Clean Energy Council, *Committee Hansard*, 29 March 2011, p. CA 20.

25 *Wind Farms Technical Paper, Environmental Noise*, Prepared for Clean Energy Council, November 2010, Sonus Pty Ltd, Adelaide, South Australia, p. 20.

26 *National Wind Farm Development Guidelines Draft July 2010*, Environment Protection and Heritage Council, Adelaide, SA, p. 37.

- Objective standards that provide a base noise limit and a background noise related limit...;[27]
- A background noise and wind speed measurement procedure to determine the applicable background noise related limits at each dwelling;
- A noise level prediction methodology to enable a comparison of the predicted noise level from the wind farm against the noise limits at each dwelling;
- The required adjustments to the predicted noise levels to account for any special audible characteristics of the wind farm noise;
- A compliance checking procedure to confirm the operational wind farm achieves the predicted noise levels at each dwelling.[28]

2.28 There was evidence that the assessment methodologies contained in the standards that applied to some wind farm developments are now out of date. The Pyrenees Shires submitted in relation to the NZ6808:1998 standard used in Victoria in relation to one wind farm that:

> ... the recent experience with the Waubra wind farm, where 32 noise complaints have been received by Council and DPCD since the first turbine was commissioned 18 months ago shows that this noise standard is in urgent need of replacement.[29]

2.29 The Committee is aware in this regard that the Victorian *Wind energy facility provisions* were amended in March 2011 to ensure that the noise impacts of wind turbines will in future be in accordance with the *New Zealand Standard NZS6808:2010, Acoustics – Wind Farm Noise*.[30]

2.30 Local councils submitted that they are significantly under-resourced to deal with wind farm complaints and to oversee that wind farms are complying with noise standards. The Committee is aware of the avenues of appeal against development application approvals by state or local government. Planning panels, tribunals and courts are interested in ensuring that the various conditions, including the noise

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27 *Note*: The *base noise limit* in Australia is either 35dB(A) or 40dB(A). The *background noise related limit* allows wind turbines to generate higher noise limits as the wind strengthens. This concept is based on the expectation that the background noise, for example, the noise in the trees will increase with higher wind speeds. The background noise related limit is set at 5dB(A) in Australia.

28 *Wind Farms Technical Paper, Environmental Noise,* Prepared for Clean Energy Council, November 2010, Sonus Pty Ltd, Adelaide, South Australia, p. 18.

29 *Submission 646*, pp 1–2.

30 *Advisory Note 35, March 2011*, Amendment VC78, Wind energy facility provisions – Clause 52.32, Department to Planning and Community Development, State Government of Victoria, p. 1.

standards, have been properly met. However, the question arises whether the standards are appropriate for their intended outcomes. The standards are not without their critics.

2.31 The Committee received a number of submissions that pertained to concerns regarding noise standards. Several submissions relayed concerns that relevant noise standards may not sufficiently address concerns regarding any adverse health effects. Noise Measurement Services in a report commissioned by Mr and Mrs Dean stated, in relation to the Waubra Wind Farm:

> It is concluded that wind farm noise prediction, as implemented under NZS6808 (the New Zealand wind farm standard) is not adequate in assessing potential adverse effect and implementation of the standard does not and will not provide an acceptable level of amenity. Application of the standard does not provide a conservative assessment of sound levels that may be experienced under different meteorological conditions.[31]

Noise measurement

2.32 The measurement of noise as used in the Standards is dB(A). This measure was explained as being appropriate because it simulates human hearing.[32] Dr Warwick Williams, a Senior Research Engineer at the National Acoustic Laboratories, explained that the A-weighting heavily discounts the low frequencies and the very high frequencies.[33] A-weighting discounts infrasound as it is below the level of human hearing.

2.33 Many persons who complain of the noise produced by wind farms refer to noise that lies within the low frequency range, and to infrasound (sound of less than 20 hertz). As discussed earlier, the 'thump' which apparently is produced by wind turbines and which causes distress to some people is a low frequency sound. According to the Sonus report, over large distances, whilst the absolute level of sound in all frequencies declines, the relative level of low frequency noise increases compared with mid and high frequencies. The Sonus report states that low frequency sound can be easily measured, and 'the C-weighting network (dB(C)) has been developed to determine the human perception and annoyance due to noise that lies within the low frequency range'.[34]

2.34 Mr Huson submitted that neither the C-weighting nor the A-weighting is appropriate for the measurement of very low frequencies:

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31 *Noise Impact Assessment Report: Waubra Wind Farm*, Mr & Mrs N Dean, Report No 1537 - Rev 1 – July 2010, Noise Measurement Services, p. 7.

32 *Wind Farms Technical Paper, Environmental Noise*, Prepared for Clean Energy Council, November 2010, Sonus Pty Ltd, Adelaide, South Australia, p. 9.

33 *Committee Hansard*, 17 May 2011, p. CA 7.

34 *Wind Farms Technical Paper, Environmental Noise*, Prepared for Clean Energy Council, November 2010, Sonus Pty Ltd, Adelaide, South Australia, p. 9.

> If we were to investigate lower frequency sound levels from wind farms we cannot use the C-weighting or the A-weighting since these attenuate low frequency sound <20 Hz significantly. The G-weighting is designed to quantify infrasound below 20 Hz.[35]

2.35 Dr Geoff Leventhall, a British acoustics consultant, informed the committee that:

> ...as environmental noise control criteria are A-weighted, they tend to under-rate potentially problematic low frequency environmental noise. This has led low frequency problems to be left to continue, whilst higher frequency problems are fixed more quickly. As a result, where genuine low frequency noise problems have occurred, their continuance leads to the development of undue stress in those affected. There is also a body of very stressful, unsolvable noise problems, described as "low frequency" by those affected, where detailed investigations cannot discover a specific noise source.[36]

2.36 The Noise Management Services report commissioned by Mr and Mrs Dean on the noise impact of Waubra Wind Farm suggested that:

> There are many possible ways that low frequency sounds may influence the ear at levels that are unrelated to hearing sensitivity. As some structures of the ear respond to low frequency sound at levels below those that are heard, the practice of A-weighting (or G-weighting) sound measurements grossly underestimates the possible influence of these sounds on the physiology of the ear. The high infrasound component of wind turbine noise may account for high annoyance ratings, sleep disturbance and reduced quality of life for those living near wind turbines.[37]

2.37 A number of witnesses informed the committee that the low-frequency noise from a wind farm was too little to adversely affect nearby residents. Mr Matthew Rebbeck, Technical Director, RES Australia Pty Ltd, informed the committee that:

> The dBG levels in the Adelaide CBD are, for example, 76 decibels; at a local beach, 75 decibels; a gas-fired power station nearby, 74 decibels; at a cliff face, 69 decibels; and then we are down to the wind farms, 67 and 63 decibels, at 185 and 200 metres downwind of the closest turbine. Of course, the nearest neighbours are normally much further away than that.[38]

2.38 The EPHC draft guidelines state that an assessment of low-frequency noise is not required as part of the pre-construction phase or post-construction monitoring phase for wind farms. This is because 'low frequency noise and infrasound levels

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35 *Submission 759*, p. 5.

36 *Submission 465*, p. 9.

37 *Noise Impact Assessment Report: Waubra Wind Farm*, Mr & Mrs N Dean, Report No 1537 - Rev 1 – July 2010, Noise Measurement Services, p. 142.

38 *Committee Hansard*, 25 March 2011, p. CA 67.

generated by wind farms are normally at levels that are well below the high levels required to cause any health effects'.[39]

2.39 This statement appears to have been based on the findings of a Sonus report, *Infrasound Measurements from Wind Farms and Other Sources,*[40] which was commissioned by Origin Energy. Mr Huson submitted that he had reviewed the data presented in that report and had found that it reached very questionable conclusions.[41] Mr Dean informed the Committee that he had measured sound at the beach and between turbines 300 metres away with an imported SVAN 959 machine and concluded:

> It is all high-frequency noise at the beach and it is all infrasound, below 20 hertz, at Waubra between the turbines. That is low-frequency infrasound that our bodies cannot bear.[42]

2.40 Pacific Hydro submitted that infrasound emissions from operational wind farms are significantly below recognised perception thresholds of 85dB(G)[43] and Dr Diesendorf submitted that:

> Infra-sound used to be a problem with some of the early wind turbines in Europe. However, according to recent European studies, modern wind turbines emit generally very low levels of infra-sound, virtually undetectable at a range of 500 m and much less than comes from motor vehicles on nearby roads. Although there have been several studies, there is no scientific evidence that infra-sound from wind turbines located at a distance greater than 500 m is a health hazard.[44]

2.41 The Committee was informed that Denmark 'the home of wind power' has flagged regulation of infrasound at wind farms and that Japan last year started a four-year study in the effects of infrasound from wind farms. The British Government also has announced that it has begun 'to review the issues that which often cause concern to local communities—such as the assessment of noise and the flickering effect when blades rotate'. [45]

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39 Draft National Wind Farm Development Guidelines – 2 July 2010, EPHC, p. 39.

40 Sonus Pty Ltd, *Infrasound Measurements from Wind Farms and Other Sources*, Prepared for: Pacific Hydro Pty Ltd, November 2010.

41 Submission 759, pp 6–7.

42 *Committee Hansard*, 28 March 2011, p. CA 3.

43 *Submission 653*, p. 9.

44 *Submission 204*, p. 4.

45 Mr Hodgson, *Committee Hansard*, 31 March 2011, p. CA 13. See Japanese, Danish and UK press reports of government announcements, submitted by Mr Hodgson, *Additional Information*, 11 April 2011. See also Wikipedia, http//en.wikipedia.org/wiki/Environmental_impact_of_wind_power, accessed 26 May, 2011.

Committee view

2.42 Although infrasound from modern turbines may be less than from older models, it is nevertheless present. The relevant standards applied in Australia rely only on the dB(A) measurement which does not take infrasound and low frequencies fully into account. If the Australian standards were to include an appropriate measurement of low frequency noise, including infrasound and vibration, governments and developers may find that at least some of the opposition to wind farms might be alleviated. In that context Mr Huson commented that:

> In the absence of applicable research it may be appropriate to set target infrasound noise limits indoors, that are easily measured, at 75 dB(G). Wind farm proponents regularly espouse that modern wind farms do not cause such sound levels so there should be no complaints from that quarter if such [a] precautionary target were to be set.[46]

2.43 Similarly, the Danish Delta report suggested that:

> For projects where outside noise levels are close to the existing noise limits for wind turbines it will be good practice to perform calculations of the indoor low frequency noise impact. This will ensure that appropriate low frequency noise levels are met and hopefully contribute to minimize groundless anxiety in cases with no low frequency impact.[47]

Recommendation 1

2.44 The Committee considers that the noise standards adopted by the states and territories for the planning and operation of rural wind farms should include appropriate measures to calculate the impact of low frequency noise and vibrations indoors at impacted dwellings.

Compliance with Noise Standards

2.45 The Victorian Minister for Planning suggested that non-compliance with standards may be a primary issue for sites where communities report negative health impacts and that authorities need to ensure there is thorough assessment against the appropriate standards.[48]

2.46 Development licences for wind farms generally require developers to monitor and report on their compliance with approved noise standards. This report may be made to a government agency or may at least be made available for audit by

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46 *Submission 759*, p. 8.

47 Low frequency noise from large wind turbines, Delta, http://www.madebydelta.com/delta/Business_units/TC/Services+by+technology/Acoustics/Low+frequency+noise/Low+frequency+noise+from+large+wind+turbines.page, accessed 16 May, 2011.

48 *Submission 651*, p. 3.

government. However, some witnesses suggested that compliance was not being adequately monitored.

2.47 Once wind farms begin to operate, different jurisdictions take somewhat different approaches to enforcing compliance with noise standards.

2.48 In South Australia one of the requirements of a wind farm licence is that the operator complies with a Safety, Reliability, Maintenance and Technical Management Plan which covers noise. AGL informed the Committee that the company's plan is regularly audited by the Essential Services Commission of South Australia.[49] In New South Wales operators are required to establish procedures for dealing with complaints. It is not clear, however, whether the procedures are satisfactory. The NSW Legislative Council Committee that inquired into rural wind farms reported that noise pollution, including from electricity generation, is covered by the *Protection of the Environment Operations Act 1997*, but that wind power generation is not covered. That Committee reported that it was concerned about:

> ... the reasons why wind power is excluded from being a scheduled activity when all other types of electricity generation (other than solar power) are included. Reasons for this are ambiguous and have resulted in the blurring of what was initially a very clear process for addressing noise pollution in NSW.[50]

2.49 In Victoria, there is some dispute about which level of government is responsible for operators' compliance with the conditions. Mr Chris Hall, the Senior Town Planner with the Pyrenees Shire Council, informed the Committee that:

> The current position of the state government in its policy guidelines is that councils are responsible for enforcing and administering all planning permits regardless of the 30-megawatt demarcation or whether or not they were called in under the section 96 call-in powers under the Planning and Environment Act. We have had legal opinions—one from a QC and the other from a well-respected planning lawyer—to the contrary that unequivocally back the council position that, in situations where those applications are called in, the minister actually becomes the responsible authority for administering and enforcing the permit.[51]

2.50 Local governments stated that they lack the resources and the expertise to ensure that wind farms comply with development approvals. Councils also expressed concern with the suggestion that they should be required to enforce compliance with plans for which they have had no responsibility.[52]

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49 Answer to a Question on Notice, 20 April 2011.

50 *Rural Wind Farms*, 16 December 2009, NSW Legislative Council General Purpose Standing Committee No. 5, p. 63.

51 *Committee Hansard*, 28 March 2011, pp CA 38–39.

52 *Committee Hansard*, 28 March 2011, p. CA 39.

2.51 In all jurisdictions, it seems that complaints about excessive noise are made to the wind farm operators in the first instance.

2.52 The wind farm operator Pacific Hydro informed the committee that it receives few complaints[53] and that the complaints it receives are taken seriously. Mr Rebbeck of RES Australia informed the Committee that his company talks to the landholders concerned and does any further noise measurements that are required. He stated that:

> We invariably find that the reason for the valid noise complaints is that there is a mechanical failure with the closest turbine or a nearby turbine, so you are getting a tonal noise from that turbine. Tonal noise is picked up very well by the human ear. That is above and beyond your planning limits. You are effectively exceeding your planning limits. Once you fix that turbine and you correct that problem with the turbine and the turbines are operating within their planning guidelines, we do not have any noise complaints.[54]

2.53 Addressing complaints to the operators may however lead to perceptions that the complaints are not taken seriously or are unreasonably dismissed as invalid. In relation to the Waubra wind farm, Mr Dean claimed that it was only after 12 months of operation that the company started to register complaints.[55] Mr Dean submitted that the operator designs and writes its own noise management plan and that does not work because the operator 'remains in control of everything'. The operator can thus assert that there is no substance to a complaint.[56] The operator, Acciona, disputed Mr Dean's assertion.[57]

2.54 Operators' reporting requirements also may be an issue. Mr Hall stated that:

> With respect to post-commissioning noise compliance monitoring of developments, under the condition requirements of many permits, there has not been a requirement for testing data to be provided until 12 months after the commissioning of the last turbine. That is resulting in 20-plus month delays in the data being made available to the public and obviously in the department being able to investigate any breaches, such as in the Waubra situation. We had to wait over 14 months before we could find out some of the issues that have arisen there.[58]

An Independent arbitrator?

2.55 Mr Dean submitted that:

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53 Mr Lane Crockett, *Committee Hansard*, 29 March 2011, p. CA 74, stated that Pacific Hydro had not received any complaints in the 10 years the Codrington facility has been operating.

54 *Committee Hansard*, 25 March 2011, p. CA 71.

55 *Committee Hansard*, 28 March 2011, p. CA 13.

56 *Committee Hansard*, 28 March 2011, p. CA 14.

57 *Correspondence*, dated 24 March 2011.

58 *Committee Hansard*, 28 March 2011, p. CA 39.

> It seems very strange to me that there is not an independent moderator for this situation, when we say there is a problem and they (Acciona) say there is no problem. After all, it is in the company's interests for there not to be a problem, so they take control of as much as they can and use their influence to get the outcome they want, it is ridiculous there is no third, completely independent party to resolve the situation.[59]

2.56 In response to a question from the Committee, witnesses representing the wind farm operators stated that they would be prepared to report quarterly to government on the complaints that they receive and stated that in some Australian jurisdictions this may already be required.[60]

Committee view

2.57 The Committee considers that if they do not already do so the responsible planning approval authorities should ensure that complaints about noise from wind farms are dealt with as soon as the complaint is received. This process should involve an impartial arbitrator. Additionally, there appears to be some confusion about the responsibility for investigating complaints between the different levels of government. If this confusion were resolved investigation of breaches of the noise standards would be facilitated.

Recommendation 2

2.58 The Committee recommends that the responsible authorities should ensure that complaints are dealt with expeditiously and that the complaints processes should involve an independent arbitrator. State and local government agencies responsible for ensuring compliance with planning permissions should be adequately resourced for this activity.

Setbacks

2.59 In Australia buffer zones exist between wind farms and residences. These zones are determined by the attenuation of sound from the wind turbines and require that measurements are made at residences that fall within a sound 'contour' of the proposed wind farm. In theory the noise from wind turbines should attenuate to the legislated levels within a set distance. However, the noise perceived at residences will be determined by a number of other factors including the size, number and mechanics of the turbines, topography and prevailing winds.

2.60 It has been suggested that the establishment of prescribed buffer zones (setbacks) would be preferable to a noise-based setback to help preserve the amenity of residents from the noise and flicker effects created by wind farms. Mr Peter Wingett, representing the Prom Coast Guardians Inc., stated that:

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59 *Submission 647*, p. 11.

60 Mr B Wickham and Mr L Crockett, *Committee Hansard*, 29 March 2011, p. CA 81.

> Adequate mandatory setbacks and rigorous enforcement of maximum noise standards would reduce the adverse impacts on properties neighbouring wind farms. A minimum setback of two kilometres or 20 times the maximum height, including the blades, of wind turbines to the nearest dwelling would be a desirable first step.[61]

2.61 The State Government of Victoria has recently amended the state's *wind energy facility provisions* to mandate that applications for the establishment of wind farms should include a plan showing all dwellings within two kilometres of a proposed turbine.[62] (The amendment also requires, among other things, that the applications include a concept plan of associated transmission infrastructure, electricity utility works and access road options.)

2.62 It is not known how this requirement will work in practice and therefore whether it will necessarily lead to a two kilometre buffer zone. The Victorian Planning and Environment Law Association suggested that because it is one of the assessment matters that need to be brought to the attention of the planning application that it will form part of the assessment criteria from now on.[63]

2.63 Wind farm developers and some other witnesses considered that prescribed buffer zones, such as a two kilometre setback, are not appropriate. The Clean Energy Council argued that because every wind farm and every community is different, because there are different geography and topography, and different prevailing winds, each application should be assessed on audible noise.[64] The Sustainable Energy Association of Australia stated that:

> ... a buffer zone should be entirely dependent on the actual physical characteristics of the wind farm, such as the number and size of turbines, its siting and location, and the acoustic factors in the area—these are used by the wind industry to determine what the zone should be. A blanket buffer zone does not face the realities of what is actually there. So we perfectly accept that there is a noise place and a noise amenity issue, but we do not believe a blanket zone is best practice either here in Australia or globally.[65]

2.64 Buffer zones may also be needed to ensure that residences are not affected by shadow flicker. Shadow flicker is caused by rotation of the turbine blades casting intermittent shadows. This gives the appearance of flickering and the effect can be visually annoying. The standards applied in the different Australian jurisdictions seek to limit shadow flicker for nearby residences. Mr Geiger stated that:

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61 *Committee Hansard*, 28 March 2011, p. CA 20.

62 *Advisory Note 35, March 2011*, Amendment VC78, Wind energy facility provisions – Clause 52.32, Department to Planning and Community Development, State Government of Victoria, p. 1.

63 Mr P O'Farrell, *Committee Hansard*, 29 March 2011, p. CA 108.

64 Mr M Warren, *Committee Hansard*, 29 March 2011, p. CA 21.

65 Mr N Prentice, *Committee Hansard*, 31 March 2011, p. CA 4.

> ... if we follow the New Zealand standard on noise, then the setbacks due to complying with the noise standards are generally greater than the setbacks required to avoid shadow flicker. So that is an issue that we do not expect to occur in Australia. With our German operations, the noise limits are much less stringent. We go as close as 300 metres to the closest house with some of our installations there. At that distance shadow flicker would be an issue.[66]

2.65 Mr Burn from WestWind Energy stated that standards applied in at least some Australian jurisdictions specify that no more than 30 hours of shadow flicker per year should be experienced by affected dwellings.[67]

2.66 Setback requirements to adequately prevent any adverse health effects have been rigorously debated. While the wind industry is against setback distances, a large number of submissions to the inquiry from researchers and concerned community members called for setback distances ranging from 2 km to 10 km.

Committee comment

2.67 A difficulty with a prescribed setback distance is that, in terms of noise and shadow flicker, the distance may either be too great or too little. If the setback is too great then this could limit the industry and possibly affect the amount of renewable power generation in Australia. If the distance were too little, residents affected adversely would not have any redress.

2.68 The Committee considers that the application of scientific measurements for sound and for shadow flicker to alleviate problems for wind farm neighbours may be preferable to prescribed setbacks. Prescribed setbacks are arbitrary and may be too great or too small. In addition, there is also some dispute about the noise standards set by governments and the noise measurements used. The matter is not necessarily settled. The Committee suggests that further consideration be given to the development of policy on separation criteria between residences and wind farm facilities.

Recommendation 3

2.69 The Committee recommends that further consideration be given to the development of policy on separation criteria between residences and wind farm facilities.

Wind Farms and Health

2.70 Much of the evidence that the Committee received in relation to claimed adverse health effects of wind turbines focussed on 'Wind Turbine Syndrome' (WTS).

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66 *Committee Hansard*, 29 March 2011, p. CA 87.

67 Mr P Burn, Project Development, WestWind energy Pty Ltd, *Committee Hansard*, 29 March 2011, p. CA 88.

This term was first used by Dr Nina Pierpont, an American medical practitioner, to describe a group of symptoms suffered by some people who have lived in close proximity to wind farms. The core symptoms of this condition as described by Dr Pierpont are as follows:

Sleep disturbance

Headache

Visceral vibratory vestibular disturbance

Dizziness, vertigo, unsteadiness

Tinnitus

Ear pressure or pain

External auditory canal sensation

Memory and concentration deficits

Irritability, anger

Fatigue, loss of motivation.[68]

2.71 A number of witnesses stated that they had suffered some or all of the above symptoms and attributed their ill health to the noise and in particular the low frequency noise and infrasound[69] from wind turbines.[70] Some stated that they had been so badly affected that they had to leave their homes at considerable cost and inconvenience.[71]

2.72 Professor Simon Chapman, Expert Adviser, Climate and Health Alliance and Professor, Public Health, University of Sydney criticised Dr Pierpont's work on a number of grounds. He considered that the sample used was too small and unrepresentative in terms of the medical history of the respondents to the survey; that the respondents had not been medically examined; that Dr Pierpont's book had not been peer-reviewed; and that Dr Pierpont did not have any other publications in the field.[72]

68 *Wind Turbine Syndrome: A Report on a Natural Experiment*, Nina Pierpont, K-Selected Books, Santa Fe, New Mexico, 2009, p. 51.

69 Infrasound is sound that is lower than normal hearers can hear. The limit is about 20 hertz, but some people can hear sounds lower than that limit. Sounds at these low frequencies have very long wave lengths and at sufficient volume can cause vibrations, including in the human body.

70 See, for example, Dr S Laurie, *Submission 390*, p. 13, noting that she has provided case histories for 60 people to the committee in confidence.

71 See Mr C Stepnell, *Submission 129*, p. [3] and Mr N Dean, *Submission 647*, p. 2.

72 *Committee Hansard*, 29 March 2011, pp CA 115-117.

2.73 Mr Briddy, a farmer from Lexton, Victoria, stated that although his homestead is 5.5 kilometres from the Waubra wind farm, due to the topography he has problems with the vibrations from the turbines, including having trouble sleeping.[73]

2.74 Mr Stepnell, whose home was 900 metres from wind turbines at Waubra, informed the Committee that after about six months the turbines began to affect his health:

> It started with the headaches and the tingling in the head and then eventually the sleep problems—waking up at two to three in the morning and not being able to go back to sleep. It was just every night, maybe until five or six nights of absolute fatigue set in and then you would sleep. It took that long to do it and then away you go again. Then eventually I had heart palpitations, which were a massive concern.[74]

2.75 Mr Stepnell and his wife consulted a medical practitioner who offered to prescribe anti-depressants, but as they were unwilling to turn to medication to live in their home, they bought a house in Ballarat, which was a huge financial cost.[75]

2.76 Mrs Kearns, who lives on a 16 hectare property in close proximity to the approved Moorabool wind energy facility, stated as follows:

> My brief anecdotal evidence re health effects is as follows: on 4 January this year, my husband and I decided to visit Waubra to view the wind farm. It was a cool, rather overcast day, not too windy. We spent over one hour and then went home. At 2 o'clock the next morning, I woke with severe chest pain. I had enough sense to take my blood pressure reading. I have no history of hypertension. I am very healthy normally. My blood pressure was 211 over 103, so health professionals know that that is far too high. I should have stroked out. I called the ambulance and I was transported to hospital and admitted to ICU for 24 hours. Further tests disproved any cardiac condition, so the diagnosis was probably stress, just from the worry.[76]

2.77 Dr Sarah Laurie, Medical Director of the Waubra Foundation, submitted details of her 'field observations' of more than 60 affected persons in three states. These persons described that they suffered from the symptoms identified by Dr Pierpont. Many of the individuals interviewed had never heard of Dr Pierpont or WTS. Dr Laurie informed the Committee that her findings were consistent with those of a UK and also an Australian rural general practitioner who noticed that some of their patients were reporting those symptoms after wind farms began operating in their vicinity.[77]

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73 *Committee Hansard*, 28 March 2011, p. CA 54.

74 *Committee Hansard*, 28 March 2011, p. CA 5.

75 *Committee Hansard*, 28 March 2011, p. CA 5.

76 *Committee Hansard*, 28 March 2011, p. CA 55.

77 *Submission 390*, pp 10–16.

2.78 Dr Laurie also submitted that elevated blood pressure and associated heart problems were occurring among people affected by wind turbines.[78] Professor Gary Wittert, a senior consultant endocrinologist at Royal Adelaide Hospital, who had access to the blood pressure readings of those involved, stated that 'no assertion could be made that there was any relationship between mean overnight turbine power and elevations of blood pressure'.[79]

2.79 Most witnesses, including those representing wind farm developers,[80] accepted that some people in the vicinity of wind farms have become ill, but suggested, firstly, that these peoples' problems were not caused by the noise from farms *per se* and, secondly, that work had not been done to indicate that the incidence of the reported symptoms among that group of people was higher than in the rural population generally.

2.80 Mr Rebbeck of RES Australia, for example, informed the committee that 'nobody disagrees that high levels of low-frequency noise cause health impacts'.[81] He referred to research involving fighter pilots and truck drivers.

2.81 A Portuguese study reported that:

> ... there are acoustical events that are not necessarily processed by the auditory system, but that nevertheless cause harm. Infrasound and low frequency noise (ILFN, <500Hz) are acoustical phenomena that can impact the human body causing irreversible organic damage to the organism, but that do not cause classical hearing impairment. Acoustical environments are normally composed of all types of acoustical events: those that are processed by the auditory system, and those that are not. [82]

2.82 Mr Bowdler agreed that some people who have lived close to wind turbines have become ill, but he did not consider that this was caused by any peculiarity of the sound generated by wind turbines. Mr Bowdler submitted that most of the subjects in Dr Pierpont's investigation had a genuine grievance related simply to the loudness of the noise. He observed that half were less than 750 metres away from a turbine and the nearest 350 metres.[83]

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78 *Submission 390*, pp 17–18.

79 *Committee Hansard*, 31 March 2011, p. 33.

80 See, for example, Mr A Thompson, Director Development, Acciona Energy, *Committee Hansard*, 29 March 2011, p. CA 72.

81 *Committee Hansard*, 25 March 2011, p. CA 67.

82 *Public health and noise exposure: the importance of low frequency noise* Mariana Alves-Pereiraa (ERISA-Universidade Lusófona, Lisbon, Portugal) and Nuno A. A. Castelo Brancob, (Center for Human Performance, Alverca, Portugal), Paper presented at Inter-Noise 2007 Conference, 28–31 August 2007 Istanbul, Turkey.

83 *Submission 218*, p. [2].

2.83 Dr Leventhall submitted that the hypotheses put forward by Dr Pierpont lack credibility and do not appear to have any scientific basis. He submitted that:

> The so called 'wind turbine syndrome' cannot be distinguished from the stress effects from a persistent and unwanted sound. These are experienced by a small proportion of the population and have been well known for some time.[84]

2.84 Dr Leventhall has also written that he is 'happy to accept these symptoms, as they have been known to me for many years as the symptoms of extreme psychological stress from environmental noise, particularly low frequency noise. The symptoms have been published before ...'[85] He also submitted that:

> Once antagonisms have been developed, even the slightest perception of a noise may lead to stress and, in its turn, long term stress may lead to somatic effects. However, this is not a function of the characteristics of the noise alone, but of the noise and listener in combination.[86]

2.85 Professor Seligman informed the Committee that:

> From the engineering and physiological perspectives, there is no mechanism for consistent adverse effects of noise from wind farms beyond the distance at which the noise falls below background levels. This is typically a few hundred metres for modern equipment. However it is accepted that under some atmospheric conditions, wind farms are audible at a distance. Salt states that his study "raises the POSSIBILTY that the dislike / disturbance of individuals by wind turbine noise may be related to the long-term stimulation of the outer hair cells with infrasound." However the atmospheric effect mentioned above is exceptional and not long-term.[87]

2.86 Dr Williams suggested that the noise in itself may not be the only factor in people reporting adverse effects from wind farms. He stated that:

> In some cases, the aspect of the noise problem is a focal point that is focusing other people's fears, apprehensions and perceptions as to maybe what wind farms are. It may not be the noise, because everything I have been able to look at basically says that, in the normal expectation of levels that you will receive, the infrasound will not have a physical effect on people's bodies.[88]

2.87 A report on a field study undertaken in the Netherlands in 2007 with 725 respondents, which was published in the Journal of the Acoustical Society of America in August 2009, concluded that:

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84 *Submission 465*, p.11.

85 *Wind Turbine Syndrome – An Appraisal*, Dr G Leventhall, p. 9. Appendix to *Submission 465*.

86 *Submission 465*, p. 5.

87 *Submission 353*, p. [3].

88 *Committee Hansard*, 17 May 2011, p. CA 8.

> Wind turbine sound is easily perceived and, compared with sound from other community sources, relatively annoying. Annoyance with wind turbine noise is related to a negative attitude toward the source and to noise sensitivity; in that respect it is similar to reactions to noise from other sources. This may be enhanced by the high visibility of the noise source, the swishing quality of the sound, its unpredictable occurrence, and the continuation of the sound at night.[89]

The study also found that people benefiting from the turbines are less likely to be annoyed by it.[90]

2.88 Mr Rebbeck commented that, with 150,000 wind turbines operating globally, it would seem likely that any genuine adverse health effects would have been widely researched and published by now.[91]

2.89 Many other witnesses who asserted that there are not any adverse health effects from wind farms relied on a survey of the literature published by the National Health and Medical Research Council (NHMRC) that concluded, among other things:

> There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines.[92]

2.90 Professor Anderson, the Chief Executive Officer of NHMRC, informed the Committee that:

> I do want to make a point to anybody who is relying on this.
>
> We regard this as a work in progress. We certainly do not believe that this question has been settled. That is why we are keeping it under constant review. That is why we said in our review that we believe authorities must take a precautionary approach to this. That is what we do say in medicine anyhow, but this is very important here because of the very early stage of the scientific literature. In any area we make statements on, we are robust, we are used to being criticised from all sorts of directions and we cannot be responsible for the use that others make of the literature ...[93]

2.91 The NHMRC's 'rapid review' of the evidence concluded, among other things, that '[t]here is currently no published scientific evidence to positively link wind turbines with adverse health effects'. That statement has been relied on by developers

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90 *Response to noise from modern wind farms in the Netherlands*, Eja Pedersen, Frits van den Berg, Roel Bakker and Jelte Bouma, Journal of the Acoustical Society of America 126 (2), August 2009, pp 634–643.

91 *Committee Hansard*, 25 March 2011, p. CA 66.

92 *Wind Turbines and Health: A Rapid Review of the Evidence*, July 2010, Australian Government National Health and Medical Research Council, p. 8.

93 *Committee Hansard*, Perth, 31 March 2011, p. CA 87.

in the wind industry to suggest that Australian research had settled the question of any adverse health effects. However, as stated by Professor Anderson, the NHMRC is keeping the matter under review and on 7 June 2011 the Council held a forum in Canberra to further investigate the health impact of wind farms with a view to updating the public statement.

2.92 The NHMRC report was not the only study relied on by those who claimed that wind turbines do not adversely affect people's health. A study commissioned by American Wind Energy Association and the Canadian Wind Energy Association concluded that:

(a) Sound from wind turbines does not pose a risk of hearing loss or any other adverse health effect in humans.

(b) Subaudible, low frequency sound and infrasound from wind turbines do not present a risk to human health.

(c) Some people may be annoyed at the presence of sound from wind turbines. Annoyance is not a pathological entity.

(d) A major concern about wind turbine sound is its fluctuating nature. Some may find this sound annoying, a reaction that depends primarily on personal characteristics as opposed to the intensity of the sound level.[94]

2.93 Some witnesses queried the impartiality of this study on the grounds that it was commissioned by the wind industry.[95] While not accepting that argument in relation to that particular study or any other study the Committee acknowledges that the claim could be made against any study whether financed by the supporters or opponents of the wind industry.

2.94 Even some government studies, which may in many circumstances be considered to be independent, also may be open to criticism because governments have a vested interest in the development of the wind industry through policies intended to encourage or support generation of electricity from renewable sources.[96]

2.95 It would therefore be difficult to satisfy all those who are interested in the health effects of wind turbines that a reliable independent study could be commissioned. Nevertheless, witnesses supported the notion that thorough epidemiological studies are needed. Dr Pierpont informed the Committee that 'what

94 *Wind Turbine Sound and Health Effects: An Expert Panel Review*. Colby et al, Prepared for American Wind Energy Association and Canadian wind Energy Association, December 2009, p. 5-2.

95 See, for example, Dr Pierpont, *Committee Hansard*, 25 March 2011, p. CA 19.

96 The UK Government has commented on the 'democratic deficit' relating to the development of wind farms in that country, See footnote 37.

are needed are clinical large-scale epidemiologic studies and lab studies'.[97] Mr Holmes a' Court, Chairman, Hepburn Wind, stated that '[a] small number of people living near a small fraction of wind farms in Australia do not currently feel that their concerns are being adequately investigated. It is in everybody's interests that these complaints are independently, rigorously and transparently investigated'.[98] Another witness, Dr Crisp, who represented Doctors for the Environment Australia questioned whether such research was worth doing given the weight of the scientific evidence and the competition for the research dollar.[99]

2.96 Recent reports of Government of Victoria Planning Panels have suggested that that government should consider commissioning independent research in health impacts associated with wind farms.[100]

2.97 A number of witnesses suggested that any adverse health effects from wind power generation should be viewed in the context of ill health caused by other forms of power generation, especially respiratory conditions associated with fossil fuel generation.[101] Given its terms of reference the Committee has not further considered this suggestion.

Committee comment

2.98 The Committee does not doubt that some people living in close proximity to wind farms are experiencing adverse health effects, but these are not necessarily caused by the noise characteristically produced by wind turbines. However, there were suggestions, concerns and opinions expressed that infrasound produced by the turbines is a cause of adverse health symptoms similar to those described as 'Wind Turbine Syndrome' by Dr Pierpont.

2.99 Adverse health effects may be caused by wind turbines but they may be caused by factors other than noise and vibration, such as stress related to sleeplessness or perceptions of harm. There is insufficient rigorous research to know the answer.

2.100 In view of the reported cases of illness and the possible consequences that any adverse health effects may have on communities' acceptance of wind farms the

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97 *Committee Hansard*, 25 March 2011, p. CA 22.

98 29 March 2011, p. CA 63.

99 *Committee Hansard*, 31 March 2011, p. CA 57. Note: Doctors for the Environment Australia is a voluntary association of medical practitioners with a particular interest and expertise in the effects of and relationship between environmental degradation and changes in human health.

100 Moorabool Wind Energy Facility: Panel application 2009012877, *Panel Report*, September 2010, p. 6. Mortlake Wind Energy Facility: Moyne Planning Scheme, *Panel Report*, 10 August 2010, p. 78.

Committee considers that soundly-based studies of these matters should be undertaken as a matter of priority.

Recommendation 4

2.101 The Committee recommends that the Commonwealth Government initiate as a matter of priority thorough, adequately resourced epidemiological and laboratory studies of the possible effects of wind farms on human health. This research must engage across industry and community, and include an advisory process representing the range of interests and concerns.

Recommendation 5

2.102 The Committee recommends that the NHMRC review of research should continue, with regular publication.

Recommendation 6

2.103 The Committee recommends that the National Acoustics Laboratories conduct a study and assessment of noise impacts of wind farms, including the impacts of infrasound.

CHAPTER 3

THE INTERFACE BETWEEN COMMONWEALTH, STATE AND LOCAL PLANNING LAWS AS THEY PERTAIN TO WIND FARMS

3.1 Although the wind energy industry depends on emissions reduction laws enacted by the Commonwealth and state parliaments,[1] the planning of wind energy facilities is a matter principally for the states and local governments.

3.2 In this chapter the Committee considers some of these laws and processes, using the planning system in NSW as an illustrative case. Climate change policies, the future interface of planning laws and the formation of national wind farm guidelines are also considered.

Commonwealth climate change policies

3.3 In recent years, the Commonwealth Government's climate change policies have affected the pattern of generation technologies across the National Electricity Market (NEM).[2] In particular, the Government has introduced two schemes which have encouraged investment in renewable energy and particularly in wind energy: the Mandatory Renewable Energy Target (MRET) scheme; and the Renewable Energy Target (RET) scheme.

The Mandatory Renewable Energy Target scheme

3.4 In June 2000, the Government introduced the national MRET scheme.[3] The scheme required electricity retailers and other large electricity buyers to purchase an additional 2 percent of their electricity from renewable or specified waste-product energy sources by 2010 (equating to 9 500GWh).

> The strategic importance of this legislation is not only that it delivers on a key aspect of [Australia's] commitment in Kyoto [to set targets for renewable electricity generation by 2010]. It is not only that it achieves significant greenhouse gas reductions, of up to seven million tonnes per year. It is also that it represents a big step along the road of 'greening' our electricity generation sector–a sector which represents the single largest contributor to Australia's total greenhouse emissions.[4]

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1 See, for example, *Renewable Energy (Electricity) Act 2000* (Cth) and *Climate Change Act 2010* (Vic).

2 Australian Energy Regulator, *State of the Energy Market 2010*, p. 22.

3 *Renewable Energy (Electricity) Act 2000*.

4 Dr Sharman Stone MP, Parliamentary Secretary to the Minister for the Environment and Heritage, *House Hansard*, 22 June 2000, p. 18 030.

3.5 In response, there was a marked increase in the number of large–scale wind farm proposals and developments.[5] However, wind generation continues to account for only a small proportion of the NEM electricity mix. In 2010, wind generation accounted for approximately 3 percent of capacity, supplying 2 percent of output.[6]

The Renewable Energy Target scheme

3.6 In August 2009, the Australian Government expanded the MRET scheme by creating the national RET scheme. The expanded scheme set a target of 20 percent renewable energy generation by 2020 (a fourfold increase of the existing target to 45 000GWh).[7]

3.7 At present, wind energy accounts for almost one quarter of Australia's clean energy generation (22.9 percent). In the past year, approximately 5 000GWh of electricity (powering over 700 000 homes) was generated by 1052 wind turbines across 52 operating wind farms.[8]

3.8 According to the Clean Energy Council, and other submitters to this inquiry:

> Wind power is likely to be the dominant technology during the early years of the [RET]. It is currently the least expensive form of renewable energy and has a proven track record of being rolled out on a large scale.[9]

3.9 The Australian Government's climate change policies are evidence of its support for wind farms as an important source of renewable energy.[10] However, while the Commonwealth is a key player in the national energy market, and specifically the NEM, its practical involvement is limited.

3.10 Each state and territory is constitutionally responsible for energy matters within its own jurisdiction. Consequently, the national energy policy is mainly implemented at the state and territory level using existing planning systems.[11]

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5 Ministerial Council on Energy, Wind Energy Policy Working Group, *Integrating Wind Farms into the National Electricity Market, Discussion Paper,* March 2005, p. ii.

6 Australian Energy Regulator*, State of the Energy Market 2010*, p. 21.

7 *Renewable Energy (Electricity) Amendment Act 2009*

8 Clean Energy Council, *Clean Energy Australia 2010*, December 2010, p. 52. Acciona's Waubra Wind Farm north-west of Ballarat in Victoria is currently the largest in the country, with 128 wind turbines spread over 173square kilometres.

9 Clean Energy Council, *Clean Energy Australia 2010*, December 2010, p. 8. Also, see Clean Energy Council, *Submission 67,* p. 1; TRUenergy Pty Ltd, *Submission 611*, p. 2; and Tasmanian Renewable Energy Industry Development Board, *Submission 624*, p. 1.

10 State and territory governments are equally supportive: see, for example, Minister for Planning, Victorian Government, *Submission 651*; and NSW Government, *Submission 819.*

11 The Commonwealth is responsible for energy matters within Commonwealth jurisdictions.

Planning systems

3.11 The multiplicity of planning systems, and the numerous requirements of each system at the state and local government levels, can cause confusion and uncertainty, with the interface between planning systems not necessarily transparent or well understood. The NSW Legislative Council's inquiry into *Rural wind farms* (the NSW Inquiry) received such evidence, as did this inquiry.[12]

3.12 The Construction Forestry Mining and Energy Union (Construction and General Division) told the committee that there should be greater co–ordination between the three tiers of government, as well as clarification of their respective roles:

> The different roles and responsibilities of the respective tiers of government is not generally understood by members of the general public and finding your way through the maze of government regulation, even using the tools such as the internet, can be daunting to those experienced in such matters.[13]

3.13 However, as noted by Wind Prospect Pty Ltd, a wind farm developer operating in a number of jurisdictions, Australian planning processes are generally similar:

> [A]ll require the provision of detailed environmental assessments of wind farm proposals, require a public consultation process to be undertaken and contain provision for public submissions on the development applications.[14]

3.14 For illustrative purposes, the planning system of New South Wales is described below in some detail.

The planning system in New South Wales

3.15 New South Wales does not have specific legislation for the development of wind farms. Proposals are instead assessed under a number of environmental planning instruments, including: the *Environmental Planning and Assessment Act 1979* (NSW); *Environmental Planning and Assessment Regulation 2000*; State Environmental Planning Policies (SEPPs); and Local Environmental Plans (LEPs).[15]

12 NSW Legislative Council, General Purpose Standing No. 5, *Rural wind farms*, Report 31–December 2009, Chapter 5.

13 Construction Forestry Mining and Energy Union (Construction and General Division), *Submission 638*, p. 4. Also, see Western Plains Landscape Guardians Association, *Submission 645*, p. 7; and Acciona Energy, *Submission 650*, p. 9.

14 *Submission 328*, p. 7.

15 As of 1 July 2009, Regional Environmental Plans (REPs) are no longer part of the hierarchy of environmental planning instruments. All existing REPs are now deemed State Environmental Planning Policies (SEPPs).

Environmental planning instruments

3.16 The *Environmental Planning and Assessment Act 1979* (NSW) is the principal legislation used to guide planning and development in New South Wales. In particular, Part 3 of the Act sets out the plan-making system, including the mechanisms by which certain developments are assessed and approved.

3.17 SEPPs and LEPs are legal documents that regulate land use and development in a specific area. SEPPs are generally made by the Minister for Planning, while LEPs are prepared by councils to guide planning decisions for local government areas.

3.18 Development Control Plans (DCPs), prepared in accordance with the *Environmental Planning and Assessment Act 1979* (NSW), are also used to help achieve the objectives of a LEP by providing specific, comprehensive requirements for certain types of development or locations.[16]

Other documents

3.19 Developers have also had available to them documents other than the legislative instruments described above. In 2002, for example, the *NSW Wind Energy Handbook* was published, providing information on all aspects of wind energy development.[17] Another example is the Australian Wind Energy Association's 2006 *Best Practice Guidelines for Implementation of Wind Energy Projects in Australia* (see below).[18]

3.20 More recently, the NSW Government has been developing guidelines to provide information on state specific assessment processes and requirements. These guidelines will also provide clarification for NSW stakeholders on the interface between Commonwealth, state and local wind farm requirements. The NSW Government plans to release the NSW Wind Farm Planning Guidelines in 2011.[19]

Assessment and approval processes

3.21 In mid–2008, the NSW Government commenced a reform of its planning system. As part of that reform, the NSW Department of Planning introduced a streamlined planning approvals regime for renewable energy, covering both small–

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16 NSW Department of Planning: http://www.planning.nsw.gov.au/PlanningSystem/Legislationandplanninginstruments/tabid/67/language/en-US/Default.aspx, accessed 5 April 2011.

17 Sustainable Energy Development Authority of NSW, *NSW Wind Energy Handbook*, 2002: http://www.industry.nsw.gov.au/__data/assets/pdf_file/0003/306048/nsw-wind-energy-handbook.pdf, accessed 5 April 2011.

18 AusWind, *Best Practice Guidelines for Implementation of Wind Energy Projects in Australia*, December 2006, p. 7.

19 NSW Government, *Submission 819*, pp 10–11.

scale and large–scale systems. Renewable energy proposals are now considered under Parts 3A, 4 and 5 of the *Environmental Planning and Assessment Act 1979* (NSW).[20]

3.22 Part 3A of the Act sets out the planning approvals regime for major infrastructure and other projects, including 'critical infrastructure' projects. Renewable energy proposals with a capital cost of more than $30 million (or $5 million in an environmentally sensitive area of state significance) are considered a major project.[21] 'Critical infrastructure' projects are a type of major project deemed by the Minister for Planning to be essential to the State for economic, social or environmental reasons.

3.23 According to the NSW Department of Planning, only a minority of major projects covered by Part 3A of the Act are declared 'critical infrastructure'.[22] However, renewable energy projects with the capacity to produce at least 30MW of electricity are classified as 'critical infrastructure'[23] which would result in a large number of wind farms being assessed by the Minister for Planning rather than councils. (In Victoria, until recently a similar situation existed whereby the Planning Minister was the responsible authority for wind farm proposals where the capacity would exceed 30MW. In 2010, in that state the majority of wind farm permit applications were determined by the Planning Minister.)[24]

3.24 Under Part 4 of the *Environmental Planning and Assessment Act 1979* (NSW), which deals with small-scale developments, local government councils are the responsible authority for all wind farm approvals The relevant SEPP is SEPP (Infrastructure) 2007, which defines small wind turbines (a wind turbine with a generating capacity of less than 100kW), small wind turbine systems (a system comprising one or more small wind turbines each of which feed into the same grid or battery bank) and wind monitoring towers.[25] A council's LEP and/or DCP might also contain additional planning controls.

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20 NSW Department of Planning: see http://www.planning.nsw.gov.au/StrategicPlanning/RenewableEnergy/tabid/394/language/en-US/Default.aspx, accessed 7 April 2011. Part 5 of the *Environmental Planning and Assessment Act 1979* (NSW) sets out environmental assessment requirements.

21 Paragraph 24 of Schedule 1 of the SEPP (Major Projects) 2005. $30 million is equivalent to a generating capacity of 10-15MW: see NSW Government, Department of Planning, *Fact Sheet, Renewable energy development under Part 3A*, April 2010.

22 NSW Government, Department of Planning, *Fact Sheet 6, Critical infrastructure and Part 3A of the Act*, October 2009.

23 NSW Government, Department of Planning, *Fact Sheet, Renewable energy development under Part 3A*, April 2010.

24 Victorian Planning and Environment Law Association, *Submission 654*, pp 2–3.

25 Part 3 Division 4 of the SEPP (Infrastructure) 2007.

The Part 3A environmental assessment and approval process

3.25 Under the Part 3A planning approvals regime, the Director–General of the NSW Department of Planning prepares the environmental assessment requirements. These requirements outline the key issues that a proponent must address in its environmental assessment of a proposed project. The requirements are specifically tailored to each project and are referred to as Director–General's Requirements.

3.26 In preparing the Director–General's Requirements, relevant public authorities (such as the Department of Environment, Climate Change and Water and local councils) may be consulted. For some projects, a planning focus meeting may be held to help determine the scope of issues and level of assessment required.

3.27 The Director–General's requirements also outline any consultation requirements and may require the proponent to include, as part of their environmental assessment, a statement of commitments setting out the actions the proponent is prepared to undertake for environmental management and mitigation measures on-site, or development contributions.[26]

Witnesses' comment on the planning process

3.28 Several submissions commented on the assessment and approval process for major and 'critical infrastructure' projects for which the NSW Minister for Planning is the responsible authority. The Clean Energy Council submitted that the planning system provides an overarching framework to assess proposed actions by balancing the benefits of a wind farm development with any impacts. In relation to impacts, the Clean Energy Council submitted:

> Extensive and exhaustive assessments are undertaken by proponents prior to submitting a development application to determine whether a wind farm is feasible on a specific site and as to whether there are any potential environmental or social issues that will impact upon the viability of a proposal. In addition to this, proponents engage a range of stakeholders at early stages of feasibility to determine whether there are any further environmental, cultural or amenity impacts that need to be understood and managed as part of the development.[27]

3.29 In contrast, other submissions did not support the Part 3A assessment and approval process. In their view, the planning system favours wind farm developers at the expense of councils and local communities.[28]

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26 NSW Government, Department of Planning, *Fact Sheet 2, Steps in the Part 3A assessment process*, October 2009.

27 *Submission 67*, p. 4. Also, see Friends of the Earth Australia, *Submission 325*, p. 7; Tasmanian Renewable Energy Industry Development Board, *Submission 624*, p. 1; and RES Australia Pty Ltd, *Submission 644*, p. 2.

28 For example, Mount Alexander Sustainability Group, *Submission 247*, p. 6; Molonglo Landscape Guardians Inc., *Submission 582*, pp 20–21.

3.30 The was informed that a similar situation exists in Victoria where the planning system allows for stakeholders[29] to make submissions and presentations on a wind farm proposal:

> These processes enable a wide range of issues relating to the wind farm proposals to be addressed, and their impacts assessed...The Victorian processes are open and transparent and satisfactorily allow, and encourage, public participation.[30]

3.31 However, Prom Coast Guardians cited its experience with the Dollar–Foster North wind farm proposal and submitted that councils and local communities essentially had no voice in relation to wind farm proposals determined by the Victorian Planning Minister. In its view, the public consultation process was deficient:

> Where a Panels Victoria hearing was convened to consider a proponent's application and objectors submissions, the hearing was required to 'give due weight' to the state government guidelines. The proponents usually had the resources to retain expert witnesses to present evidence favourable to their position, as well as lawyers to argue their case and to cross–examine objectors. Local communities and councils in rural areas did not have the resources to match this state government and corporate overkill...In the unlikely event that a panel hearing found in favour of the objectors, the Planning Minister did not have to accept the recommendations, or make them public and could issue a permit anyway. This made a lot of people in South Gippsland feel that the whole process disenfranchised them.[31]

Role of local government

3.32 State and territory government assessment and approval processes do not always produce the outcome desired by at least some councils and local communities. Councils and local communities have indicated to the Committee that, where the state government is the responsible authority, the interface with local planning laws is not adequate.

South Australia

3.33 In 2003, the South Australian Government inserted objectives and principles into local area development plans to encourage and guide wind farm development. The Environmental Defenders Office (SA) supported these changes which encourage the development of renewable energy sources in appropriate locations and submitted that:

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29 'Stakeholder' is defined in the EPHC draft *National Wind Farm Development Guidelines* as any individual, business or group who may live or work in proximity to a wind farm, or who may have an interest or association with a wind farm developer or its potential impacts.

30 Victorian Planning and Environmental Law Association, *Submission 654*, p. 3.

31 *Submission 146*, pp 2–3. Also, see Pyrenees Shire Council, *Submission 646*, p. 3.

> The principles included such matters as ensuring wind farms are sited, designed and operated in a manner that:
>
> (a) does not significantly detract from significant visual and landscape character elements of the area;
>
> (b) utilises elements of the landscape, materials and finishes that minimises visual impact;
>
> (c) minimises the potential for adverse impact on areas of native vegetation, conservation, environmental, geological, tourism or heritage significance;
>
> (d) does not impact on the safety of aircraft and the operation of airfields and designated landing strips; and
>
> (e) minimises the potential for nuisance or hazard to nearby property owners/occupiers, road users and wildlife.[32]

3.34 Evidence from the Northern Areas Council was not so supportive. The Council argued that the 2003 objectives and principles do not represent local policy. Not only are councils obliged to implement the state wind farm policy but they find it difficult to amend state–wide policies:

> A Council's ability to unilaterally change, add to, modify, strengthen or tighten these established policies is very much limited. A Council is unlikely to 'win' any argument with the Minister to accept amendments and additions to his own State–wide policies.[33]

3.35 According to the Northern Areas Council, its local community considers that the state policy does not adequately protect residents and the environment from perceived adverse impacts resulting from the operation of wind turbines. In its view, there is a need for a stronger planning focus in the development plan to better balance economic benefits with the environmental and social consequences of wind farms.[34]

3.36 Another South Australian council, the Southern & Hills Local Government Association also expressed dissatisfaction with the 2003 objectives and principles.

> [T]hey are pretty general in nature, although there are other council wide planning principles and objectives that can be applied to different aspects of this type of development. The issue is that the conditions are of a general nature and making a case to support or reject can mean paying for expert consultants. Over the last several years, international and interstate standards have become more detailed and more 'performance based', seeking to establish greater setback distances to more adequately deal with low frequency sound impacts on human health etc. The Planning Principles

32 *Submission 640*, pp 1–2.

33 *Submission 861*, p. 1.

34 *Submission 861*, pp 1–2. This evidence was similar to that received from Molonglo Landscape Guardians.

> within South Australia have not been updated since they were introduced in 2003.[35]

New South Wales

3.37 Similar views to those above were held by some witnesses from NSW, including the Molonglo Landscape Guardians and the Upper Hunter Landscape Guardians.

3.38 Molonglo Landscape Guardians submitted that the NSW Government interferes in local planning instruments.[36] Molonglo Landscape Guardians also objected to state and territory governments using statutory powers to override the wishes of local communities. Three examples were cited as evidence: first, the announcement of the Renewable Energy Precincts (see below); second, the availability and use of call–in powers; and third, the quashing of community views by the 'greater good' argument.[37]

3.39 The Upper Hunter Landscape Guardians submitted that its council does not have a DCP in relation to wind farm development as the council does not see any value in developing such a DCP when the state government can choose to 'ignore local guidelines'.[38]

3.40 In essence, the Committee heard that there is a disconnect between the state government and some councils, which represent the interests of their local communities. This point was also made in the evidence of the Victorian Planning and Environmental Law Association, who explained the different policy drivers as follows:

> Councils are run to represent the community and as a result, influence from the local community can affect decisions at a local level. For example, residents are generally opposed to major change within the community. On the other hand, policy at the Commonwealth or State level can be driven and respond to state wide and Commonwealth issues, such as meeting obligations under Commonwealth's Large–scale Renewable Energy Target.[39]

35 *Submission 53*, p. 2.

36 *Submission 582*, pp 19–20.

37 *Submission 582*, pp 20–23. The submission also argues that the NSW Government's streamlined planning approvals regime for renewable energy proposals accords such proposals special treatment: see p. 20.

38 *Submission 80*, p. 4.

39 *Submission 654*, p. 9.

Victoria

3.41 Several submissions particularly commented on one state policy, which, when implemented, might significantly alter the manner in which wind farm development proposals are assessed and approved.

3.42 The Victorian Planning Minister advised that the Victorian Government is committed to empowering councils to play the lead role in the location of future wind farms. In addition to vesting primary responsibility for determinations with councils, the state government submitted that it will provide councils with technical and ongoing support from appropriate state agencies, as necessary.[40]

3.43 Some submitters expressed concern with this policy. Origin Energy Limited, for example, argued that, in general, it is more efficient and appropriate for a state planning department, or minister, to determine planning consents for large–scale wind farms. It gave a number of reasons for its position:

- other infrastructure projects of a corresponding size are typically determined at state, not council level;
- state departments have the appropriate resources, both in terms of capacity and technical expertise;
- wind farms can sometimes be divisive within a local community–increasing biases and pressures upon a local council. The state government would most likely be independent from the more localised issues;
- large projects can be located across more than one local government area. Again, state government would usually be best placed to handle these cross–boundary projects (including where a transmission line associated with the project crosses another local government area); and
- state–based decision makers often have a broader perspective to consider and account for higher–level policy settings such as state renewable energy targets, the RET and Australia's Kyoto target.[41]

3.44 As discussed in Chapter 2, some Victorian councils expressed concern with their ability to assess wind farm development proposals.[42]

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40 *Submission 651*, p. 4.

41 *Submission 591*, pp 15–16. Also, see Dr James Prest, *Submission 631*, p. 2 and WestWind Energy Pty Ltd, *Submission 655*, p. 12.

42 For example, CSIRO, *Submission 579*, p. 6 and Union Fenosa Wind Australia, *Submission 340*, p. 5. Also, see Vestas–Australian Wind Technology Pty Ltd which submitted that the number of wind farm applications approved over the past ten years has developed a body of precedents for councils: *Submission 712*, p. 5.

3.45 The Committee for Portland, for example, considered the policy proposal impractical and backward. Its submission argued that councils do not have the requisite expertise or resources. Accordingly, state governments, which can engage technical experts, should remain responsible for the complexity and compliances associated with wind farm developments.[43]

3.46 Pyrenees Shire Council agreed with the Committee for Portland's comments regarding local councils' abilities to assess wind farm proposals. It reported that councils often need to engage specialist consultants to assist with the assessment of complex noise reports; many councils (due to resourcing constraints) accept a lot of expert evidence on face value; and councils defer hard decisions to a secondary consent phase of endorsing management plans.[44]

3.47 Pyrenees Shire Council also commented that the proposal would:

> [P]lace massive resourcing constraints on local governments' already limited resources, and unless significant support can be provided by specialist staff from [Department of Community and Planning Development] this model is seen as being unworkable.[45]

3.48 The Committee notes that the Victorian Minister for Planning submitted that the Government proposes to provide support to councils affected by the new policy. However, the nature and extent of this support, as well as any terms and conditions, are not yet known.

Community consultation

3.49 A key theme to emerge in many submissions was the extent of community consultation.

3.50 Thomsons Lawyers in South Australia act for several wind farm developers. Its submission commented positively on the amount of council and local community involvement in the wind farm planning process:

> The local Council usually has significant involvement in the planning process and ensures that the community is not disadvantaged by the development. In fact, where most wind farms are developed, the Council has encouraged that development by providing for wind farm development (which meets certain requirements) in its development plan. Of course, notwithstanding the inclusion of a wind farm development in the development plan, such developments are often subject to significant public

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43 *Submission 614*, p. 3. Also, see Ballarat Renewable Energy and Zero Emissions Inc., *Submission 720*, p. 7. For further comments regarding compliance issues see Lal Lal and Elaine Landscape Action Group, *Submission 867*, p. 6 and Moyne Shire Council, *Submission 169*, p. 4.

44 *Submission 646*, p. 2.

45 *Submission 646*, p. 2.

> consultation. Further, the ultimate decision of the planning body is, in most jurisdictions, subject to judicial review.[46]

3.51 Many submissions did not, however, share these views. Instead, it was claimed that state and territory governments do not satisfactorily engage with local communities, either at commencement or during the development phase.

3.52 In New South Wales, one example cited was the designation of six Renewable Energy Wind Precincts for the state: the New England Tablelands, Upper Hunter, Central Tablelands, NSW/ACT Cross Border Region, Snowy–Monaro and the South Coast. These cover 47 local government areas.

3.53 According to the NSW Department of Planning, the precincts are a community partnership initiative in areas where significant future renewable energy development is expected–especially wind farms–designed to give local communities a voice and a stake in renewable energy development. Precinct advisory committees are to be formed in each of the six precincts. A key focus of the committees will be to enhance consultation and engagement. To help facilitate improved engagement, the precinct advisory committees will include broad community representation.[47]

3.54 The Upper Hunter Landscape Guardians submitted that, in spite of the designation of the Upper Hunter as a Renewable Energy Precinct, a precinct advisory committee with local representation has not been established. Nor, it stated, did anyone from the NSW Government visit the area and meet with the local community prior to the designation of the area as a Renewable Energy Precinct.[48]

3.55 The Molonglo Landscape Guardians submitted that the main role of the precinct advisory committees appears to be 'to convince local governments and their communities of the benefits of establishing industrial wind installations in their areas'. Furthermore:

> Top–down coercion of local residents and their councils by a heavy–handed and 'wind–happy' state government will not encourage 'local buy–in and ownership'. It will simply further disenfranchise rural communities.[49]

3.56 More broadly, the Collector Community Association submitted that the NSW planning system is 'immature'. In particular, the Association stated that the community engagement model is poor, causing 'immediate community–wide concern where feelings of anxiety, helplessness, and disempowerment echo around the community'. In addition, the planning regime does not 'support the imbalance of resources to equip

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46 *Submission 363*, p. 2.

47 NSW Department of Planning: http://www.planning.nsw.gov.au/StrategicPlanning/RenewableEnergy/tabid/394/language/en-US/Default.aspx (accessed 12 April 2011)

48 *Submission 80*, pp 1 and 4.

49 *Submission 582*, p. 21.

the community to achieve a better understanding of the impacts of a wind farm development'.[50]

3.57 The Western Plains Landscape Guardians Association stated that the lack of community consultation in wind farm planning processes is alarming and breaks down many rural communities. Its submission suggested that consultation throughout all planning stages would ease community division and enable fairer outcomes for the community.[51]

3.58 CSIRO submitted that it is currently conducting a preliminary study into the factors affecting societal acceptance of wind farms in Australia. One of the factors promoting wind farm acceptance is transparent and inclusive planning processes from an early stage.[52]

Committee view

3.59 The Committee acknowledges evidence that some residents feel excluded from wind farm policy decisions affecting their local communities. It considers that affected communities should be informed of wind farm proposals in their area from the outset. It is the responsibility of the wind farm developer to ensure that effective and transparent community consultation is carried out early in the process, including but not limited to an allowance of adequate time to deliberate and provide feedback on the effect that the wind farm will have on the community. Should the proposal be significantly altered at any time during the planning process, then the local community should also be informed of the fact and be provided with an opportunity to comment on the amendment to the original application.

3.60 The Committee also considers that information provided to an affected community should contain sufficient detail as to what is proposed and how that proposal will impact on the community to allow residents to comment objectively. It would be helpful for the information to direct residents to sources of further assistance (such as the state planning body) should they wish to pursue a course of inquiry.

3.61 To the extent that planning systems do not already contain such provisions, the Committee considers that those systems' community engagement models should be examined with a view to improving stakeholder and community consultation.

The future interface of planning laws

3.62 Many submissions addressed specific aspects of planning laws at the state and local government levels. This evidence informed the Committee of the interface–both positive and negative–between those two tiers of government.

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50 *Submission 574*, pp 1–2.

51 *Submission 645*, pp 7–9.

52 *Submission 579*, p. 2.

3.63 However, contributors to the inquiry had little to say regarding the interface with Commonwealth planning laws. This is not surprising given the Commonwealth's limited role in the planning processes. The comments that the Committee did receive were general in nature and directed toward improving certainty and efficiency in national wind farm policy.

3.64 Origin Energy Limited, for example, submitted that having appropriate and efficient planning processes is critical to supporting the growth of the renewable energy industry. Accordingly, Origin Energy Limited supported the following features in wind farm planning processes:

- expediency (such as a prescribed maximum timeframe for determination);
- well defined and streamlined approval processes (avoiding potentially redundant and/or multiple approval hurdles, ensuring that relationships and responsibilities amongst the various regulatory bodies are clearly defined, and coordination of issues across different departments/authorities within the state system as well as coordination between different levels of Government);
- simplified, clearly defined and consistently applied protocols, standards and criteria for environmental and technical assessment; and
- certainty (definitive and stable policy and regulatory frameworks enable better investment decisions to be made with respect to the wind industry).[53]

3.65 Many submissions focussed on one of these features, submitting that while it is desirable to have effective environmental standards:

> [C]urrent Australian standards and guidelines for wind farm developments are already among the most rigorous in the world.[54]

3.66 For that reason, many submitters did not support any further regulation of the wind industry, although they considered that Australian wind farm planning processes could be improved.[55]

3.67 The Clean Energy Council, for instance, submitted:

> There are numerous planning requirements currently in place at Federal, State and local government levels. The interplay of these existing federal, state and local planning laws already create a sometimes ineffective and

53 *Submission 591*, p. 14.

54 Denmark Community Windfarm, *Submission 227*, p. 2. Also, see Roaring 40s, *Submission 242*, p. 2; The Windturbine Company, *Submission 297*, p. 2; GV Community Energy Pty Ltd, *Submission 345*, p. 2; Hydro Tasmania, *Submission 606*, p. 2; Windlab Developments Pty Ltd, *Submission 725*, p. 3.

55 For example, Bayside Climate Change Action Group, *Submission 592*, p. 3.

> unnecessary hurdle to the development process of wind farms with differing regulatory controls in different jurisdictions making it more cumbersome for developers working across jurisdictions. Adding additional regulatory controls would only act to add to this red tape and make wind energy more expensive.[56]

3.68 Acciona Energy agreed, stating that securing a wind farm planning permit is time consuming and costly, a situation created by complex and inconsistent regulatory approval systems in each jurisdiction. In its view, there is an environmental policy disconnect between all three tiers of government:

> The development of renewable energy is supported by high level climate change policy at both Commonwealth and State level. There is however a disconnect between that high level policy and local environmental objectives applied by state and federal referral authorities.[57]

3.69 Windlab Developments Pty Ltd also saw a need to improve national uniformity and consistency:

> We find that the planning process in our Australian market is more complex and less efficient than elsewhere and is often due to the interaction of the often conflicting Federal, State and local government planning requirements. Providing for more universal and consistent regulation across all levels of statutory authority would help to reduce red tape and hopefully make wind power less expensive.[58]

3.70 Dr James Prest from the Australian National University Australian Centre for Environmental Law & Centre for Climate Law and Policy argued that the RET is an important way in which to meet Australia's climate change mitigation obligations. This involves removing and addressing legal, institutional and practical barriers to renewable energy investment. Dr Prest recommended:

> Attention should be given to reviewing how the existing legal framework in all Australian jurisdictions presents barriers to wind energy projects.
>
> ...
>
> [T]here is insufficient justification for the enactment of special purpose Commonwealth legislation specifically regarding wind energy, which would be used to intervene in State and Territory approval of wind farms. Nationally significant matters (with the exception of climate change) are adequately addressed by the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

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56 *Submission 67*, p. 4. Also, see Denmark Community Windfarm, *Submission 227*, p. 2; The Windturbine Company, *Submission 297*, p. 2; Bayside Climate Change Action Group, *Submission 592*, p. 3; and Friends of the Earth Australia, *Submission 325*, p. 7.

57 *Submission 650*, p. 9. Also see Victorian Planning and Environmental Law Association which argues that Victoria's planning regime is multi–layered and takes into account Commonwealth, state and local government planning policies: *Submission 654*, p. 10.

58 *Submission 725*, p. 3.

> ...
>
> Specific purpose Commonwealth regulation would violate the principle of consistency in regulation. It would be unprecedented for the Commonwealth to step in and apply regulatory requirements to one particular energy industry to the exclusion of all others.[59]

Committee view

3.71 The Committee acknowledges that, as in many areas of national interest, where there are different constitutional responsibilities and intergovernmental cooperation is required, there is a degree of complexity in the interface between Commonwealth, state and local wind farm planning laws. However, there is a need for greater certainty, consistency and transparency in Australia's wind farm planning processes.

Formation of national wind farm guidelines

3.72 As previously mentioned, the Australian Government has limited practical involvement in planning wind energy facilities but COAG has developed draft national wind farm guidelines as a means of promoting consistency in state and territory planning processes.

A brief background to national guidelines

3.73 At the national level, industry best practice guidelines were released by the Australian Wind Energy Association (also known as AusWind and now the Clean Energy Council) in 2002.[60] The aim of the guidelines was to facilitate the development of high quality wind energy projects, including setting out the steps that proponents needed to undertake in the development of a wind farm.[61]

3.74 Almost concurrently, COAG established the EPHC to address broad national policy issues relating to environmental protection (particularly in regard to air, water, and waste matters) and heritage (natural, Indigenous and historic).[62] However, it was not until April 2008 that the EPHC requested its Standing Committee to examine:

> [T]he impediments associated with wind farm development in Australia and to establish whether it is possible to enhance confidence from the community and industry in the wind farm planning and assessment

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59 *Submission 631*, p. 2.

60 The AusWind best practice guidelines were updated in 2006.

61 AusWind, *Best Practice Guidelines for Implementation of Wind Energy Projects in Australia*, December 2006, p. 7.

62 Welcome to the Environment Protection and Heritage Council website, http://www.ephc.gov.au, accessed 21 April 2011.

> processes through the development of a national wind farm code or by other means.[63]

3.75 After a six month long inquiry, the Standing Committee identified a number of issues that it described as 'impediments' to the sustainable development of wind farms, namely: local amenity/environmental nuisance; ecological and heritage impacts; community engagement; and other (miscellaneous) issues.[64]

3.76 The Standing Committee also commented on the wind farm assessment and approval systems in the states and territories. It found that these systems 'are generally robust and working well':

> Each of the jurisdictions has a well–developed process for the approval of new developments, including the assessment of potential environmental impacts. These processes are generally supported by a range of documentation, including policies, regulations, guidelines, zoning schemes, planning overlays and the like. Planning regulations also define the responsible authority, the statutory consultation process (including nature and length of public exhibition periods), the review process and rights of appeal. While the generic nature of the processes and documentation is similar between jurisdictions, there are local differences due to the historic development of these in each jurisdiction.[65]

3.77 In conclusion, the Standing Committee found that there would be merit in developing government–endorsed National Wind Farm Development Guidelines. Such guidelines would ensure a higher degree of consistency and transparency in the planning, assessment, approval and environmental monitoring of wind farms, as well as increase community acceptance and support for wind farms.[66]

3.78 In October 2009, the EPHC released its first draft *National Wind Farm Development Guidelines* for a two month consultation period. In June 2010, the EPHC released a second draft *National Wind Farm Development Guidelines* (the Draft Guidelines) for a 12 month consultation period.

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63 Environment Protection and Heritage Council, *Report on Impediments to Environmentally and Socially Responsible Wind Farm Development*, November 2008, Attachment 1, p. 47.

64 Environment Protection and Heritage Council, *Report on Impediments to Environmentally and Socially Responsible Wind Farm Development*, November 2008, p. 4.

65 Environment Protection and Heritage Council, *Report on Impediments to Environmentally and Socially Responsible Wind Farm Development*, November 2008, p. 5.

66 Environment Protection and Heritage Council, *Report on Impediments to Environmentally and Socially Responsible Wind Farm Development*, November 2008, p. 5 and Recommendation 1, p. 6.

3.79 The ultimate aim of the Draft Guidelines is to improve the transparency and consistency of each state and territory's process for assessing wind farm proposals by clearly outlining the key principles and issues for consideration.[67]

3.80 The Draft Guidelines address a range of issues which are unique or significant to wind farm development and operation: Community and stakeholder consultation; Wind turbine noise; Visual and landscape impacts; Birds and bats; Shadow flicker; and Electromagnetic interference. For these six key topics, the Draft Guidelines provide detailed methodologies.[68]

3.81 In addition, the Draft Guidelines comment on Aircraft safety and lighting; Blade glint; Risk of fire; Heritage; and Indigenous heritage. However, the Draft Guidelines 'do not have detailed methodologies [for these issues] because the solution is relatively simple or is covered well in other planning processes and documents'.[69]

3.82 The Standing Committee makes the point:

> The Guidelines are not intended to be mandatory; every jurisdiction has a different statutory process for assessing wind farm proposals and it is not the intention of the Guidelines to change these. Opting for the release of draft Guidelines allows each jurisdiction to assess how the Guidelines could be best adopted within their processes.[70]

3.83 Some states and territories already have best practice guideline documents in place for the development and operation of wind farms.[71]

Commentary on the Draft Guidelines

3.84 The future interface between national and state/territory planning laws would depend upon the extent to which a state or territory commits to the Draft Guidelines. Notably, many submissions did not endorse the Draft Guidelines in their current form. Instead, these submissions described a number of perceived deficiencies and in some instances, suggested ways in which the Draft Guidelines should be amended.

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67 Environment Protection and Heritage Council, *National Wind Farm Development Guidelines – Draft*, July 2010, p. 1.

68 Environment Protection and Heritage Council, *National Wind Farm Development Guidelines – Draft*, July 2010, p. 2.

69 Environment Protection and Heritage Council, *National Wind Farm Development Guidelines – Draft*, July 2010, p. 2.

70 Environment Protection and Heritage Council, *National Wind Farm Development Guidelines – Draft*, July 2010, p. 5.

71 Planning WA, Planning Bulletin 67, Guidelines for Wind Farm Development (2004); Environment Protection Authority South Australia, Wind Farms Environmental Noise Guidelines (2009); and Sustainability Victoria, Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (2009), respectively.

Consistency with state/territory planning laws

3.85 The Clean Energy Council conceded that national guidelines have the potential to encourage greater consistency between planning regimes and remove impediments to development. However, the Council did not support the Draft Guidelines. In its view, the Draft Guidelines:

> [O]nly add serious impediments to wind farm development beyond those imposed on other infrastructure investments, reducing certainty for the planning assessment process by introducing additional, often conflicting guidelines. This would add additional costs and delays to wind farm developers without delivering improved outcomes.[72]

3.86 Similarly, the NSW Government supported the concept of national guidelines but submitted that the Draft Guidelines are neither practicable nor accessible to all stakeholders:

> Feedback on the guidelines at a NSW industry workshop convened in late 2010 focussed on the perceived complexity of the assessment process under the draft guidelines and deviation from accepted practices in existing assessment requirements, particularly regarding noise.[73]
>
> The Upper Hunter Landscape Guardians supported comprehensive national guidelines, including noise and setback guidelines for which the Draft Guidelines do not make provision: There should be a consistent Australian noise standard for industrial wind farms and that standard should ensure that non–hosting residents within a 10km radius of the wind farm are adequately protected.[74]

3.87 Union Fenosa Wind Australia, a rural wind farm developer in both Victoria and New South Wales, agreed with the opinion of the Clean Energy Council, and added that there are two great drawbacks with the Draft Guidelines:

- the adoption of stringent measures to govern noise impacts without recommending uniform noise limits; and
- the legitimising of unverified claims of infrasound–induced sickness.[75]

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72 *Submission 67*, p. 5. Also, see Wind Prospect Pty Ltd, *Submission 328*, p. 8; Origin Energy Limited, *Submission 591*, p. 16; Westgate Community Wind, *Submission 702*, p. 5; Vestas–Australian Wind Technology Pty Ltd, *Submission 712*, p. 6; and GE Energy, *Submission 798*, p. 3.

73 *Submission 819*, p. 10.

74 *Submission 80*, p. 4.

75 *Submission 340*, p. 4.

Commonwealth involvement in state/territory planning systems

3.88 Infigen Energy, the largest wind farm owner and operator in Australia informed the that the Commonwealth should not be involved in the state and territory planning systems:

> It is a fundamental tenet of any planning system that there be one set of planning rules and regulations and one 'responsible authority' to approve or reject planning applications. If there are two sets of planning 'rules', there will inevitably be conflicts between the two sets of rules and how is the proponent, or the community, to know which of the two rules are to be followed?[76]

3.89 Infigen Energy submitted that the Commonwealth should leave each state and territory to use its well–developed environment assessment framework for wind farms without the imposition of a complex and conflicting set of national guidelines.[77]

3.90 The District Council of Grant questioned whether adoption of the Draft Guidelines would result in the passage of enabling (federal) legislation. In South Australia, for example, councils' development plans do not cover a number of issues encompassed by the Draft Guidelines (such as potential wind turbine noise, vibrations and adverse health effects). The District Council of Grant contended that, if the Australian Government were to pass legislation, a framework similar to that of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (see below) could apply in relation to rural wind farms.[78]

3.91 Vestas–Australian Wind Technology Pty Ltd argued that adoption of the Draft Guidelines would inhibit achievement of Australia's RET by discouraging investment in renewable energy resources:

> For Australia to move from its existing level of renewable energy (currently less than 10%) up to the Government's target of 20% will require a concerted effort to attract the necessary investment in new renewable energy capacity. This is also the case with respect to reducing greenhouse emissions from the energy sector.
>
> The draft Guidelines do not help Australia achieve these policy targets in any respect at all. If fact they are a model example of how not to encourage investment and jobs in clean energy.[79]

3.92 Some submissions from wind energy developers were especially critical of the noise assessment provisions of the Draft Guidelines.

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76 *Submission 652*, p. 9. Also, see Acciona Energy, *Submission 650*, pp 9–10.

77 *Submission 685*, pp 7–8.

78 *Submission 685*, p. 8.

79 *Submission 712*, p. 6. Also, see, for example, Mr Terry Lee, *Submission 728*, p. 10; and Bendigo Sustainability Group, *Submission 754*, p. 6.

3.93 According to Wind Prospect Pty Ltd, the Draft Guidelines' noise assessment provisions do not necessarily align with those of the states and territories. Australian Standard AS 4959–2010: Acoustics: Measurement, Prediction and Assessment of noise from Wind Turbine Generators, is different in some respects from the standards used in the states and territories. Wind Prospect stated that the EPH draft guidelines 'unfortunately only serve to add further confusion and uncertainty to the development process'.[80]

3.94 GE Energy submitted that:

> [T]he base noise level requirement of 35 or 40dB(A) provided in the main assessment tool in Australia is already significantly more stringent than the World Health Organisation's recommended guideline value of 45B(A).[81]

3.95 Origin Energy Limited referred to a report which it had commissioned into the effect of the Draft Guidelines' proposed noise requirement. The technical consultancy, Sonus, reported that the guideline, which includes a 5 dB penalty for 'unpredictable audible characteristics', could require the removal of two–thirds of proposed turbines from a typical project.[82] Origin Energy Limited submitted that that this would create an unviable situation for any new wind farm project and suggested that the 'noise section' be rewritten prior to any further consideration of its adoption by the states.[83]

Committee view

3.96 The Committee has noted the criticism of the Draft Guidelines but considers that they could provide for greater transparency and consistency for planning for wind energy facilities.

3.97 The Committee notes that the Draft Guidelines are not in their final form and there is scope for amendment in line with feedback received during the EPHC consultation process.

3.98 The draft guidelines also need to reflect revisions that are being made by NHMRC to its 2010 public statement regarding any health effects of wind farms.

Recommendation 7

3.99 **The Committee recommends that the draft National Wind Farm Development Guidelines be redrafted to include discussion of any adverse health effects and comments made by NHMRC regarding the revision of its 2010 public statement.**

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80 *Submission 328*, p. 8.

81 *Submission 798*, pp 5–6.

82 Sonus Pty Ltd, *Draft National Wind Farm Development Guidelines, Review of Noise Aspects,* November 2010, p. 7.

83 *Submission 591*, p. 15.

Environment Protection and Biodiversity Conservation Act 1999

3.100 In November 1997, COAG agreed in principle to the Heads of Agreement on Commonwealth and State roles and responsibilities for the Environment (the Agreement).[84] Subsequently, all heads of government and the Australian Local Government Association signed the Agreement, aiming to create a more effective framework for intergovernmental relations on the environment.[85]

3.101 A number of key aspects of the Agreement have been implemented by the Australian Government with the enactment of the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act).

3.102 The EPBC Act is the Australian Government's primary piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places. These are defined in the EPBC Act as matters of 'national environmental significance.'

3.103 The EPBC Act applies to any group or individual whose actions may have a significant impact on a matter of national environmental significance. Therefore, in some instances, the Commonwealth will be involved, to a degree, in the assessment and approval of a wind farm proposal.

3.104 While some submissions mentioned the EPBC Act, few submitters commented on its interface with state and territory environmental planning systems.[86] Commentary referred only briefly to the practical assessment and approval procedures under the EPBC Act.

3.105 The EPBC Act includes a mechanism to ensure that federal, state and territory governments do not duplicate their environmental protection functions or otherwise create inefficiencies. Under this mechanism, the Australian Government may enter into an agreement with a state or territory government, under which the state or territory may assess proposals that might affect matters of national environmental significance.

84 Council of Australian Governments' Communiqué, 7 November 1997: http://www.coag.gov.au/coag_meeting_outcomes/1997-11-07/index.cfm, accessed 20 April 2011.

85 Heads of agreement on Commonwealth and State roles and responsibilities for the environment, Preamble: see http://www.environment.gov.au/epbc/publications/coag-agreement/preamble.html, accessed 20 April 2011.

86 For example, NSW Government, *Submission 819*, p. 10.

3.106 At present, all states and territories are parties to a bilateral agreement with the Commonwealth, allowing the state and territory governments to assess compliance with the EPBC Act.[87]

3.107 Suzlon Energy Australia Pty Ltd expressed its support for the EPBC mechanism.[88] In contrast, the Environmental Defenders Office (SA) Inc. indicated that enabling a state or territory to assess matters referred under the EPBC Act narrows the scope for opinion, as well as potentially limiting appeal rights (as occurs under section 48E of the *Development Act 1993* (SA)).[89]

Committee view

3.108 The Committee considers that the EPBC Act does not require amendment specifically to address issues arising from the development of wind farms. However, the various levels of government should be clear as to which party has the responsibility for which aspect of planning. The responsible authority should be then be well resourced and should adopt very clear and transparent consultation processes.

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87 Department of Sustainability, Environment, Water, Population and Communities: see http://www.environment.gov.au/epbc/assessments/bilateral/index.html, accessed 7 April 2011. The Western Australia bilateral agreement is currently being revised, as is the New South Wales bilateral agreement.

88 Suzlon Energy Australia Pty Ltd, *Submission 593*, p. 6.

89 *Submission 640*, pp 3–4.

CHAPTER 4

PROPERTY VALUES, EMPLOYMENT OPPORTUNITIES AND FARM INCOME

4.1 In this chapter the Committee considers the effects of the establishment of wind farms on the values of rural properties. Also included in this chapter is information on employment opportunities presented by the development of the wind industry and the income of landholders who host wind turbines and landholders who live near them.

Property values

4.2 Property values tend to capture people's perceptions of the impacts of rural wind farms, such as noise, visual amenity, biodiversity, fire risk and social cohesion.[1]

4.3 Large-scale wind power generation is a relatively new phenomenon in Australia and the effects of the establishment of wind farms on rural property values are not known with any certainty.[2] For this reason, some witnesses have relied on overseas studies for their submissions on land valuations.

4.4 There is, however, one recent, Australian study that has been cited by a number of witnesses.

4.5 A 'preliminary assessment' report prepared for the NSW Valuer General, which was referred to in a number of submissions, reached several (qualified) conclusions as to the effect of the development of wind farms on property values. The results were qualified because wind farms 'have been developed in locations generally removed from densely populated areas...the small samples of sales transactions available for analysis limited the extent to which conclusions could be drawn'.[3]

4.6 In brief, the report concluded that:

- Wind farms do not appear to have negatively affected property values in most cases.
- A property's underlying land use may affect the property's sensitivity to price impacts:

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1 *An economic assessment of the proposed McHarg Ranges wind farm*, Report by Access Economics Pty Limited for Residents against Turbines of Tooborac, Access Economics, December 2008, p. 41.

2 See, for example, Victorian Minister for Planning, *Submission 651*, p. 4.

3 *Preliminary Assessment of the Impact of Wind Farms on Surrounding Land Values in Australia: NSW Department of Lands*, DuPonts in association with PRP Valuers and Consultants, Prepared for NSW Valuer General, August 2009, p. 2.

(i) No reductions in sale price were evident for rural properties or residential properties located in nearby townships with views of the wind farm.

(ii) The results for rural residential properties (commonly known as 'lifestyle properties') were mixed and inconsistent; there were some possible reductions in sales prices identified in some locations alongside properties whose values appeared not to have been affected ...[4]

4.7 In its submission CSIRO referred to 'an earlier assessment of 78 property sales around the Crookwell wind farm in NSW over the period 1990-2006 [that] found no reductions in property values'.[5] That study included a comparison of sales of property within six kilometres of a wind farm with sales of those not in the 'viewshed' of the farm.[6]

4.8 The Committee heard anecdotal evidence that suggested that proximity to wind farms may lead to lower prices in some cases. A number of submitters referred to a document produced by an experienced Australian estate agent that stated that land adjacent to wind farms could lose from 30 percent to 50 percent of its value.[7] One witness informed the Committee that:

> ... we have an 80-acre property, so therefore it is lifestyle. ... We had it valued originally at $380,000 to $400,000, and the last offer we received was $230,000. That is a loss of $150,000, and for people that have just reached the age of 30, that is a massive, massive loss and a big drawback for us and our young family.[8]

4.9 Mrs Anne Schafer, whose lifestyle property at Berrybank in Victoria will be in close proximity to a large number of turbines, was concerned that the property will be devalued:

> It is hard to prove this, and the wind farm companies will certainly not let anything happen to make it look as though values have dropped, but common sense in itself says that if you are living on a lifestyle property next to 100 turbines surrounding you on three sides, for goodness sake, it is worth nothing. You are out there for the ambience, for the lifestyle, and you

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4 *Preliminary Assessment of the Impact of Wind Farms on Surrounding Land Values in Australia: NSW Department of Lands*, Duponts in association with PRP Valuers and Consultants, Prepared for NSW Valuer General, August 2009, p. 2.

5 CSIRO, Submission 579, p. 5.

6 *Preliminary Assessment of the Impact of Wind Farms on Surrounding Land Values in Australia: NSW Department of Lands*, DuPonts in association with PRP Valuers and Consultants, Prepared for NSW Valuer General, August 2009, p. 8.

7 Email message from an Elders Real Estate valuer, quoted by A and J Hodgson, *Submission 837*, p. 3.

8 Mrs T Kehoe, *Committee Hansard*, 28 March 2011, p. CA 69.

> have an industrial complex next to you. Of course all of these properties are going to be devalued. It is just sheer common sense.[9]

4.10 Another witness submitted that in the vicinity of Toora it had been reported that properties had been devalued by 30 percent and were difficult to sell.[10]

4.11 A report prepared by Access Economics Pty Limited for Residents Against Turbines of Tooborac suggested that the use of the land (agricultural or amenity) is important when considering the impact of wind farms on land values. The report noted that, to the extent that land values are adversely impacted by a wind farm, the cost is borne by a relatively few surrounding property owners. The report reads in part:

> From a policy perspective, it is debatable whether paying for what is a genuine public good – greenhouse gas abatement – should fall so disproportionately on so few.[11]

4.12 Acciona submitted that:

> ... in rural areas the main factor influencing a property's value is the land's productivity. This is a function of its resource endowment and its condition, both of which are unaffected by the presence of a wind farm nearby.
>
> ...
>
> In reference to properties hosting the wind turbines, wind farms should have a direct positive effect on their value. These properties receive a long term, reliable revenue stream for the placement of a wind turbine that coexists easily with other and uses, i.e. it does not materially affect the productivity of the land, generally occupying around 1.5-2% of the total land area. In some cases, the provision of improved access tracks and supply of power to remote areas of a property may also create improvements in the land's productive capacity.[12]

Overseas studies

4.13 Origin Energy submitted that overseas studies have found there is little to suggest that wind farms impact negatively on the value of neighbouring properties. Origin drew the Committee's attention to a Sustainability Victoria publication that referenced studies carried out in the USA and Denmark.[13]

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9 *Committee Hansard*, 28 March 2011, p. CA 59.

10 Assessment of Economic Impacts of the Oaklands Hill Wind Farm Proposal Prepared by Peter Prasser for The Grampians Glenthompson Landscape Guardians Inc, *Submission 349*.

11 *An economic assessment of the proposed McHarg Ranges wind farm*, Report by Access Economics Pty Limited for Residents against Turbines of Tooborac, Access Economics December 2008, p. 50.

12 *Submission 650*, p. 7.

13 *Wind Energy Myths and Facts*, Sustainability Victoria, May 2007, p. 11, quoted in Origin Energy, *Submission 591*, p. 11.

4.14 The Danish study referred to above evaluated the costs to nearby households caused by the visual effects and noise of nearby windmills. This evaluation was done partly by means of a house price survey. The study found, among other things, that in certain cases there are considerable costs for a few households. Houses which lay close to a single windmill were approx. DKK 16,200 (approx. $3000) cheaper than other houses – with parity of other factors – and houses which lay close to a windmill park with 12 windmills were DKK 94,000 (approx. $17000) cheaper – with parity of other factors.[14]

4.15 The Clean Energy Council (CEC) cited an overseas study undertaken by the US Department of Energy's Lawrence Berkeley National Laboratory (LBNL). That study found that even for homes situated within a one-mile distance of a wind project, no persuasive evidence of a property value impact had been found.[15] The study was based on site visits, data collection and analysis of almost 7,500 single-family home sales in areas where wind farms have been developed.[16] Despite reaching the above conclusion, the report suggested that the primary goal of further research should be to concentrate on those homes located closest to wind facilities where the least amount of data are available.[17]

4.16 The CEC also referred to a Canadian study that concluded that 'where wind farms are clearly visible, there was no empirical evidence to indicate that rural residential properties realised lower sale prices than similar residential properties within the same area that were outside of the 'viewshed' of a wind turbine'.[18]

4.17 A study of land values in Texas (USA) indicated that values of rural land diminished by 27 to 50 percent as the result of the establishment of a wind farm.[19] The study, which was presented to a Wind and Wildlife Conference in 2009, compared

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14 *Social Assessment of Wind Power; Visual Effect and Noise from Windmills Quantifying and Evaluation*. Jorge Jordal-Jorgensen, AKF, April 1996, Summary. http://www.windaction.org, accessed 1 June 2011.

15 *The Impact of Wind Power Projects on Residential Property values in the United States: A Multi-Site Hedonic Analysis*, Ben Hoen, Ryan Wiser, Peter Cappers, Mark Thayer and Gautam Sethi, Ernest Orlando Lawrence Berkeley National Laboratory, Environmental Energy Technologies Division, December 2009, p. 75, http://eetd.lbl.gov/EA/EMP, accessed 2 June 2011.

16 *Submission 67*, pp 8–9.

17 *The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis*, Ben Hoen, Ryan Wiser, Peter Cappers, Mark Thayer and Gautam Sethi, Ernest Orlando Lawrence Berkeley National Laboratory, Environmental Energy Technologies Division, December 2009, p. 75, http://eetd.lbl.gov/EA/EMP, accessed 2 June 2011.

18 *Submission 67*, p. 9.

19 Friends of Collector, *Submission 836*, p. 8.

direct sales of seven properties in south Texas.[20] Interestingly, the presenter of the paper noted that the highest use of Texas rangeland is now 'recreational use', which includes what would be described in Australia as 'lifestyle properties'.

4.18 Another study from the USA was submitted by an experienced professional real estate appraiser, Mr Michael McCann, to the Adams County Board (Illinois, USA) in relation to a proposed wind farm in the county. Mr McCann suggested that there would be a 25 percent loss factor for homes in the footprint of the wind farm, and an average 5 percent value diminution factor for all homes in the 2-mile zone.[21] Mr McCann also criticised the LBNL report, stating that the study tended to minimise the impacts, 'as the carefully crafted language in the report's executive summary appears to indicate is the case'.[22]

4.19 Although there were conflicting views expressed, there were sufficient indications in the evidence to suggest that the value of rural lifestyle properties in close proximity to wind farms may be adversely affected by the establishment of the wind farms. Agricultural properties near wind farms which do not host turbines may not be similarly affected, although there could be some diminution of values if dwellings on the properties are situated very close to turbines. There might also be some negative effects on agricultural property values if those properties could not utilise aerial applications of fertiliser, seeds and pesticides.[23]

4.20 The value of properties that are hosts to wind turbines should increase provided of course that the rights to rentals for the turbines are transferable with the sale of the property. It was argued by wind farm developers that turbines occupy only a minute percentage of the land and may improve it to the extent that tracks are maintained and that some electric facilities might be available in areas of properties where they had not been before.[24]

Compensation and property guarantees

4.21 Some witnesses suggested that because wind farms devalue adjacent properties the developers should pay compensation to those affected. Mrs Read, Secretary, Western Plains Landscape Guardians, stated that:

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20 Derry T Gardner, Gardner Appraisal Group Inc., Impact of Wind Turbines on Market Value of Texas Rural Land, prepared for South Texas Plains Agriculture Wind and Wildlife Conference, 13 February 2009, American Wind Power Center and Museum, Lubbock, Texas. http://texas-wildlife.org, Accessed 2 June 2011.

21 Michael S McCann, McCann Appraisal, LLC, Submission to the Chairman and members of the Adams County Board, 8 June 2010, p. 16.

22 Michael S McCann, McCann Appraisal, LLC, Submission to the Chairman and members of the Adams County Board, 8 June 2010, p. 14.

23 See Aerial Agricultural Association of Australia, *Submission 2*.

24 See, for example, Mr Burn, *Committee Hansard*, 29 March 2011, p. CA 93.

> Developers of wind farms have a duty to pay compensation for loss of property value to neighbouring or affected properties.[25]

4.22 Mr Jonathon Upson, Senior Development Manager, Infigen Energy, when commenting on the matter of compensation for neighbouring property holders, quoted at length from a decision of the NSW Land and Environment Court in relation to the Cullerin Range wind farm, as follows:

> Commissioner Tim Moore responded to the Landscape Guardians group's argument that neighbours should be compensated for the blight and perceived loss of property values by stating:
>
> Such a proposition faces a number of insurmountable hurdles.
>
> The first is that the wind farm, as earlier noted, is a permissible use on all of the parcels of land upon which it is proposed to be located … If the concepts of blight and compensation, as pressed by the Guardians, were to be [adopted and] applied to this private project (a proposition which I reject) then any otherwise compliant private project which had some impact in lowering the amenity of another property … would be exposed to such a claim.
>
> Creating such a right to compensation (for creating such a right it would be) would not merely strike at the basis of the conventional framework of land use planning but would also be contrary to the relevant objective of the [Planning] Act …for the promotion and co-ordination of the orderly and economic use and development of land.[26]

4.23 Mr Upson argued that if every proposed infrastructure development—a rail line, a hospital, a power line, a shopping centre, a freeway—were subject to every neighbour being able to put their hand out for compensation according to their perceived amenity impact, the planning system would descend into chaos and few, if any, development projects would ever proceed. He stated that:

> We believe that wind farm projects are just another infrastructure project and we should be treated with the same rules and regulations that other infrastructure project go by.[27]

4.24 If it were decided to compensate households that experience adverse effects from a project, it would be difficult to determine how an appropriate level of compensation might be set, who should be compensated and who should pay. The NSW Legislative Council Committee recommended that the state minister should commission research into compensation options and that the research should

25 *Committee Hansard*, 28 March 2011, p. CA 23.

26 *Committee Hansard*, 29 March 2011, pp CA 93–94.

27 *Committee Hansard*, 29 March 2011, p. 94.

investigate options including the purchasing of affected properties and/or the provision of monetary compensation by the developer.[28]

4.25 At the moment host landholders gain financial benefits but neighbours miss out. This leads to problems within communities. CSIRO suggested that the issue might be addressed by implementing alternative models of compensation, as follows:

> Alternative models of compensation could involve agreements to formally share royalties between landholders whose properties host the turbines on a sliding scale with the immediate neighbours who experience visual intrusion (as assessed by the wind farm design). In addition, often the 'community fund' established by the wind farm developer is directed into the local council's consolidated revenue. An alternative approach to address inequitable financial gains would be to direct this to those community members most negatively impacted.[29]

4.26 The Clean Energy Council submitted that:

> The planning and approvals systems that operate throughout Australia provide a transparent process open to third party representations to ensure potential impacts at regional, local and site levels are thoroughly assessed and developments are only granted planning permits if they meet the established planning policies and provisions or have conditions imposed to ensure they comply. This process already provides opportunities for both developers and land owners to enter into commercial arrangements outside of the regulated approval process.[30]

4.27 Mr William Elsworth, a resident of Smeaton, Victoria, stated that developers should be required to give property guarantees. He informed the Committee that:

> In America it is starting to happen where local authorities are making wind companies provide a property guarantee for people who neighbour wind farms to protect those people.[31]

4.28 Mr Elsworth's claim that property guarantees are given in at least some counties in the United States of America is supported in Mr McCann's submission to the Adams County Board.[32]

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28 *Rural wind farms*, NSW Parliament, Legislative Council General Purpose Standing Committee No. 5, Report 31, December 2009, p. 83.

29 *Submission 579*, p. 6.

30 *Submission 67*, p. 9.

31 *Committee Hansard*, 28 March 2011, p. CA 63.

32 Michael S McCann, McCann Appraisal, LLC, Submission to the Chairman and members of the Adams County Board, 8 June 2010, p. 6.

Committee view

4.29 Although the impact of wind farms on property values is unclear, the value of some properties that are close to turbines may be adversely affected. In most cases, the Committee understands that planning processes such as setbacks are designed to avoid such situations. However, for such properties, government agencies might consider including in the planning processes provisions such as those suggested by CSIRO, which have been discussed in paragraph 4.25 above. In this regard, the Committee notes existing arrangements in New South Wales, whereby the planning minister can require a property acquisition clause to be included in a planning approval, if requested by the affected landowner.

Employment opportunities

4.30 CSIRO informed the Committee that 'job creation in wind farm construction and, to a lesser extent, in operation of the wind farm, was the second-highest aspect cited in support of wind farm development in the CSIRO media analysis. Financial benefits through indirect opportunities were also cited, including tourism potential'.[33]

4.31 Mr Thompson, Director Development, Acciona Energy, informed the Committee that the Australian wind industry provides 2148 full-time equivalent jobs, which is expected to increase to more than 19 000 by 2020. Acciona had projects worth in the order of $1.5 billion over the next three to four years and expected to employ more than 500 workers during the construction of the projects and 60 during operations.[34] AGL stated that its wind farms at Hallett in South Australia had employed an average of 98 construction workers at any one time from 2005 to 2010.[35] Other developers also provided data on employment on their projects.[36]

4.32 Significant indirect employment may result from the development of wind farms. A report commissioned by AGL on the economic impact of the Hallett wind farms (SKM report) used a multiplier of three to estimate the numbers of indirect jobs generated by the development of Hallett. The multiplier was based on one that was used in an earlier report which in turn used a calculation of the European Wind Energy Association. According to the SKM report, the figure may be conservative because 'it is significantly lower than the national multiplier for the electricity, gas and water sector (over 6) and the non residential construction sector (over 4)'.[37] Using this

33 *Submission 579*, p. 5.

34 *Committee Hansard*, 29 March 2011, p. CA 68.

35 Ms S McNamara, *Committee Hansard*, 25 March 2011, p. CA 64.

36 See, for example, Mr T Mitchell, Union Fenosa Wind Australia, *Committee Hansard*, 25 March 2011, p. CA 68.

37 *Economic Impact Assessment of the Hallett Wind Farms*, Final Report, Sinclair Knight Merz, 8 July 2010. p. 40.

multiplier, the SKM report suggested that the Hallett project could have generated an extra 2400 full time equivalent job years.[38]

4.33 Flow-on employment effects may be observed at Keppel Prince Engineering in Portland, Victoria, which employs 150 people dedicated to wind farm activity. The company has built wind farms in Australia and has exported parts to New Zealand and Portugal.[39]Another example is American Superconductor Corporation which sells solutions that help connect wind and solar farms to the grid and which has recently opened its first office in Australia.[40]

4.34 Not all of the jobs generated by a wind farm development will be in the local region, although the industry attempts to employ locally wherever possible. Workers in the regions will not have all the necessary skills, but the following workers and businesses may benefit directly:

- Domestic scale electricians
- Transport operators
- Machine operators
- General labourers
- Quarries
- Concreters[41]

4.35 Indirect benefits will also accrue to local businesses, such as stores and providers of accommodation, who provide services for the workers. Many of these local benefits will be temporary, however, because the construction phase is much more labour intensive that the operations and maintenance phase. Nevertheless, employment in the regions of wind farms should increase somewhat in the longer term and may be bolstered to the extent that rentals paid to host landholders and rates paid to local governments remain in those regions.

4.36 Acciona submitted that 200 people were employed on the construction of Waubra and 30 people are employed on operations and maintenance.[42] Origin Energy submitted that a general rule of thumb is that for every 25 turbines three on-site jobs are generated.[43]

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38 *Economic Impact Assessment of the Hallett Wind Farms*, Final Report, Sinclair Knight Merz, 8 July 2010. p. 44.

39 Mr Stephen Garner, General Manager, Keppel Prince Engineering Pty. Ltd., *Submission 294*.

40 Mr John Wright-Smith, Australian Sales Manager, American Superconductor Corp., *Submission 486*.

41 *Economic Impact Assessment of the Hallett Wind Farms*, Final Report, Sinclair Knight Merz, 8 July 2010, p. 45.

42 *Submission 650*, p. [8].

43 *Submission 591*, p. 12.

4.37 The construction of wind turbines requires some skills that are not readily available in the rural regions where wind farms are developed and in some cases not in Australia. However, the industry attempts to employ local people. Acciona submitted that:

> Whenever possible, we source employment locally. For example, our Waubra Wind Farm in rural western Victoria sourced approximately 80% of the jobs from the region during both the construction and operations and maintenance phases of the project.[44]

4.38 Acciona also submitted that:

> The wind energy sector contributes to building skilled employment, which is particularly relevant to addressing skill gaps and providing a pathway for industry growth in the renewable energy industry, a long-term and worldwide industry. As an example of the upskilling of the local workforce, at ACCIONA Energy we provide in-house training for tradespeople to become technicians that acquire both electrical and mechanical skills. Moreover, many of the skills are transferable to other industries, both locally or further afield.[45]

4.39 Employment on wind farms is concentrated and hence easily measured, but it is not easy to estimate employment effects in the wider economy. As discussed, some of these flow-on effects will be positive, resulting from the economic activity generated by wind farm developments. Negative effects could result from increased electricity prices and opportunity costs (if the investment in wind power were at the expense of other economic activities).

4.40 The Committee received little information about negative employment effects and nothing from an Australian perspective. One submitter, the Australian Landscape Guardians (ALG) referred to work done in Spain that found that increased power costs from wind energy in that country caused the loss of 2.2 jobs for every job created in the wind industry. On that basis, ALG estimated that the 84 jobs generated by the Stockyard Hill project would destroy 184 jobs—a net loss of 100 jobs.[46]

4.41 The study to which ALG referred is a *Study of the Effects on Employment of Public Aid to Renewable Energy Sources*, from King Juan Carlos University in Spain.[47] That study has been criticised on a number of grounds, including that it deviates from the traditional methodologies used to estimate job impacts and that it lacks transparency and supporting statistics. The criticism is contained in a paper

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44 *Submission 650*, p. [8].

45 *Submission 650*, p. [8].

46 *Supplementary Submission 6*, p. 25.

47 Alvarez, G.C.; Merion Jara, R.; Rallo Julian, J.R. (2009). *Study of the Effects on Employment of Public Aid to Renewable Energy Sources*. King Juan Carlos University. March 2009.

produced by the National Renewable Energy Laboratory which is operated for the US Department of Energy by the Alliance for Sustainable Energy. [48]

4.42 In Australia it has been estimated that the cost of electricity will increase by about 4 to 5 percent as a result of the implementation of the RET.[49] Mr Swift, Executive General Manager Corporate Development, Australian Energy Market Operator, told the Committee that wind power at the moment is significantly more expensive than gas or coal generation. He indicated that the additional cost was equivalent to the price of Renewable Energy Certificates which were trading at about $39 per MWh.[50] The Committee did not receive evidence that would have allowed it to estimate the employment effects of this cost on business in other sectors of the Australian economy.

Committee view

4.43 In the absence of relevant data it is not possible to calculate the net employment effects of the development of the wind industry on the Australian economy. However, the Australian industry clearly generates many jobs especially in the regions and will continue to generate significant levels of direct and indirect employment. The Committee supports the development and use of a skilled local workforce both in the construction and maintenance of wind farms.

4.44 In the Committee's view, even if the net gains in employment were small, the public good, i.e., greenhouse gas abatement, which is produced by the wind industry, should be taken into account.

Farm income

4.45 Landholders who host turbines receive some recompense for the long-term use of their land. Landholders who adjoin wind farms do not, although in some cases they may be subject to as much nuisance from the facility as those who benefit financially. This has been identified as a major issue in this inquiry.

4.46 For the hosts, the income received from rent or lease of their land to wind farm operators may be the difference between having a viable business and losing their livelihood. Infigen Energy submitted that several families participating in its Lake Bonney wind farm indicated that the lease payments had been the difference

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48 Eric Lanz and Suzanne Tegen, *NREL Response to the Report Study of the Effects on Employment of Public Aid to Renewable Energy Sources* from King Juan Carlos University (Spain), White Paper NREL/TP 6A2-46261, August 2009, p. 5.

49 McLennan Magasanik Associates, *Impacts of Changes to the Design of the Expanded Renewable Energy Target*, May 2010, quoted in the Senate Environment, Communications and the Arts Legislation Committee Report on the Renewable Energy (Electricity) Amendment Bill 2010 [Provisions] and two associated bills, June 2010, p. 6.

50 *Committee Hansard*, 17 May 2011, p. CA 6.

between them being able to continue farming and having to sell out.[51] It is therefore understandable that there is an incentive for some farmers to encourage the development of wind farms. For others who do not benefit financially there may be costs in terms of living amenity or even financial costs from living and working in close proximity to wind turbines.

4.47 In theory, everyone living in a region where a wind farm is established should receive some indirect financial benefit from increased employment and economic activity, or from the contributions made by wind farm operators to local government and local community organisations. Acciona informed the Committee that:

> ... in Victoria, a typical rate contribution from a wind farm is $40,000 + $900 per megawatt of rated capacity per annum. Over 20-25 years of a 100 MW wind farm, this can equate to $130,000 per year or $3.6 million (indexed to CPI) in local rates in aggregate.
>
> ...
>
> The Community Benefit Fund for Waubra Wind Farm, for example, provides $64,000 per year (indexed to CPI) which will contribute over $1.6 million to that community over the initial term of the project.[52]

4.48 The Committee did not receive any detailed information in relation to the financial benefits obtained by farmers who lease land to wind farm operators. The operators are not prepared to make this information public and the hosts are bound by commercial confidentiality agreements. Some host landholders are reluctant to release this information. Some submitters provided estimates. These estimates ranged widely, but indicated that leasing land to wind farm operators is at the least a good supplement to other farm income. Infigen Energy submitted that press reports had suggested that lease payments were from $8000 to $10 000 a year.[53] Mr Hodgson from the Friends of Collector suggested that most landholders receive $12 000 to $15 000 per year for turbines but that at Collector Transfield is proposing to pay $2500 per turbine which he described as 'woefully inadequate'.[54]

51 *Submission 652*, p. 6.

52 *Submission 650*, p. 9.

53 *Submission 652*, p. 6.

54 Submission 837, p. 4.

Committee view

4.49 The Committee considers that the wind industry generally makes a significant contribution to farmers' incomes either directly through the payment of rent to individual landholders or indirectly to other landholders through increased economic activity in the region and payments to local councils and community organisations.

Senator Rachel Siewert

Chair

ADDITIONAL COMMENTS

SENATOR JUDITH ADAMS

THE SOCIAL AND ECONOMIC IMPACT OF RURAL WIND FARMS

This inquiry drew an enormous response from international and Australian researchers and wind farm developers as well as from the general public.

Total Submissions	1017
Pro - Wind Farms	535
Anti - Wind Farms	468
Neutral	14

Throughout the inquiry the statement from the National Health and Medical Research Council (NHMRC) has been relied upon by developers in the wind industry to suggest that Australian research had settled the question of any adverse health effects, caused by living in close proximity to wind turbines.

The NHMRC's 'rapid review' of the evidence concluded that: 'There is currently no published scientific evidence to positively link wind turbines with adverse health effects'.

NHMRC gave evidence at the Inquiry, Senate Budget Estimates and held a scientific forum on 7 June 2011—'Wind Farms and Human Health'.

The forum was facilitated by Dr Gael Jennings with the opening address by Professor John McCallum (NHMRC), Professor Geoffrey Leventhall and Professor Mariana Alves-Periera formed the first Scientific Panel to speak on 'Current evidence and health impacts'.

The second Scientific Panel comprised Dr Bob Thorne—human perception and infrasound and Dr Simon Chapman—psycho-social factors.

The third panel comprised Dr Sarah Laurie (Chair), Ms Bernie Janssen, Mr Donald Thomas and Mr David Page—personal stories.

A summary was presented by the NHMRC's Chief Executive Officer Professor Warwick Anderson. After lunch small group workshop sessions were held, at which evidence gaps, public concerns and other issues were discussed.

Following the scientific forum, Professor Anderson presented a communiqué on the day's proceedings:

Wind Farms and Human Health Scientific Forum 7 June 2011

I am pleased to provide a preliminary communiqué on today's Wind Farms and Human Health Scientific Forum.

The constructive approach taken by all participants will assist the National Health and Medical Research Council in its review of its Public Statement on Wind Turbines and Health.

In developing the Forum, we were committed to achieving a balance of representatives. The forum was attended by consumers, leading international researchers, Australian researchers and industry representatives. As a result of the wide range of views that were brought to the Forum, NHMRC will be able to continue to build on its understanding of the issues.

Today, we heard presentations about the acoustic issues in audible and sub-audible noise, the experiences of people living near wind farms and a discussion about some of the sociological and psycho-social factors that need to be taken into consideration.

We also invited our participants to work together to discuss a range of questions. Their responses to those questions will be considered by Council as part of the review of the NHMRC statement.

The NHMRC has the responsibility under its legislation, and the capacity, to provide health advice. We can provide an objective overview of the scientific literature to help to balance out where information is unclear or missing.

The NHMRC will ask its Council, which comprises eminent researchers and the Chief Medical Officers of the States and Territories, to consider the outcomes of today's Forum and an NHMRC literature review as part of its review of its Statement.

Today's Scientific Forum was the first time that NHMRC has used web streaming. This made the presentations and discussions in the morning session available to a wide range of people. We are pleased that we were able to provide that accessibility in Australia and internationally.

Finally, I would like to thank the speakers and participants who came together today to discuss their research and experience with wind farms. I am grateful for their willingness to give us their time today.

NHMRC Council meeting

As NHMRC informed the Committee on 21 June 2011:

At the NHMRC Council meeting held on 16 and 17 June 2011, Council members considered the outcomes of the forum and recommended that NHMRC commissions experts to systematically review the scientific literature, especially focussing on the possible health impacts of audible noise and infrasound.

Depending on the results of this review, the NHMRC Public Statement would be updated and consideration would be given to targeted research in this area.

> NHMRC will continue to keep the Community Affairs Committee informed of their work on this important issue.

As a member of this Committee I am pleased that the NHMRC is prepared to continue investigating the issue of any adverse health effects caused by wind turbines.

In April I had the opportunity to join a Parliamentary Delegation to travel to Denmark, Sweden and Greece. Renewable energy was the main issue the delegation undertook to study and the three countries we visited all had a large number of wind farms.

We met with a number of wind farm developers and all were of the opinion stated by the NHMRC that 'there is currently no published scientific evidence to positively link wind turbines with adverse health effects'.

Community groups in all three countries were concerned about health issues that may have been caused by living close to wind turbines. To date they do not have any peer reviewed scientific evidence to substantiate their concerns.

An independent study partly funded by the Danish government and published in the Acoustical Society of America Journal June 2011 confirms:

> beyond any doubt that the low-frequency part of the spectrum plays an important role in the noise at neighbours and that the low-frequency sound must be treated seriously in the assessment of noise from large turbines.[1]

This published peer reviewed research from June 2011 has found that:

> ...results confirm the hypothesis that the spectrum of wind turbine noise moves down in frequency with increasing turbine size. The relative amount of emitted low frequency noise is higher for large turbines than for small turbines...
>
> Large turbines affect the same area—or possibly even larger areas—with noise when compared to small turbines with the same total installed electric power.[2]

As a Western Australian Senator I am concerned at the number of proposed wind farms that are to be constructed in rural Western Australia. It appears that wind farm developers are taking advantage of the generous subsidy offered by the Government to meet renewable energy targets.

The height of the turbines is increasing and the latest wind farm proposal to be constructed at Williams in the Central Great Southern Region of Western Australia will have turbines of 194 metres.

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1 Henrik Møller and Christian Sejer Pedersen, 'Low-frequency noise from large wind turbines', *Journal of the Acoustical Society of America*, June 2011, 129(6), p. 3735. This research was commissioned by Delta.

2 Henrik Møller and Christian Sejer Pedersen, 'Low-frequency noise from large wind turbines', *Journal of the Acoustical Society of America*, June 2011, 129(6).

Lack of early community consultation has caused a great deal of angst in small rural communities where wind farms are to be developed and it seems unfair that Local Governments have been given the responsibility to make the decision as to whether the application is to be approved.

If it is proved that adverse health effects are caused by living in close proximity to wind turbines it will be essential that a setback ruling is legislated. Currently there is no setback rule in Western Australia.

Senator Judith Adams

Liberal Party

FAMILY FIRST

ADDITIONAL COMMENTS

Family First initiated a Senate inquiry in order to allow for proper consideration of a number of concerns that were raised with our office and in particular, to investigate claims that wind farms are causing adverse health effects for residents living in close proximity to them.

What has become evident during the Senate hearings is that there is an enormous divergence of views expressed by the proponents and opponents of wind farms. There have also been serious concerns about the over-reliance by wind farm developers on the National Health and Medical Research Council's rapid review of evidence, and public statement on wind farms and health, both released in July 2010.

A number of submissions have sought to highlight the economic benefits or pitfalls of Australia's renewable energy policy and whether wind power has a viable future in this country. However, Family First's main focus has always been on whether or not wind turbines pose a serious health risk to local residents.

Health

There have now been many inquiries, of which this Senate committee investigation is just one, that have uncovered numerous cases where adverse health effects have been attributed to wind farms.

These issues have been identified in cases around the world, wherever wind farms have been built. As a result, there have been reviews of the public health effects of wind farms not only in Australia but internationally. Many of these reviews, however, have been confined to examination of the existing literature, rather than conducting new research that directly targets the issues. Examples include a 2008 report by the Chatham-Kent Public Health Unit for the Chatham-Kent Municipal Council in Canada, a 2011 report by Delta consulting for the Danish Ministry of the Interior and Health, and the 2010 NHMRC rapid review of evidence on wind farms and health.

Research consistently shows that the noise from wind farms at levels below those required by planning guidelines is annoying to nearby residents and causes sleep disturbance. It would also appear that there is a link between the symptoms of stress and disturbance by wind farm noise. There are also other serious health symptoms reported by some of these residents. There is no adequate research to explain these cases.

We simply do not know enough about the health effects on individuals and communities that find themselves adjacent to these large developments. As a consequence, Family First remains concerned about the use made by wind farm developers of the NHMRC's rapid review of evidence on wind farms and health. Family First thinks the NHMRC's evidence to this committee is critical:

> We regard this as a work in progress. We certainly do not believe that this question has been settled. That is why we are keeping it under constant review. That is why we said in our review that we believe authorities must take a precautionary approach to this. That is what we do say in medicine anyhow, but this is very important here because of the very early stage of the scientific literature.[1]

It is notable that, since the NHMRC has given evidence to the inquiry, it initiated a scientific forum on the issue, initiated a systematic review of the literature, and may update its previous statements.[2]

While this is encouraging, the misuse of the NHMRC's work by developers has damaged the perceived independence of the NHMRC in the eyes of those in affected communities. Mr Mitchell from Australian Landscape Guardians said 'The NHMRC and the state departments of health have not got off their chairs. They do not know what is going on'.[3]

Dr Pierpont commented of the study that it was:

> A really pitiful and dubious document, and I have just reviewed it. It has also been reviewed by Dr Robert McMurtry in Canada, a dean at a medical school. I am also a PhD scientist, and I know about evidence. The sources used in this document are mostly government sources and other non-scientific, non-peer reviewed sources, and of the peer reviewed sources they cite, one of them I know well, which is the Pederson and Persson Waye, and they misused their information...
>
> Many of the sources it cites are also direct wind industry documents, from the American and Canadian Wind Energy Association and the Australian Wind Energy Association. These are not independent sources, these are industry documents. This is not scientific critique. There is an obvious conflict of interest in what these documents and people have to say.[4]

Dr Laurie remarked:

> I must admit that when I read the NHMRC document not only was I disturbed; I was a little appalled. There was a lack of recognition about the conflict of interest and the issues which were emerging even then, back in July, particularly in Waubra in Victoria. There were reports emerging then. To just ignore people I think was unconscionable.[5]

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1 Professor Warwick Anderson, *Committee Hansard*, 31 March 2011, p. CA 87.

2 NHMRC, correspondence to the committee, 21 June 2011.

3 Mr Peter Mitchell, *Committee Hansard*, 28 March 2011, p. CA 18.

4 Dr Nina Pierpont, *Committee Hansard*, 25 March 2011, p. CA 19.

5 Dr Sarah Laurie, Waubra Foundation, *Committee Hansard*, 29 March 2011, p. CA 39.

The committee has recommended that the NHMRC review of evidence should continue, with regular publication. However, Family First believes that there must now be a role for an independent organisation in reviewing the existing literature. A body that operates at arm's length from government should review the evidence and the work of the NHMRC to date. This could be a university research centre with expertise in medical research and policy, or a research and policy institute. Organisations that could conduct such an independent review include the Sax Institute, which conducts evidence check reviews in the areas of health policy and medicine.[6]

It is also necessary that new research be conducted on the health issues themselves. Family First endorses the committee's recommendation that the National Acoustics Laboratories (NAL) conduct a study and assessment of noise impacts, including the impacts of infrasound.

However, NAL's mission is 'to lead the world in research and development that improves the way hearing is assessed, hearing loss is prevented, and hearing loss is rehabilitated'. This is a much narrower brief than the full range of health issues associated with wind farms.

Broader research must be conducted. The committee has recommended that that the Commonwealth Government initiate as a matter of priority thorough, adequately resourced epidemiological and laboratory studies of the possible effects of wind farms on human health. Family First endorses this, and emphasises that there must be a sense of urgency.

It is also vital that the research be peer-reviewed, and be conducted by individuals and organisations that do not have an ongoing relationship with the wind energy industry. Organisations that could conduct this research include the Australian National University's National Centre for Epidemiology and Population Health (NCEPH). Family First also notes the evidence of Dr Laurie, indicating there are existing research proposals ready to be undertaken that could be funded.[7] These should be given serious consideration.

Planning controls

Family First notes that the current trend is toward tightening controls around wind farm development, and believes that this is for good reason. The Victorian government has recently revised its planning guidelines for wind farms. The revisions have included setting more stringent noise limits in low-noise environments:

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6 Sax Institute, Evidence Check Reviews, http://www.saxinstitute.org.au/policyresearchexchange/EvidenceCheckReviews.cfm?objid=945#Types, accessed June 2011.

7 Dr Sarah Laurie, Waubra Foundation, *Committee Hansard*, 29 March 2011, p. CA 40.

> The *New Zealand Standard NZS 6808:2010, Acoustics – Wind Farm Noise* (the Standard) specifies that a noise limit of 40 decibels is appropriate for the protection of sleep, health and amenity of residents at most locations... Importantly, the Standard also sets out a process to determine if a more stringent limit should apply in specific noise sensitive locations (discussed below).
>
> All wind farm applications will need to be assessed to determine if the location warrants application of the Standard's more stringent 'high amenity noise limit' of 35 decibels as set out in Section 5.3 of the Standard. The high amenity standard applies in special circumstances, such as in an environment where the background noise level is particularly low.[8]

Evidence received by the committee strongly suggests that most, if not all, wind farm developments outside built-up areas should require the high amenity standard.

Victoria has also set a greater distance as the guidelines for notification of affected neighbours:

> Responsible authorities should ensure affected parties are fully informed of a proposed Wind energy facility development. It is suggested that all property owners with dwellings within 2 km of a proposed turbine are notified of a proposal, as a minimum.

The New South Wales Legislative Council Committee report on rural wind farms recommended that the NSW Minister for Planning 'include a minimum setback distance of two kilometres between wind turbines and residences on neighbouring properties in the *NSW Planning and Assessment Guidelines for Wind Farms*'.[9]

Family First recognises that establishing guidelines for any development project can be complex. However, planning controls must take account of the nature of the proposed development and its potential adverse impacts.

In this regard, Family First notes that independent studies have shown that residents are annoyed by wind farm noise at far lower decibel levels than they are by road and aeroplane noise.[10] Family First believes that planning controls and development guidelines should reflect this fact.

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8 Victoria Planning Provisions, 'Amendment VC78 - Wind energy facility provisions - Clause 52.32', Advisory Note 35, March 2011, http://www.dpcd.vic.gov.au/__data/assets/pdf_file/0011/59897/AN35-Amendment-VC78-wind-energy-facilitiy-provisions.pdf, accessed June 2011.

9 NSW Legislative Council General Purpose Standing Committee No. 5, *Rural wind farms*, December 2009, p. 68.

10 Delta, for the Danish Ministry of the Interior and Health, *Relationship between noise from wind turbines and health effects*, March 2011; Frits van den Berg et al., Project WINDFARMperception: Visual and acoustic impact of wind turbine farms on residents, June 2008, http://www.epaw.org/documents/WFp-final-1.pdf, accessed June 2011.

Recommendation 1

Family First recommends that, at a minimum, planning controls and development guidelines in all states and territories should require that wind farm proposals meet the high amenity noise limit in Section 5.3 of *New Zealand Standard NZS 6808:2010, Acoustics – Wind Farm Noise*.

Recommendation 2

Family First recommends that, at a minimum, planning controls and development guidelines in all states and territories should require all property owners with dwellings within 2 km of a proposed turbine to be notified of a development proposal.

Recommendation 3

Family First recommends that the EPHC's draft *National Wind Farm Development Guidelines* be revised to reflect the position outlined in the two recommendations above.

Recommendation 4

Family First recommends that, in addition to immediately acting on the above recommendations, all states and territories should review their planning controls and development guidelines for wind farms within three years to consider whether new research on the health impacts of wind farms warrants further tightening of development conditions, including possible mandatory setbacks.

Senator Steve Fielding

Family First Party

APPENDIX 1

SUBMISSIONS AND FORM LETTERS RECEIVED BY THE COMMITTEE

Submissions

1	Ms Helen White
2	Aerial Agricultural Association of Australia *plus* Attachments
3	Mr Paul Cross
4	Eyre Peninsula Local Government Association
5	Ms Vicki Mitchell
6	Australian Landscape Guardians • Supplementary Submission
7	Mr Dave Clarke
8	Friends of Arran Lake / Central Bruce Grey Wind Concerns Ontario (WCO) *plus* Attachments
9	Mrs Suzanne Giddins
10	Name Withheld
11	Name Withheld
12	Mr Chris Kirk *plus* Attachments
13	Dr. Nina Pierpont, MD, PhD
14	Name Withheld
15	Mr Ken and Mrs Rosemary Rees
16	Mrs Lee Watt
17	Mr Tony Edney
18	Mr Richard Dewick
19	Mr Peter Russell-Clarke
20	Artists for the Environment Landscape Guardians
21	Mrs Heather and Mr John McMahon
22	Dr David Spooner
23	Upper Lachlan Shire Council *plus* Attachments
24	The Alliance to Protect Prince Edward County *plus* Attachment
25	Mr P C Wilson • Supplementary Submission

26	Mr Bryan Leyland
27	Mr Val Martin *plus* Attachments • Supplementary Submission
28	Mrs Judith Meulblok
29	Mr Glenn R. Schleede *plus* Attachment
30	Mr Grant Church *plus* Attachment
31	Mr Andrew S. Reed
32	Viscount Christopher Monckton of Brenchley *plus* Attachment
33	Ms Jutta Reichardt *plus* Attachment • Supplementary Submission
34	Mr Bert Mulder
35	Confidential
36	Mr Graeme Combe
37	Name Withheld
39	Mr Warwick Lister-Kaye
40	Mr Derek Partington *plus* Attachment
41	Dr Arline L. Bronzaft
42	Mr Simon Brown
43	Dr Kothar Terleth
44	Mr John Graham
45	Mr John Holliday
46	Mr Alain de la Charie
47	Mr Ian Albery
48	Prof. Hans-Günter Appel
49	Confidential
50	Tom and Susan Reakes • Supplementary Submission
51	Ms Noreen Marshall
52	Mr Henrik Wachtmeister
53	Southern and Hills Local Government Association *plus* Attachments
54	Dr. Helen Schwiesow Parker *plus* Attachment • Supplementary Submission
55	Mr Wiiam Oxenham

56	REpower Australia *plus* Attachment
57	Ms Lilli-Ann Green
58	Dr. Calvin Martin *plus* Attachments
59	Ms Maureen Anderson
60	Name Withheld
62	Ararat and District Historical Society (Langi Morgala Museum)
63	Mr David Tozer
64	Ms Christine Sawyer
65	Mr Joe Keynes
66	Mr Malcolm Linke
67	Clean Energy Council *plus* Attachments • Supplementary Submission
68	Ms Wendy Rainbird
69	Mr Bob Wallace
70	Ms Margaret Burbidge
71	Ms Becky Heffernan
72	Ms Pam DiLorenzo
73	Mr Darryl Baxter
74	Mr Daryl O'Flaherty
75	Mr Geoffrey Clark
76	Mrs Megan Read
77	Name Withheld
78	Mr Timothy Novice
79	Name Withheld
80	Upper Hunter Landscape Guardians Inc
81	Mr Geoffrey Nyoni-Tonks
82	Name Withheld *plus* Attachment
83	Name Withheld
84	Mrs Amanda Coe
85	Mr Robert Broadbent *plus* Attachment
86	Name Withheld
87	Name Withheld
88	M Meika Loofs Samorzewski

89	Mr Peter Stone
90	Name Withheld
91	Name Withheld
92	Mr David Eddey
93	Ms Tania Neville
94	Flyers Creek Wind Turbine Awareness Group
95	Mr Roger Bilney
96	Mr Case Smit
97	Ms Elizabeth Banks
98	Mr Andrew Grant
99	Ms Yvonne McRae
100	Mrs Helen Darbyshire
101	Mr Stuart Darke
102	Mr Peter Hansford, Woodend Integrated Sustainable Energy Group
103	Ms Sandra Hawkins
104	Edythe Anderson and Rosemary Holmes
105	Ms Jan Robbins
106	Confidential
107	Mr Jim Dunstan *plus* Attachment
108	Dr Rachel Robbins
109	Mrs Janine Hannan
110	Codrington Rural Fire Brigade
111	Ms Barbara Ashbee
112	Dr Bob Thorne
113	Mr Gordon Monsbourgh
114	Ms Muriel Scholz
115	Ms Carmen Krogh and Beth Harrington
116	Tanya, Bernard and children
117	Mr Alex McRae
118	Mr Rohan Arden, Safety Ba6
119	Ms Janet Rice
120	Doug and Pauline Boatman
121	Anne and Allan Schafer

122	Ms Lorna Gilmore
123	Mr Alan Gillespie-Jones
124	Ms Marguerite Marshall
125	Ms Holly Marsh
126	Mr Douglass Cahill
127	Dr Bob Rich
128	Mr Craig Gaymer
129	Mr Carl Stepnell
130	Ms Samantha Stepnell
131	Ms Cheryl Small
132	Mr Douglas Hopkins
133	M C Robinson
134	Mr Roger Lillecrapp
135	Mr Graeme Leslie, Ararat Clay Target Club Inc.
136	Angela and Frank Kearns *plus* Attachments
137	Mr Michael Nugent
138	Nick and Lyndsey Ward
139	Ms Joy Ringrose
140	Ms Megan Bliss
141	Ms Tracey Sleet
142	Confidential
143	Susan and Alexander Dennis
144	NAWAG
145	Mr Kalvin Bartlett
146	Prom Coast Guardians Inc. *plus* Attachments
147	Ms Tracey Stringer
148	Mr David Tranter, Canwin
149	Mr Wayne Marsh
150	Confidential
151	Mr Andy Simpson
152	Dr George Deutsch
153	Mr Michael Weadon
154	Mr Peter Stafford

155	Mr David Dawson
156	Mr David Price
157	Mr Dennis Long
158	Mr Norman McMurray
159	Ms Margret Lockwood
160	Mr Ian McBurney
161	Greenpeace Australia Pacific *plus* Attachment
162	Ms Heather McLaughlin
163	J and L Kinghorn
164	Mr Neil Barrett
165	Name Withheld
166	Mr Keith Staff *plus* Attachment
167	Mr David Robertson
168	Mrs Janet Walsh
169	Moyne Shire Council *plus* Attachments
170	Ms Gail Dawes
171	Ms Rosa Dawes
172	Name Withheld
173	Ms Petra Tiemann, Fuer Mensch und Natur Gegenwind Schleswig-Holsten e.V.
174	Mr Pascal Goux
175	Mr David Perry
176	Waubra Football and Netball Club
178	Dr Philip Machanick • Supplementary Submission
179	Mr Don Jelbart
180	Kieron and Shirley Moore
181	Mr Michael Sayn
182	Name Withheld
183	Ms Jill Whitford
184	Ms Vivian Parish
185	Mr Tim Brady
186	Mr Zachary Casper

187	Ms Kathy Williams
188	Mr Lorne Smith
189	Mr Fabienne Chapuis Hini, Association les Travers du Vent
190	Mr William Graham
191	Moya and Dermot Murphy
192	Ms Kirsten Mielsen
193	Ms Mireille Bonin, Terre Citoyenne
194	Ms Elizabeth Grieb
195	Mr Patrick Ryan
196	Mr Laurie Derrick, Lawrence Derrick and Associates
197	Mr Kurt van Wijck
198	Confidential
199	Ms Mary Prell
200	Mr Allan Barrett
201	Mr Geoff Kennedy
202	Mr Duane Chilcott
203	Mrs Lee Harrison
204	Dr Mark Diesendorf, Institute of Environmental Studies, University of New South Wales
205	Ms Sue Svenson
206	Ms Wilma Western
207	Mr Ingrid Radford
208	Mr Ulf Lindberg
209	Ms Jessie Wells
210	Mr Bernie Millane
211	Ms Sue Scarman
212	Mr Robert Scarman
213	Ms Noelene Nelson
214	Mr Gregory Olsen
215	Ms Lyn Hovey
216	Ms Dallas Kinnear
217	Name Withheld
218	Mr Dick Bowdler

219	Mr Colin Davidson
220	Mr Brian Burke
221	Mr Peter Hall
222	Confidential
223	Name Withheld
224	Mrs Christine Howie
225	Ms Deb Saunders
226	Mr Robert Meek
227	Mr Craig Chappelle, Denmark Community Windfarm Inc.
228	Mr Peter Reefman
229	Mr Brendan Ryan
230	Mr Josh Nash
231	Ms Kelly Mapleston
232	Mr Terry Teoh
233	Mr Kevin Quigley
234	Mr Peter Cook, Dandenong Ranges Renewable Energy Association Inc.
235	Name Withheld
236	Mr Kevin Ramholdt
237	Carmel and Kevin Simpson
238	Mr Rob Tozer
239	Ms Margaret Whitehead, Friends of Pallister's Reserve
240	Mr John Droz jr.
241	Mr Stephen Crowe
242	Mr Steve Symons, Roaring s Renewable Energy Pty Ltd
243	Mr Allan Brown
244	Name Withheld
245	Mrs Judy Mackinnon
246	Mr Steve Phillips
247	Mount Alexander Sustainability Group
248	Rodney and Margaret Read
249	Name Withheld
250	Ms Janet Kay

251	Mr Nigel Baker
252	Epuron Pty Ltd
253	Ms Anna Grabis
254	Mr Angus King
255	Robert and Jill Warner
256	Liz Traeger and Dennis Dale
257	Mr Michael Balshaw
258	Ms Trish Jelbart
259	Mrs Caroline Harvey
260	Mr Toni Ryan
261	Dr Rob Phillips
262	Name Withheld
263	Mr David Morgans
264	Mr Mauri Johansson, National Association of Neighbors to Giant Land Wind Turbines
265	Ms Vicky Wood, Stop Molesworth Wind Farm
266	Mr David Clarke
267	Mr Michael Muldoon
268	Mr Ray Martin
269	Dr John R. Etherington *plus* Attachment
270	Name Withheld
271	Dr Bill Parker
272	Mr Graham Sturzaker
273	Ms Alicia Webb
274	Mr David Mitchell, Ararat and District Woodies Club Inc.
275	Save Our Scenery
276	Mr Dennis Workman
277	Mr Peter Skeel Hjorth
278	Mr Derek Wrigley
279	Mr Cliff Wallis
280	Name Withheld
281	Ian and Trixy Allott
282	Name Withheld

283	Ms Collette McLean
284	Mr Adam Gray
285	Mr Alex Krisman
286	Mr Douglas Evans
287	Mr Jim King
288	Ms Mellissa Helbig
289	Robert and Margaret Whitehead
290	Environment Victoria
291	Dr John Foster
292	Mr Ben Courtice
293	Confidential
294	Keppel Prince Engineering Pty Ltd
295	Mr Harold Bracegirdle
296	Mr Marcus O'Brien
297	The Wind Turbine Company
298	Mrs and Mr Maureen and David Coleman
299	Mr Jon Strachan
300	Name Withheld
301	Ms Prudence Thompson
302	Ms Greer Taylor
303	Mr Alastair Greenall
304	Dr John Wells
305	Mr Bill Gresham
306	Mr Richard Paltridge
307	Mr Jim Allen
308	Dr Jim McDonald
309	Mr Robert Boelen
310	Climate Change Balmain-Rozelle
311	Ms Patricia Asch
312	Mr Peter Goddard
313	Ms Heather Flavel
314	Mr Christopher Stroud
315	Name Withheld

316	Name Withheld
317	Mr David E. Rentsch
318	Mr Bryan Lyons
319	Mr Martin Lloyd-Smith, North-Western Agricultural Society Inc.
320	Ms Linda and Danny Kenna
321	Mr Stephen Coleman
322	Ms Jocelyn Mitchell
323	Mrs Patricia Gabb
324	Mr and Mrs Ken and Lorraine Kay, BOLT BOY
325	Friends of the Earth Australia
326	Mr Yarrow Andrew
327	South West Sport
328	Wind Prospect Pty Ltd *plus* Attachments
329	Mr Richard Keech
330	Ms Penelope Coleman
331	The Carbon Sense Coalition
332	Ms Olivia Holmes a Court
333	The Oil Mallee Association of Australia (Inc) *plus* Attachments
334	Confidential
335	Mr Ben Madin
336	Mr Charles Martin
337	Ms Gabriella Hont
338	Dr Charles Cranfield
339	Mr and Mrs M.G and J.H Ginger
340	Union Fenosa Wind Australia
341	Mr and Mrs Rob and Margaret McDonald
342	Mr David Dowie
343	Emerald for Sustainability
344	Ms Susan Clarke
345	GV Community Energy
346	Mr Malcolm Mckelvie
347	Dr Gordon Monro
348	Crystal Brook Community Association

349	Grampians - Glenthompson Landscape Guardians Inc. *plus* Attachment
350	Mr and Mrs Douglas and Carol Mac Donald Haddow
351	Ms Lisa Dinning
352	Mr and Mrs Graeme and Catherine Keating
353	Prof Peter Seligman
354	Hughes Family Superannuation Fund
355	Mr Rodney Brew *plus* Attachment
356	Mr Anthony Brown
357	Name Withheld
358	Mr Robin Friday
359	Confidential
360	Mr and Mrs Lois and Kenneth Townsend • Supplementary Submission
361	Confidential
362	Mr Barry Murfett
363	Thomsons Lawyers
364	Glenelg Shire Council
365	Name Withheld
366	pitt and sherry
367	Mrs Robyn Brew *plus* Attachment
368	Mr Doug Rolfe
369	Name Withheld
370	Mr Steven Gallina *plus* Attachment
371	Confidential
372	Mr Graham Laurie
373	Dr Daniel Magasanik
374	Ms Di Colman
375	Mr Gilles Beau
376	Mr Adam Long
377	Climate Action Canberra *plus* Attachments
378	Mr Shaun Scallan
379	Mrs Belinda Wehl

380	Mr Robert Mittag
381	Mrs Ann Lees
382	Ms Sarah Lloyd
383	Mr Igor Brandao
384	Name Withheld
385	Mrs Heather Hicks
386	Name Withheld
387	Mrs Noreen Wills
388	Name Withheld
389	Mr Gerry Noonan, The Parkville Association
390	Dr Sarah Laurie, Waubra Foundation
391	Andrew and Janice Robertson
392	Mr Jonathan W. Peter
393	Mr Darren Briggs
394	Mr Thomas Greig
395	Mr Allan Meers
396	Mr Paul Buchanan
397	Mrs Cheryl Shea
398	Ms Michelle Jones
399	Ms Bronwyn Fackender
400	Dr Mary-Faeth Chenery
401	Mr Lindsay Marriott
402	Ms Vanessa Webb
403	Ms Carolyn Ingvarson
404	Ms Karen Sutherland
405	Ms Vicki Horrigan
406	Mr David Munro
407	Mr Simon Rush
408	Mr Russell Brian
409	Ms Anna Fabigan
410	Mr Angus Smith
411	Roger and Elizabeth Chafer
412	Jill and Gary Seddon

413	Ms Christine Anne Nova Johnston
414	Mr Peter Forster, Environmental Farmers Network
415	Mr Danny Halstead
416	Mr Peter Leitner, Trans Pacific Projects Pty Ltd.
417	Mr Peter Coleman
418	Mr Phil Cole
419	Mr Nick Lilley
420	Mr Adrian and Mrs Margaret Bufton
421	Ms Julia McLellan
422	Mr Graeme Tonkins
423	Mr Stuart Whiting
424	Mr Paul Denham Reid Houghton
425	Ms Lexie Noble
426	Mr Bernhard Voll
427	Mr Randall Bell
428	Mr Alan Wood
429	Ms Jillian Adams
430	Ms Emma Clayton
431	Mr Brian Carpenter
432	Mr John Robert Birrell
433	Mr David Grosmann
434	Confidential
435	Mr Gerry Bolt
436	Ms Valerie Wheatstone
437	Mr John Flavel Campbell
438	Ms Martha R. Hills
439	Mr Joe Hoogland , Measurement Engineering Australia Pty Ltd
440	Ms Kate Hook
441	Mr Michael Hulme
442	Mr Colin Dooley
443	Mr Adam Blakester
444	Mr Dale Park
445	Mrs Ann B Brown

446	Ms Ann Parris
447	North East Region Sustainability Alliance
448	Mr Brian Wolfenden
449	Ms Caroline Marshall
450	Ms Caroline Peacock
451	Ms Cassandra Franzose
452	Mr Charlie Prell
453	Mr Chas Holmes
454	Mr Chris Anderson
455	Ms Meredith Kleinig
456	Mr Michael S McCann
457	Ms Sue Warren
458	West Hills Farm Pty Ltd
459	Ms Nettie Pena
460	Blair Fox Pty Ltd
461	Name Withheld
462	Name Withheld
463	Ms Helga Hung *plus* Attachment
464	Confidential
465	Dr Geoff Leventhall
466	Australian Volunteer Coast Guard Association
467	Wind Pacific
468	Maxim Renewable
469	Mr Daniel Sacchero
470	Mr David Sewell
471	Ms Lisa Alexander
472	Mr David Macilwain
473	Professor David Morris
474	Dr David Osmond
475	Mr David Sims
476	Confidential
477	Confidential
478	Ms Marion Parsonage

479	Mr Martin Wynne
480	Mr Andrew Reid *plus* Attachment
481	Mr Simon Magasanik
482	Ms Barbara Nash
483	Ms Michelle Croker
484	Ms Peggy Kay Lowrey
485	Mr Madisen Cook
486	Mr John Wright-Smith, American Superconductor Corp. (NASDAQ: AMSC)
487	Ms Sonja Lane, WindWorks! Northwest *plus* Attachments
488	Ms Jennifer Blamey
489	Mr Russell Crook, Karni Engineering
490	Ms Karin Hensen
491	Mr David Edmonston
492	Mr Gordon Mitchell
493	Mr Richard Moreton
494	Mr Mick Carlson
495	Mrs Liz Diamond
496	Mr Rob Keiller
497	Mr Rod Ladd, Ladd Electrical Pty Ltd
498	Mr Mark Learmonth
499	Ms Cyril Cram , Portland Coast Guard
500	Rosalind and Peter Lowe
501	Hepburn Relocalisation Network
502	Ms Pam Atkins
503	AGL Energy Limited *plus* Attachments
504	Ms Gillian Wells
505	Mr Warren Yates
506	Mr Stephen Higgs
507	Mr Roy Whitworth
508	Carol Grills and Doug Beaumont
509	HR and MJ Johnston
510	RC and EM Grills

511	Mr Sean O'Rourke
512	Mr George Jones
513	John and Elizabeth Fincher
514	Ms Kathi Summer
515	Mr Matthew Forwood
516	Ararat Greenhouse Action Group Inc.
518	Sutherland Climate Action Network (SCAN)
519	Ms Fiona Fulton
520	Ms Sarah Benson
521	Name Withheld
522	Mr Leighton Evans
523	Lake Bolac Eel Festival
524	Wind Pacific (Aust) Pty Ltd
525	Mr Michael Nolan
526	Prof Frank Fisher *plus* Attachments
527	Ms Linda Webster, Save our Stainmore
528	Ms Sharon Dohnt *plus* Attachments
529	Mr Luc Rivet, EPAW *plus* Attachments
530	Mr. P.S. and Mrs. V.C.K. Metcalfe
531	Rae and Bruce Jarrett
532	Name Withheld
533	Mr Matthew Neil Armstrong
534	Mr Jonathon Tree
535	Mr Glenn Bailey
537	Anne Marie Beinke and Stuart William Beinke
538	Mr Mal Corcoran
539	Mr Pat Sharkey, Gweebarra Conservation Group
540	Dr Daniel Shepherd *plus* Attachment
541	Confidential
542	Wollongong Climate Action Network
543	Ms Bernadette Daubin, Fédération vent d’Anjou
544	Ms Jolanta Loritz-Dobrowolska, Towarzystwo Ochrony Przyrody i Krajobrazu

545	Mr Robert Boyle
546	Ms Larelle Dean
547	Mrs Jean Dooley
548	Mr Dimetre Triadis
549	Mr Everard Linke
550	Ms Pamela Reeves
551	Mr Ben Purcell
552	Transition Kurilpa
553	Confidential
554	Dr Neil I Smith
555	Mr Peter Stephens
556	Sustainable Jamboree
557	Mr Will Elsworth
558	Mr Jim Elsworth
559	Hip Pocket Workwear and Safety Ballarat
560	Mr Hugh Piper
561	Ms Kate Owe-Young
562	Dr Paul Ebert
563	Mr Don Harvey
564	Country Fire Authority
565	Mr Adam Shepherd
566	Mrs Marie Burton
567	Lions Club of Ararat
568	Mr and Mrs Meryl and Peter Holland
569	Dr Lindsay Quennell
570	AMDOCS
571	Mr Adrian Ciccocioppo
572	Mr and Mrs Jason and Lisa Lehmann
573	Mr David Macilwain
574	Collector Community Association
575	Mr D F Rowbottom
576	Scott and Jodie Dennis
577	Mr Brian Gallagher

578	Mr Russell Jones
579	CSIRO
581	Ms Liz Zorondo
582	Molonglo Landscape Guardians Inc
583	Mr Pat Horan
584	Mary and Epiphnie Cassar *plus* Attachments
585	Mr and Mrs Harry and Kerrie Buskes
586	Mr Nick King, Orange Climate Action Now (OCAN)
587	Mr Kingsley Slipper
588	Mr Peter Dawes
589	Mr David Bruce King
590	Mr Glenn Osboldstone
591	Origin Energy Limited
592	Bayside Climate Change Action Group
593	Suzlon Energy Australia Pty Ltd
594	Cairns and Far North Environment Centre Inc
595	Mr and Mrs James and Pamela McGregor
596	Mr and Mrs Geoffrey and Rosemary Pearce
597	Codrington Wind Farm Tours
598	Mr Simon Nelson
599	Dr Keith Ayotte
600	Mr Tom Green
601	Rydal District Landholders Association *plus* Attachments
602	Locals Into Victoria's Environment (LIVE)
603	Rising Tide Newcastle
604	Mr Colin Briggs
605	Climate and Health Alliance
606	Hydro Tasmania
607	Mr Jerome Coleman
608	Dr Peter Turner
609	Mr Bruce Easton
610	Mr and Mrs William and Isabel McLaren
611	TRUenergy Pty Ltd

612	Mr John Burke
613	100% Renewable Community Campaign
614	Committee for Portland
615	Australian Environment Foundation
616	Noske Group
617	Mr Andrew Gabb *plus* Attachments
618	Consolidated Power Projects
619	Ms Janice Marshall
620	SkyFarming Pty Ltd
621	Ms Janet Souter
622	Mr and Mrs Ruth and Rod Corrigan
623	Community Power Agency
624	Tasmanian Renewable Energy Industry Development Board
625	Mr David Myer
626	Mr Philip Schier
627	Civil and Allied Technical Construction Pty Ltd
628	Mr Simon Holmes à Court
629	Mr David Maughan *plus* Attachments
630	Mr and Mrs Tom and Lin Butcher
631	Australian Centre for Environmental Law *plus* Attachment
632	Beyond Zero Emissions
633	Industry Capability Network
634	Moreland Energy Foundation Limited
635	Mr Tim Brady
636	Climate Action Newtown
637	Mr Deiny Peterson
638	CFMEU (Construction and General Division)
639	Mrs Sue Bell
640	Environmental Defenders Office (SA) Inc.
641	Transfield Services *plus* Attachment
642	Ms Janene Webb
643	Mr Malcolm Lambert
644	RES Australia Pty Ltd

645	Western Plains Landscape Guardians Association (WPLGA)
646	Pyrenees Shire Council
647	Mr Noel Dean *plus* Attachment
648	Ms Janine Dean
649	Mr Rod Dean
650	ACCIONA Energy
651	Minister for Planning, Victorian Government
652	Infigen Energy
653	Pacific Hydro *plus* Attachment
	• Supplementary Submission
654	Victorian Planning and Environmental Law Association
	• Supplementary Submission
655	WestWind Energy Pty. Ltd
656	Sustainable Energy Association of Australia Inc. (SEA)
657	The Western Australian Farmers Federation (Inc.) (WAFarmers)
658	Ms Annie Gardner
659	Mr Gus Gardner
660	Peter Prasser and Judy Vanrenen
661	Mr John O'Shea
662	Confidential
663	Confidential
664	Mr Noel Thomas
665	Mrs Enid Thomas
666	Ms Maggie Reid
667	Mr Donald Thomas
668	Mr Paul Thompson *plus* Attachment
669	Ms Catherine Bayne
670	Mr John Carter
671	Ms Kirstie Jamieson
672	Mr Gunther Wilhelm
673	Mr Peter Nash
674	Mr Stuart Schafer
675	Leesa and Jonathon Inglis *plus* Attachment

676	Mr Richard Evans
677	Ms Berni Janssen
678	Ms Sarah Cook
679	Ms Sarah Cole
680	Mrs Catherine Williams
681	Ms Shelley McDonald
682	Mr Mike Noske
683	Geoff Putland and Christine Thompson
684	Ms Robin Sharrock
685	District Council of Grant
686	Ms Jan Perry
687	Mr John Leddin
688	Ms Melanie Robertson
689	Ms Linda Zibell
690	Ms Rosemary Lathouris, Katoomba Climate Action Now
691	Cr Alison Clarke
692	Mr Phillip King
693	Mr Chris Judd
694	Mr Malcolm Lambert
695	Ms Ming Wu
696	Mr David Carr
697	Mr Steve Lockart
698	Sally and John Hoskins
699	Mr Edward Fernandez
700	Dr Kaye Scholfield and Ms Mexie Butler, Potter Rural Community Research Network
701	Mr Paul Kretschmer
702	Westgate Community Wind
703	Upper Hunter Shire Council
704	Mr Frank Hannan
705	Mr Jim Wiegand
706	Ms Karin Green
707	Ms Felicity Crombach

708	Mr Jamie Finch
709	Ms Fran Birrell
710	Ms Anita Crisp, Central Local Government Region of Councils, South Australia
711	EPURON Pty Ltd
712	Vestas Australian Wind Technology P/L *plus* Attachment
713	Mr Andrew Chapman
714	Ms Sonia Trist
715	Dr Dave Burraston and Ms Sarah Last *plus* Attachments
716	Name Withheld
717	Mr Hamish Officer
718	Name Withheld
719	Name Withheld
720	Ballarat Renewable Energy and Zero Emissions Inc (BREAZE)
721	Mr Hamish Cumming
722	North West Minerals Province
723	Ms Lyn Hamilton
724	Darren and Kerrie Robinson
725	Windlab Developments Pty Ltd
726	Ms Mary Dougherty, Embark
727	Ms Julie P Townrow
728	Mr Terry Lee, Regional Development Australia, Adelaide Hills, Fleurieu and Kangaroo Island
729	Mr Andrew John Allerton Scott
730	Mr James Miele
731	Name Withheld
732	Mr Simon Holmes a Court, Hepburn Wind (Hepburn Community Wind Park Co-operative Ltd)
733	Enhar
734	GL Garrad Hassan
735	Mr Danny Walsh
736	Mr James Purcell
737	Mr Trevor Berrill
738	Frank Eden and Iris Domeier

739	Mr Neil Jenkin
740	Name Withheld
741	Mr Stefan Gsaenger, World Wind Energy Association
742	Alternative Technology Association (ATA)
743	Vipac Engineers and Scientists Ltd
744	Mr Jack Gilding
745	Mr John Zubrzycki
746	Mr Shaun Blackie
747	Mr Michael Wilson
748	Jo and David Gebhardt
749	Ms Jillian Staton-Regazzo
750	Ms Sonia Teitel
751	Mr John Michelmore
752	Australian Wind Energy Institute (AWEI)
753	Ms Joan Liley
754	Bendigo Sustainability Group
755	Mr David Fletcher
756	Ms Kati Thompson
757	B.J. Hall and F.M. Raschka
758	Dr Peter Morgan
759	Mr William Huson *plus* Attachment
760	Name Withheld
761	Mr Fred Davies
762	Mr Greg Fletcher
763	Mr Betrand Rossi
764	Mr RV and Mrs PJ Barbero
765	Association for Geoconservation, Hong Kong
766	Alain and Isabelle Ducatillon
767	Dr David Colby
768	Ms Christine Lovelock
769	Mr Richard Kelly
770	Robert, Anthony and Gordon Kelly
771	Cr Geoff White

772 Mr Mark Wills

773 Mr Mike Lewis, RPG Australia

774 Mrs Amanda Straw

775 Mr Brian Gallagher
- Supplementary Submission

776 Mr John B Howard

777 Mr Gabrielle Leago

778 Mr John Harvey, Central Victorian Greenhouse Alliance

779 Confidential

780 Mr Adrian Lyon *plus* Attachment

781 Mr William Holmes a Court

782 Confidential

783 Mr Alex Cross

784 Mr Matthew Saward, Circular Head Council

785 Confidential

786 Mr John Brenan

787 Karen and Peter Corbett, Powerhouse Productions

788 Confidential

789 Mr Daniel Ardoin, ASSOCIATION VIGI-EOLE

790 Mr Rob Spehr

791 Rowan and Theresa Huxtable, Wollongong Climate Action Network

792 CAETS Noise Control Technology Committee

793 Middelgrundens Windpower Co-operative

794 Confidential

795 Mr Kevin Bennewith

796 Mr Ralph Kuhn

797 Mr Colin Schaefer

798 Mr Kirby Anderson, GE Energy

799 Mr Peter McLaughlin *plus* Attachments

800 Mr Don Fairbrother

801 Australian Psychological Society

802 Noise Watch Australia Inc.

803	Confidential
804	Name Withheld
805	Mr Jeff Rowe
806	Ms Lynden Riley
807	Mr Mick Kerin
808	Ms Tracy Strange
809	Mayor Daryl Quilliam, Circular Head Council
810	Mr David Brooks, Parkesbourne/Mummel Landscape Guardians Inc.
811	Mr Kim Derriman
812	Confidential
813	Mr Brian Wolfenden
814	John and Rhonda Spehr
815	Mr Frank Brennan, WATTLE RANGE COUNCIL
816	Mr Todd Palmer
817	Mr Richard Bell
818	BlueScope Steel
819	NSW Government
820	Ms Maria C Lopez Leyro
821	Mr Tom Robertson
822	Mr Matthew Donoghoe
823	Mr Gary Cunningham
824	Els Tielemans and Johan Debast
825	Kate and Michael de Kleuver
826	Ms Helen Bignell
827	Ms Elizabeth Atkins *plus* Attachment
828	Mr Peter Robertson
829	Doctors for the Environment Australia
830	Mr Mark Duchamp, Climate Change and Alternative Energies, Iberica
831	Mr Paul Manning
832	Confidential
833	Dr David Moncrieff *plus* Attachment

834	Confidential
835	Mr David Jackson
836	Friends of Collector Inc *plus* Attachments
837	Tony and Judy Hodgson
838	Mrs Renate Metzger *plus* Attachments
839	Sarah and Philip Hawker *plus* Attachments
840	Name Withheld
841	Ron and Chris Jelbart
842	Ms Lindy Sharp
843	Mr N.B Carter
844	Dr Andrew Lothian
845	Dr John Merory
846	Confidential
847	Confidential
848	Mr David McLaren *plus* Attachments
849	Confidential
850	National Health and Medical Research Council
851	Mr Gilbert Wilson
852	Mr Gerry Meyer *plus* Attachments
853	Confidential
854	Confidential
855	Ms Kay Stafford *plus* Attachments
856	Confidential
857	Confidential
858	Mr Andrew Greenwood
859	Confidential
860	Mr Timothy Le Roy
861	Northern Areas Council *plus* Attachments
862	Confidential
863	Mr Wes Crisp
864	Confidential
865	Ms Sue Corrigan *plus* Attachment
866	Mr Stephen Mitchell

867	Lal Lal and Elaine Landscape Action Group
868	Confidential
869	Confidential
870	Mr Brian Osborne
871	The Mundoora Bowling Club Inc
872	Melbourne Energy Research Institute (MEI)
874	Mr Michael Addison
875	Ms Astrid Kaupert, translated by Dr Claus Dirnberger (NAATI ID)
876	Mr Hans Ulrich Schroeder, Bundesverband Landschaftsschutz e.V (BLS), translated by Dr Claus Dirnberger (NAATI ID)
877	Dr Klaus Peter Krause, translated by Dr Claus Dirnberger (NAATI ID)
878	Mr Bertrand Rossi, Castelnau de Levezou Cultural Centre, translated by Sabine Bouladon (NAATI ID)
879	Mr Claude Reboul, The Wind Blowing Through the Mountains Association, translated by Sabine Bouladon (NAATI ID)
880	Mr Francois Talon, La croisee des vents Association, translated by Sabine Bouladon (NAATI ID)
881	Mr Herve Texier, translated by Sabine Bouladon (NAATI ID)
882	Mr Jean Pierre Riou, translated by Sabine Bouladon (NAATI ID)
883	Confidential
884	Mr Nick Pastalatzis
885	Boorowa District Landscape Guardians Inc
886	Ms Jackie Rovensky
887	Mr Charlie Arnott
888	Dr Alan Watt OAM
889	Ms Cherie Draper
890	Mr David Mackay
891	Name Withheld
892	Ms MairiAnne Mackenzie
893	Confidential
894	Dr Caroline Cook
895	Dr Kathryn Antioch *plus* Attachments
896	Port Fairy Consolidated School

897	Dr Carl Phillips
898	Cr Gilbert Wilson
899	Mr Craig Falconer
900	Association de Defense des Collines du Pic d'Estelle
901	Ms Teresa Paltridge
902	Mr Steven Jeffery
903	Michael and Robyn Phyland
904	Ma Karen Jones *plus* Attachment
905	Mr John Howard
906	Infigen Energy
907	Mr William Grainger
908	Mr Noel Carter
909	Mr Phillip Evans
911	Ms Jenny Wall
912	Name Withheld
913	Mr Terry O'Brien
914	Mr Rupert Elvins
915	Mr Russell Jones
916	Mr Darren Sexton
917	Chelsea Heights EarthCarers Group
918	Ms Melinda Munn
919	Mr Lynden Lee
920	Mr Leigh Roberts
921	Ms Jenny Klingberg
922	Friends of the Great South West Walk
923	Ms Angela Munro
924	Mr Ashley Peake
925	Dr Barbara Fraser
926	Mr Ben Walsh
927	Ms Bethany Hoye
928	Blade Repairs Australia
929	Dr Caroline Cook
930	Mr Darren Stephens

931	Mr Gerard Wheeler
932	Friends of Cape Nelson Landcare/Coastcare
933	Mr John Doyle
934	Ms Linda Zibell
935	Ms Susan Wills
936	Mr Tony Foti
937	Ms Paulette Crawley
938	Mr Nilesh Patel
939	Ms Nikki Friend
940	Mr George Browne
941	Redrock Central Cleaning
942	Climate Action Moreland
943	Mr Declan Peake *plus* Covering Letter
945	Ms Ann Gardner
946	Mr Gus Gardner
947	Mr Andrew Reid *plus* Attachment
948	Name Withheld *plus* Covering Letter
949	Mr Martin Shield
950	Mr John Faint
951	Ms Wanda Allott
952	Anne and Allan Schafer
953	Mr Brendan Jarrett
954	Confidential
955	Dr Chris Hanning *plus* Covering Letter
956	Mr Mark Cool
958	Ms Marg Kelly
961	Mr John Faint, Waterloo and District Concerned Citizens Group
962	Confidential
963	Veronica and Keith Smith
964	Mr Lyall Frazer
965	Harden Shire Council
966	Mr Murray Woods
967	Confidential

968	Michael and Margo Rees
969	Ms Leanne Robinson
970	Mr Tim Otter
971	Mr Jim Robinson
972	Ms Barbera Powell
973	Clare and Gerald Miller
974	Ms Janet Jackson *plus* Attachments
975	Mr Carlos Andrade
976	Ms Elizabeth McGregor
977	Mr Anthony Briody
978	Tom and Lin Butcher
979	Mr Robert R Addison
980	Kaye and Howard Draffin
981	Mr Ray Sullivan
982	Mr Ernst Weyhausen, NewEn Australia Pty Ltd *plus* Attachment
983	Confidential
984	Mr Edward Coleridge
985	Ms Geraldine Foti
986	Ms Anne Gutauskas
987	Ms Wendy McGarvie
988	Irene and David Willison
989	Mr Rodger Weste, Max Crane and Equipment Hire (SA) Pty Ltd
990	Mr Geoff Bailey
991	Mr Dale Askew
992	Ms Carey Wakely
993	Mr Ben Lipplegoes
994	Mr Dom Brabender
995	Mr Rodney Ryan
996	Mr Des Bowman
997	Mr Matthew Malseed
998	Mr David Mills
999	Mr Martin Logan
1000	Mr Adam Currie

1001	Mr Matthew Kohlman
1002	Mr Will Little
1003	Mr Luke Van Heugten
1004	Mr Sonny Chapman
1005	Mr Allan Waters
1006	Ms Helen Henry
1007	Ms Wendy Rawiri *plus* Attachments
1008	Ms Brigitte Reiche
1009	Mr Alasdair Stuart
1010	Mr Steve Wikes
1011	Ravi and Saskya
1012	Moonies Hill Energy Pty Ltd
1013	Confidential
1014	Mr Thomas Paltridge
1015	Country Guardian
1016	Vent de Raison
1017	Mr Pierre Bonn

Form Letters

1	Form Letter Style 1, Received from approximately 1100 Individuals.
2	Form Letter Style 2, Received from approximately 35 Individuals.
3	Form Letter Style 3, Received from approximately 17 Individuals
4	Form Letter Style 4, Received from 2 Individuals.

APPENDIX 2

ADDITIONAL INFORMATION RECEIVED BY THE COMMITTEE

Acciona Energy

- Response to possible adverse comment, received 24 March 2011

Aerial Agricultural Association of Australia

- Answers to a Question on Notice from Mr Phil Hurst, CEO, received 25 March and 27 April 2011.

AGL

- Answer to a Question on Notice received 20 April 2011.

Artists for the Environment Landscape Guardians

- *An Economic Assessment of the proposed McHarg Ranges wind farm*, report by Access Economics Pty Ltd, received 28 March 2011

Australian Landscape Guardians

- Wind farm noise, received 5 April 2011

Australian Psychological Society and the Climate and Health Alliance

- Answer to a Question on Notice, Comments on Draft National Wind Farm Development Guidelines, received 4 May 2011.

Barry, Ms Lynda

- Interviews with families living near wind turbines in Wisconsin, US
- 'Mars Hill Wind Turbine Project, Health Effects - Pilot Study', M. A. Nissenbaum [PowerPoint presentation]

Burraston, Dr David

- Document on local meteorological impacts of large-scale wind farms, received 13 April 2011
- *Air Emissions due to Solar and Wind Power*, Paper, received 14 April 2011
- Energy Ventures report on decommissioning of wind turbines at Beech Ridge, USA, received 14 April 2011
- *Incorporating wind into a Natural Gas Turbine Baseline Power System Increases Nitrous Oxide and Carbon Dioxide Emissions from the Gas Turbines*, Paper, received 14 April 2011
- Testimony of Dr Jay Apt to the US House of Representatives Committee on Energy and Commerce, received 14 April 2011

CSIRO

- Answers to Questions on Notice from hearing on 25 March 2011, received 27 April 2011.

Davis, Ms Sarah

- Confidential

Dean, Mr Noel

- Extracts from documents: Origin energy: Department of Health and Ageing: Minneapolis Star Tribune: Waubra Wind Farm Noise Impact Assessment for Mr and Mrs Dean.
- Answer to question on notice received 7 May 2011
- Acciona Energy - *Waubra Wind Farm Operational (Stage 2) Environmental Management Plan Version 1.1*, February 2008. Received 7 May 2011
- Correspondence from Noise Measurement Services and Acciona Energy, received 10 April 2011
- Power point presentation and extracts from Dr Salt's paper on infrasound, received 10 April 2011
- Noise measurement data at Dean residence

Department of Climate Change and Energy Efficiency

- Answers to Questions on Notice received 2 May 2011.

Doctors for the Environment

- Answers to questions on notice received 9 May 2011
- Answer to a Question on Notice in relation to the NHMRC Rapid Review, received 7 April 2011.

Doolan, Mr Con

- Confidential

Evans, P and MA

- Glen Innes wind farm: "Statement of Facts and Contentions 2010", received 7 February 2011.

Falconer, Mr Craig

- "Submission for the Dollar Wind Farm Proposal", received 7 February 2011.

Friends of the Earth Australia

- Report: *Wind farms and Community Engagement in Australia: A Critical Analysis for Policy Learning*, received 31 March 2011.

Greenpeace

- Energy Shock: Confronting higher prices, received 25 March 2011
- Wind energy and electricity prices, received 25 March 2011
- Electricity from renewable energy sources, received 25 March 2011
- '2009 Wind Technologies market report', received 25 March 2011
- Answers to questions on notice and letter from Greenpeace Research Laboratories received 20 April 2011.

Information received via Fax. Sender Unknown.

- Letter(fragment) relating to Lal Lal wind farm, received February 2011

Fraser, Mr Andrew

- Letter: Concerns relating to Macarthur Wind farm, received 13 December 2010

Frey, Ms Barbara

- 'Noise radiation from wind turbines installed near homes: effects on health', B. Frey and P Hadden

Fricker, Ms Ally

- 'The Answer is blowing in the Wind', pamphlet written and produced by Ally Fricker, illustrations by Evie Leonard.

Hodgson, Mr A

- Danish, Japanese and British Press reports on health issues, received 9 April 2011
- NHMRC report: email message, received 9 April 2011

Hepburn Wind

- Photograph of protest; email from Australian Environment Foundation to Australian Landscape Guardians; List of submissions in support of wind farms, received 29 March 2011
- Weblink to noise compliance requirements, received 8 April 2011
- Data on pre-construction noise monitoring, received 8 April 2011

Hindmarsh, Dr Richard, Snr Associate Professor

- "Wind Farms and Community Engagement in Australia: A Critical Analysis for Policy Learning".

Krogh, Ms Carmen

- 'First International Symposium, The Global Wind Industry and Adverse Health Effects: Loss of Social Justice?' Messages of Support.
- Ms Carmen Krogh and from The Society for Wind Vigilance: 'Annoyance, A Clinical Misnomer?' poster by Brett Horner, BA, CMA.

- 'The Relationship of Increased Mood Alterations and Industrial Wind Turbines - Implications and Social Justice', poster by Lorrie Gillis, Protocol Administrator, and Carmen Krogh, BscPharm.

Laurie, Dr Sarah

- European Heart Journal, 7 February 2011 - "Sleep duration predicts cardiovascular outcomes: a systematic review and meta-analysis of prospective studies."

LeRoy Mr John

- Received 30 March 2011

Lowrey, Ms P

- Article – Infrasound: The Hidden Annoyance of Industrial Wind Turbines – Professor Claude Renard., received 3 March 2011

Ms Carmen Krogh and The Society for Wind Vigilance

- 'An Integrative Curriculum for the Winds of Change - Advancing Critical Thinking about the Michigan Wind Rush', poster by Elizabeth E. Wheatley, PhD.
- 'VOW - Victims of Wind', poster by Barbara Ashbee.
- 'Policy and Political Process - the Consequences', poster by Barbara Ashbee and contributors globally (VOW).

Medical Officer of Health

- Report to the Board, Ontario, Canada - 21 January 2011.

McMurtry, Professor Robert, University of Western Ontario

- Evidence of Known Adverse Health Effects Related to Industrial Wind Turbines, Submitted to the Appeal for Renewable Energy Approval issued to Kent Breeze Corp. and MacLeod Windmill Project Inc. (Kent Breeze Wind Farms) c/o Suncor Energy Services Inc., EBR Registry Number 011-1039Chatham-Kent

National Health and Medical Research Council

- Answers to questions on notice received 24 May 2011

North West Minerals Province

- Blueprint for the Future Development of the North West Minerals Province

Oil Mallee Australia.

- Health issues: press clippings, received 16 February 2011

Pierpont, Dr Nina

- Pierpont rebuttal to McCunney affidavit, received 18 January 2011
- "Author Preprint" (June 2010), author Dr. Alec N. Salt

Phyland, Mr Michael and Mrs Robyn

- Presentation: Lal Lal wind farm, received 16 February 2011.

Putland, Mr Geoff and Ms Christine Thompson and the Glen Innes Landscape Guardians

- NSW Legislative Council Committee report on rural wind farms

Pyrenees Shire Council

- Council Land Valuation Report, received 30 March 2011

Russell, Ms Kathy

- Quadrant Article, July 2010 - "The Great Renewable Energy Rort", by Kathy Russell.
- Reference from Quadrant Article, "Driving Investment in Renewable Energy in Victoria, Options for a Victorian market-based measure", 1 February 2006

Society for Wind Vigilance

- First International Symposium on Adverse Health Effects from Wind Turbines - No Rules, No Caution, No Accountability – Paper: No global standards
- First International Symposium on Adverse Health Effects from Wind Turbines - No Rules, No Caution, No Accountability – Paper: How we got here
- First International Symposium on Adverse Health Effects from Wind Turbines - No Rules, No Caution, No Accountability – Paper: Wind turbine noise
- First International Symposium on Adverse Health Effects from Wind Turbines - No Rules, No Caution, No Accountability – Paper: Wind turbine noise and sleep
- Infrasound - Your ears "hear" it but they don't tell your brain, by Alec N. Salt PhD
- First International Symposium on Adverse Health Effects from Wind Turbines - No Rules, No Caution, No Accountability - Paper: The Consequences, Violation of Social Justice
- First International Symposium on Adverse Health Effects from Wind Turbines - No Rules, No Caution, No Accountability - Paper: Loss of Social Justice?

Vestas Australia Wind Technology Pty Ltd

- Weblink to Wind Energy Update – Dong Energy, received 29 March 2011
- Article by Gary Norris, "Ontario Court Dismisses Appeal on Wind Farm Health Concerns", March 3, 2011, received 14 March 2011.
- Copy of Ontario Superior Court of Justice decision, received 14 March 2011

Victorian Planning and Environment Law Association

- Planning issues: power point presentation and newsletter article, received 4 April 2011

Wittert, Professor Gary

- Answer to a Question on Notice received 3 May 2011.

CORRESPONDENCE RECEIVED BY THE COMMITTEE

Fisher , Mr Joseph

- Correspondence received, 7 February 2011

Hewitt , Mr and Mrs Jeremy and Belinda

- Correspondence received, 10 April 2011

Linke, Ms Amy

- Correspondence received, 9 February 2011

Marlow, Mr Leigh

- Correspondence received, 8 March 2011

Nardin, Mr Xavier

- Correspondence received, 11 February 2011

Pacific Hydro

- Response to potential adverse comment

Paine , Ms Lynn

- Correspondence received, 10 February 2011

Ribbons, Mr Ben

- Correspondence received, 25 January 2011

WestWind Energy

- Response to potential adverse comment

APPENDIX 3

PUBLIC HEARINGS

Friday 25 March 2011

Parliament House, Canberra

Committee Members in attendance:

Senator Rachel Siewert (Chair)
Senator Judith Adams
Senator Sue Boyce
Senator Carol Brown
Senator Mark Furner
Senator Steve Fielding

Witnesses

Department of Climate Change and Energy Efficiency

Mr Andrew Bailey, First Assistant Secretary, Renewable Energy Efficiency Division

Mr David Tonna, Director, Strategy and Partnerships Branch, Renewable Energy Efficiency Division

Dr Nina Pierpont, Private capacity

Commonwealth Science and Industrial Research Organisation (CSIRO)

Dr Peta Ashworth, Group Leader, CSIRO Science into Society Group

Dr Nina Hall, Social Scientist, SCIRO Science into Society Group

Greenpeace Australia Pacific

Mr Julien Vincent, Climate and Energy Campaigner

Aerial Agricultural Association of Australia Ltd

Mr Phillip Hurst, Chief Executive Officer

Dr James Prest, Private Capacity

AGL Energy Ltd

Mr Nigel Bean, Head - Generation Development

Ms Sarah McNamara, Head - Government Affairs

RES Australia Pty Ltd

Mr Matthew William Rebbeck, Technical Director

Union Fenosa Wind Australia

Mr Guillermo Alonso, Technical Manager

Mr Thomas Mitchell, Development Manager

Mr Shaq Mohajerani, Engineering Manager

Union Fenosa Wind Australia Crookwell 3

Mr Matthew Donoghoe, Landholder

Monday 28 March 2011

University of Ballarat, Ballarat

Committee Members in attendance:

Senator Rachel Siewert (Chair)
Senator Claire Moore (Deputy Chair)
Senator Steve Fielding
Senator Sue Boyce
Senator Judith Adams

Witnesses

Mr Carl and Mrs Samantha Stepnell, Private Capacity

Mr Noel Dean, Private Capacity

Australian Landscape Guardians

Mr Paul Miskelly, Member, Technical and Economic Committee

Mr Peter Mitchell, Member, Technical and Economic Committee

Artists for the Environment Landscape Guardians

Mr Peter Russell-Clarke, President

Prom Coast Guardians Inc

Mr Alexander McKinlay, President

Mr Peter Wingett, Secretary

Dr Alan Lacey, Public Officer

Grampians-Glenthompson Landscape Guardians Inc

Mr Adrian Lyon, Secretary

Mrs Judy Vanrenen, President

Mrs Helen Lyon, Committee Member

Western Plains Landscape Guardians

Mr Andrew Charles Gabb, Chair

Mr David Jackson, Committee Member

Mrs Megan Read, Secretary

Moyne Shire Council

Mr Russell Guest, Manager, Strategic Planning

Glenelg Shire Council
Mr Sydney Deam, Group Manager Planning and Economic Development
Ms Sharon Kelsey, Chief Executive Officer

Pyrenees Shire Council
Mr Stephen Cornish, Chief Executive Officer
Mr David Clark, Councillor, Mitchell Riding
Mr Chris Hall, Senior Town Planner,

Chepstowe Wind Farm Action Group
Mrs Jenny Bruty, Leader, Rural Zone Landowners Group

Mr Per Bernard, Private Capacity

Mrs Robyn Brew, Private Capacity

Mr Tony Briddy, Private Capacity

Mr Stephen Coleman, Private Capacity

Mrs Suzanne Dean, Private Capacity

Mr James Elsworth, Private Capacity

Mr William Elsworth, Private Capacity

Mr Richard Leigh Evans, Private Capacity

Ms Karen Jones, Private Capacity

Mrs Angela Kearns, Private Capacity

Mr Graeme Keating, Private Capacity

Mrs Cathy Keating, Private Capacity

Mrs Tanya Kehoe, Private Capacity

Mr Richard Kelly, Private Capacity

Mr Brian Kermond, Private Capacity

Dr David Mackay, Private Capacity

Mr Peter McLaughlin, Private Capacity

Mr John McMahon, Private Capacity

Mrs Heather McMahon, Private Capacity

Mrs Renate Metzger, Private Capacity

Ms Melanie Robertson, Private Capacity

Mr Allan Schafer, Private Capacity

Mrs Anne Schafer, Private Capacity

Mr Peter Seligman, Private Capacity

Mr Martin Shield, Private Capacity

Mr Donald Thomas, Private Capacity

Ms Alicia Webb, Private Capacity

Tuesday 29March 2011

St James Court Conference Centre, Melbourne

Committee Members in attendance:

Senator Rachel Siewert (Chair)
Senator Claire Moore (Deputy Chair)
Senator Judith Adams
Senator Sue Boyce
Senator Steve Fielding

Witnesses

Vestas Australian Wind Technology Pty Ltd

Mr Ken McAlpine, Director, Policy and Government Relations, Asia-Pacific Region

Ballarat Renewable Energy and Zero Emissions

Mr Andrew Bray, Community Campaigner

Clean Energy Council

Mr Russell Marsh, Policy Director

Mr Matthew Warren, Chief Executive Officer

Waubra Foundation

Dr Sarah Laurie, Medical Director

Country Fire Authority Victoria

Mr Geoffrey Conway, Deputy Chief Officer, Emergency Management

Hepburn Wind

Mr Simon Holmes à Court, Chairman

Acciona Energy

Mr Brett Wickham, Director Generation

Mr Andrew Thomson, Director Development

Infigen Energy

Mr Jonathon Upson, Senior Development Manager

Origin Energy Ltd

Mr Kyle Russell, Group Manager Development

Pacific Hydro Pty Ltd

Mr Lane Crockett, General Manager Australia

WestWind Energy Pty Ltd

Mr Phil Burn, Project Developer
Mr Tobias Geiger, Managing Director

Wind Pacific (Australia) Pty Ltd

Mr Craig Eyes, Director

Friends of the Earth Australia

Mr Cam Walker, Campaigns Coordinator

Victorian Planning and Environment Law Association

Mr Peter O'Farrell, Board Member,
Ms Jane Sharp, Executive Director

Climate and Health Alliance

Dr Susie Burke, Board Member and Senior Psychologist, Public Interest, Environment and Disaster Response, Australian Psychological Society

Professor Simon Chapman, Expert Adviser, and Professor of Public Health, University of Sydney

Ms Elizabeth Reale, Board Member and Federal Professional Research Officer, Australian Nursing Federation

Mr Andrew Cox, Private capacity

Thursday 31 March 2011

Legislative Assembly, Perth

Committee Members in attendance:

Senator Rachel Siewert (Chair)
Senator Claire Moore (Deputy Chair)
Senator Judith Adams
Senator Sue Boyce
Senator Steve Fielding

Witnesses

Sustainable Energy Association of Australia

Mr Neil Anthony Prentice, Advisory Services Manager

Friends of Collector Inc
Mr Anthony Hodgson AM, Inaugural President

Western Australian Farmers Federation Inc
Mr Dale Park, Senior Vice President

Professor Gary Wittert, Private Capacity

Doctors for the Environment Australia
Dr George Crisp, WA Representative

Mr Roger Bilney, Private Capacity

Ms Helen Bignell, Private Capacity

Mrs Elizabeth Atkins, Private Capacity

Oil Mallee Association of Australia Inc
Mr Lex Hardie, President

National Health and Medical Research Council
Professor Warwick Anderson AM, Chief Executive Officer
Professor John McCallum, Head of Research Translation Group

SkyFarming Pty Ltd
Mr Andrew Woodroffe, Technical Director

Collgar Wind Farm Pty Ltd
Mr Alistair Craib, Chief Executive Officer

Moonies Hill Energy Pty Ltd
Dr Sarah Rankin

West Hills Farm Pty Ltd
Mr Mathew Rosser

Tuesday 17 May 2011

Parliament House, Canberra

Committee Members in attendance:
Senator Rachel Siewert (Chair)
Senator Claire Moore (Deputy Chair)
Senator Judith Adams
Senator Sue Boyce
Senator Steve Fielding

Witnesses

Australian Energy Market Operator

Mr David Swift, Executive General Manager Corporate Development

National Acoustic Laboratories

Dr Warwick Williams, Senior Research Engineer

Appendix B – Summary of main conclusions reached in 25 reviews of the research literature on wind farms and health.

Summary of main conclusions reached in 25 reviews of the research literature on wind farms and health.

Compiled by Prof Simon Chapman, School of Public Health and Teresa Simonetti, Sydney University Medical School

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Updated 10 April 2015.

1. Council of Canadian Academies (2015). Understanding the evidence. Wind Turbine Noise.
2. Schmidt JH, Klokker M (2014) Health effects related to wind turbine noise exposure: a systematic review. PLoS ONE 9(12): e114183. doi:10.1371/journal.pone.0114183
3. 2014: McCunney RJ, Mundt KA, Colby WD, Dobie R, Kaliski K, Blais M. Wind turbines and health: a critical review of the scientific literature. Journal of Occupational & Environmental Medicine 2014; 56(11):pe108-130.
4. 2014: Knopper LD, Olson CA, McCallum LC, Whitfield Aslund ML, Berger RG, Souweine K, McDaniel M. Wind turbines and human health. Frontiers in Public Health 2014; 19 June
5. 2014: Arra I, Lynn H, Barker K, Ogbuneke C, Regalado S. Systematic review 2013: association between wind turbines and human distress. Cureus 6(5): e183. doi:10.7759/cureus.183 [Note: this review is a very poor quality paper published in a non-indexed, pay-to-publish journal. A detailed critique of it can be found at the end of this file.]
6. 2014: National Health and Medical Research Council (Australia). University of Adelaide full report (296pp) and draft consultation report (26pp). Final Report (Feb 15 2015)
7. 2013: VTT Technical Research Centre of Finland. (in Finnish) – summary at end of document
8. 2013: Department of Health, Victoria (Australia) Wind farms, sound and health.
9. 2012: Massachusetts Department of Environmental Protection. Independent Expert Science Panel Releases Report on Potential Health Effects of Wind Turbines
10. 2012: Oregon Wind Energy Health Impact Assessment.
11. 2011: Fiumicelli D. Windfarm noise dose-response: a literature review. Acoustics Bulletin 2011; Nov/Dec:26-34 [copies available from simon.chapman@sydney.edu.au]
12. 2011: Bolin K et al. Infrasound and low frequency noise from wind turbines: exposure and health effects. Environmental Res Let 2011;
13. 2010: Knopper LD, Ollsen CA. Health effects and wind turbines: a review of the literature. Environmental Health 2010; 10:78
14. 2010: UK Health Protection Agency Report on the health effects of infrasound
15. 2010: NHMRC (Australia) Rapid Review of the evidence
16. 2010: Chief Medical Officer of Health in Ontario
17. 2010: UK Health Protection Agency. Environmental noise and health in the UK. A report by the Ad Hoc Expert Group on Noise and Health. (this report is about all environmental noise)

18. 2009: Minnesota Department of Health. Environmental Health Division. Public Health Impacts of Wind Turbines.
19. 2009: Colby et al. Wind Turbine Sound and Health Effects: An Expert Panel Review.
20. 2008: Chatham-Kent Public Health Unit.
21. 2007: National Research Council (USA): Impact of wind energy development on humans (Chapter 4: pp97-120) of: Environmental Impacts of Wind-Energy Projects.
22. 2006: Context and Opinion Related to the Health Effects of Noise Generated by Wind Turbines, Agence Française de Sécurité Sanitaire de l'Environnement et du Travail(Affset), 2006. (in French only)
23. 2005: Jakobsen J. Infrasound emission from wind turbines. *J Low Frequency Noise, Vibration and Active Control* 2005; 24(3):145-155
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25. 2003: Eja Pedersen's Review for the Swedish EPA

Reviews of the evidence - extracted highlights

Direct health effects from noise and WTS

- "There is no consistent evidence that noise from wind turbines—whether estimated in models or using distance as a proxy—is associated with self-reported human health effects. Isolated associations may be due to confounding, bias or chance." NHMRC (2014) full report

- "There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines." *Source: NHMRC 2010* http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

- "There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects." *Source: Colby 2009 review* http://199.88.77.35/EFiles/docs/CD/PlanCom/10_0426_IT_100416160206.pdf

- "... surveys of peer-reviewed scientific literature have consistently found no evidence linking wind turbines to human health concerns." *Source: CanWEA* http://www.canwea.ca/pdf/CanWEA%20-%20Addressing%20concerns%20with%20wind%20turbines%20and%20human%20health.pdf

- "There is insufficient evidence that the noise from wind turbines is directly... causing health problems or disease." *Source: Massachusetts review* http://www.mass.gov/dep/energy/wind/turbine_impact_study.pdf

- "There is no reason to believe, based on the levels and frequencies of the sounds and... sound exposures in occupational settings, that the sounds from wind turbines could plausibly have direct adverse health consequences." *Source: Colby 2009 review* http://199.88.77.35/EFiles/docs/CD/PlanCom/10_0426_IT_100416160206.pdf

- "... while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects..." *Source: Ontario CMOH Report* http://www.health.gov.on.ca/en/public/publications/ministry_reports/wind_turbine/wind_turbine.pdf

- "... the audible noise created by a wind turbine, constructed at the approved setback distance does not pose a health impact concern."*Source: Chatham-Kent Public Health Unit* http://www.harvestingwindsupport.com/blog/wp-content/uploads/2011/03/Chatham-KentHealth-and-Wind-.pdf

- There is no evidence for a set of health effects, from exposure to wind turbines that could be characterized as a "Wind Turbine Syndrome." *Source: Massachusetts review* http://www.mass.gov/dep/energy/wind/turbine_impact_study.pdf

- "... there is not an association between noise from wind turbines and measures of psychological distress or mental health problems." *Source: Massachusetts review* http://www.mass.gov/dep/energy/wind/turbine_impact_study.pdf

- "Evidence that environmental noise damages mental health is… inconclusive." *Source: Ad Hoc Expert Group on Noise and Health* http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1279888026747

- "…no association was found between road traffic noise and overall psychological distress…"*Source: Ad Hoc Expert Group on Noise and Health* http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1279888026747

- "To date, no peer reviewed scientific journal articles demonstrate a causal link between people living in proximity to modern wind turbines, the noise (audible, low frequency noise, or infrasound) they emit and resulting physiological health effects." *Source: Knopper&Ollson review* http://www.ehjournal.net/content/pdf/1476-069X-10-78.pdf
  "... there is no scientific evidence that noise at levels created by wind turbines could cause health problems other than annoyance..." *Source: Eja Pedersen 2003 Review* http://www.naturvardsverket.se/Documents/publikationer/620-5308-6.pdf

  "None of the... evidence reviewed suggests an association between noise from wind turbines and pain and stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and headache/migraine." *Source: Massachusetts review* http://www.mass.gov/dep/energy/wind/turbine_impact_study.pdf

"...there are no evidences that noise from wind turbines could cause cardiovascular and psycho-physiological effects." *Source: Eja Pedersen 2003 Review* http://www.naturvardsverket.se/Documents/publikationer/620-5308-6.pdf

"…there was no evidence that environmental noise was related to raised blood pressure…"*Source: Ad Hoc Expert Group on Noise and Health* http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1279888026747

- "The health impact of the noise created by wind turbines has been studied and debated for decades with no definitive evidence supporting harm to the human ear." *Source: Chatham-Kent Public Health Unit* http://www.harvestingwindsupport.com/blog/wp-content/uploads/2011/03/Chatham-KentHealth-and-Wind-.pdf

- "The electromagnetic fields produced by the generation and export of electricity from a wind farm do not pose a threat to public health..."*Source: NHMRC 2010* http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

- "... no consistent associations were found between wind turbine noise exposure and symptom reporting, e.g. chronic disease, headaches, tinnitus and undue tiredness." *Source: Bolin et al 2011 Review* http://iopscience.iop.org/1748-9326/6/3/035103/pdf/1748-9326_6_3_035103.pdf

- "... low level frequency noise or infrasound emitted by wind turbines is minimal and of no consequence... Further, numerous reports have concluded that there is no evidence of health effects arising from infrasound or low frequency noise generated by wind turbines." *Source: NHMRC 2010* http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

- "... renewable energy generation is associated with few adverse health effects compared with the well documented health burdens of polluting forms of electricity generation..." *Source: NHMRC 2010* http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

- "Although opposition to wind farms on aesthetic grounds is a legitimate point of view, opposition to wind farms on the basis of potential adverse health consequences is not justified by the evidence." *Source: Chatham-Kent Public Health Unit* http://www.harvestingwindsupport.com/blog/wp-content/uploads/2011/03/Chatham-KentHealth-and-Wind-.pdf

- "What is apparent is that numerous websites have been constructed by individuals or groups to support or oppose the development of wind turbine projects, or media sites reporting on the debate. Often these websites state the perceived impacts on, or benefits to, human health to support the position of the individual or group hosting the website. The majority of information posted on these websites cannot be traced back to a scientific, peer-reviewed source and is typically anecdotal in nature. In some cases, the information contained on and propagated by internet websites and the media is not supported, or is even refuted, by scientific research. This serves to spread misconceptions about the potential impacts of wind energy on human health..." *Source: Knopper&Ollson review* http://www.ehjournal.net/content/pdf/1476-069X-10-78.pdf

- Afsset was mandated by the Ministries responsible for health and the environment to conduct a critical analysis of a report issued by the *Académie nationale de medicine* that advocated the use of a minimum 1,500 metre setback distance for 2.5 MW wind turbines or more. The Affset report concluded that "It appears that the noise emitted by wind turbines is not sufficient to result in direct health consequences as far as auditory effects are concerned. [...] A review of the data on noise measured in proximity to wind turbines, sound propagation simulations and field surveys demonstrates that a permanent definition of a minimum 1,500 m setback distance from homes, even when limited to windmills of more than 2.5 MW, does not reflect the reality of exposure to noise and does not seem relevant."

Annoyance

- "... wind turbine noise is comparatively lower than road traffic, trains, construction activities, and industrial noise."*Source: Chatham-Kent Public Health Unit* http://www.harvestingwindsupport.com/blog/wp-content/uploads/2011/03/Chatham-KentHealth-and-Wind-.pdf

- "There is consistent evidence that noise from wind turbines—whether estimated in models or using distance as a proxy—is associated with annoyance, and reasonable consistency that it is associated with sleep disturbance and poorer sleep quality and quality of life. However, it is unclear whether the observed associations are due to wind turbine noise or plausible confounders" NHMRC (2014) full report

- "The perception of noise depends in part on the individual - on a person's hearing acuity and upon his or her subjective tolerance for or dislike of a particular type of noise. For example, a persistent "whoosh" might be a soothing sound to some people even as it annoys others."*Source: NRC 2007* http://www.vawind.org/assets/nrc/nrc_wind_report_050307.pdf

- "... some people might find [wind turbine noise annoying. It has been suggested that annoyance may be a reaction to the characteristic "swishing" or fluctuating nature of wind turbine sound rather than to the intensity of sound." *Source: Ontario CMOH Report* http://www.health.gov.on.ca/en/public/publications/ministry_reports/wind_turbine/wind_turbine.pdf

- "… being annoyed can lead to increasing feelings of powerlessness and frustration, which is widely believed to be at least potentially associated with adverse health effects over the longer term."*Source: Ad Hoc Expert Group on Noise and Health* http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1279888026747

- "Wind turbine annoyance has been statistically associated with wind turbine noise, but found to be more strongly related to visual impact, attitude to wind turbines and sensitivity to noise." *Source: Knopper&Ollson review* http://www.ehjournal.net/content/pdf/1476-069X-10-78.pdf

- "... self reported health effects like feeling tense, stressed, and irritable, were associated with noise annoyance and not to noise itself..." *Source: Knopper&Ollson review* http://www.ehjournal.net/content/pdf/1476-069X-10-78.pdf

- "... many of the self reported health effects are associated with numerous issues, many of which can be attributed to anxiety and annoyance." *Source: Knopper&Ollson review* http://www.ehjournal.net/content/pdf/1476-069X-10-78.pdf

- "To date, no peer reviewed articles demonstrate a direct causal link between people living in proximity to modern wind turbines, the noise they emit and resulting physiological health effects. If anything, reported health effects are likely attributed to a number of environmental stressors that result in an annoyed/stressed state in a segment of the population." *Source: Knopper&Ollson review* http://www.ehjournal.net/content/pdf/1476-069X-10-78.pdf

- "… some community studies are biased towards over-reporting of symptoms because of an explicit link between…noise and symptoms in the questions inviting people to remember and report more symptoms because of concern about noise." *Source: Ad Hoc Expert Group on Noise and Health* http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1279888026747

- "... it is probable that some persons will inevitably exhibit negative responses to turbine noise wherever and whenever it is audible, no matter what the noise level." *Source: Fiumicelli review abstract*

- "The major source of uncertainty in our assessment is related to the subjective nature of response to sound, and variability in how people perceive, respond to, and cope with sound." *Source: Oregon review* http://public.health.oregon.gov/HealthyEnvironments/TrackingAssessment/HealthImpactAssessment/Documents/Oregon%20Wind%20Energy%20HIA%20Public%20comment.pdf

- "... sleep difficulties, as well as feelings of uneasiness, associated with noise annoyance could be an effect of the exposure to noise, although it could just as well be that respondents with sleeping difficulties more easily appraised the noise as annoying." *Source: NHMRC 2010* http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

- "Even noise that falls within known safety limits is subjective to the recipient and will be received and subsequently perceived positively or negatively."*Source: Chatham-Kent Public Health Unit* http://www.harvestingwindsupport.com/blog/wp-content/uploads/2011/03/Chatham-KentHealth-and-Wind-.pdf

- "... annoyance was strongly correlated with a negative attitude toward the visual impact of wind turbines on the landscape..." *Source: NHMRC 2010* http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

- "Respondents tended to report more annoyance when they also noted a negative effect on landscape, and ability to see the turbines was strongly related to the probability of annoyance."*Source: Minnesota Health Dept 2009* http://www.health.state.mn.us/divs/eh/hazardous/topics/windturbines.pdf

- "[It is proposed that annoyance is not a direct health effect but an indication that a person's capacity to cope is under threat. The person has to resolve the threat or their coping capacity is undermined, leading to stress related health effects... Some people are very annoyed at quite low levels of noise, whilst other are not annoyed by high levels." *Source: NHMRC 2010* http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

- "Further, sounds, such as repetitive but low intensity noise, can evoke different responses from individuals… Some people can dismiss and ignore the signal, while for others, the signal will grow and become more apparent and unpleasant over time… These reactions may have little relationship to will or intent, and more to do with previous exposure history and personality." *Source: Minnesota Health Dept 2009* http://www.health.state.mn.us/divs/eh/hazardous/topics/windturbines.pdf

- "Stress and annoyance from noise often do not correlate with loudness. This may suggest [that other factors impact an individual's reaction to noise… individuals with an interest in a project and individuals who have some control over an environmental noise are less likely to find a noise annoying or stressful." *Source: Minnesota Health Dept 2009* http://www.health.state.mn.us/divs/eh/hazardous/topics/windturbines.pdf

- "There is a possibility of learned aversion to low frequency noise, leading to annoyance and stress..." *Source: Leventhall 2005 review* http://www.noiseandhealth.org/article.asp?issn=1463-1741;year=2004;volume=6;issue=23;spage=59;epage=72;aulast=Leventhall

- “Noise produced by wind turbines generally is not a major concern for humans beyond a half mile or so because various measures to reduce noise have been implemented in the design of modern turbines.”*Source: NRC 2007*
  http://www.vawind.org/assets/nrc/nrc_wind_report_050307.pdf

- “Noise… levels from an onshore wind project are typically in the 35-45 dB(A) range at a distance of about 300 meters... These are relatively low noise or sound-pressure levels compared with other common sources such as a busy office (~60 dB(A)), and with nighttime ambient noise levels in the countryside (~20-40 dB(A)).” *Source: NRC 2007*
  http://www.vawind.org/assets/nrc/nrc_wind_report_050307.pdf

- “Complaints about low frequency noise come from a small number of people but the degree of distress can be quite high. There is no firm evidence that exposure to this type of sound causes damage to health, in the physical sense, but some people are certainly very sensitive to it.” *Source: Ad Hoc Expert Group on Noise and Health*
  http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1279888026747

- “… there is the theoretical possibility that annoyance may lead to stress responses and then to illness. If there is no annoyance then there can be no mechanism for any increase in stress hormones by this pathway… if stress-related adverse health effects are mediated solely through annoyance then any mitigation plan which reduces annoyance would be equally effective in reducing any consequent adverse health effects. It would make no difference whether annoyance reduction was achieved through actual reductions in sound levels, or by changes in attitude brought about by some other means.” *Source: Ad Hoc Expert Group on Noise and Health*
  http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1279888026747

Infrasound

- “Infrasound is audible when the sound levels are high enough. The hearing threshold for infrasound is much higher than other frequencies. Infrasound from wind farms is at levels well below the hearing threshold and is therefore inaudible to neighbouring residents. There is no evidence that sound which is at inaudible levels can have a physiological effect on the human body . This is the case for sound at any frequency, including infrasound.”
  http://docs.health.vic.gov.au/docs/doc/5593AE74A5B486F2CA257B5E0014E33C/$FILE/Wind%20farms,%20sound%20and%20%20health%20-%20Technical%20information%20WEB.pdf

- "Claims that infrasound from wind turbines directly impacts the vestibular system have not been demonstrated scientifically... evidence shows that the infrasound levels near wind turbines cannot impact the vestibular system."
  http://www.mass.gov/dep/public/press/0112wind.htm
- “There is no evidence that infrasound ... [from wind turbines ... contributes to perceived annoyance or other health effects.” *Source: Bolin et al 2011 Review*
  http://iopscience.iop.org/1748-9326/6/3/035103/pdf/1748-9326_6_3_035103.pdf

- "There is no consistent evidence of any physiological or behavioural effect of acute exposure to infrasound in humans." *Source: UK HPA Report* http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1265028759369

- "... self reported health effects of people living near wind turbines are more likely attributed to physical manifestation from an annoyed state than from infrasound." *Source: Knopper&Ollson review* http://www.ehjournal.net/content/pdf/1476-069X-10-78.pdf

- "... infrasound from current generation upwind model turbines [is well below the pressure sound levels at which known health effects occur. Further, there is no scientific evidence to date that vibration from low frequency wind turbine noise causes adverse health effects." *Source: Ontario CMOH Report* http://www.health.gov.on.ca/en/public/publications/ministry_reports/wind_turbine/wind_turbine.pdf

- "It would appear... that infrasound alone is hardly responsible for the complaints... from people living up to two km from the large downwind turbines." *Source: Jakobsen 2005 review* http://multi-science.metapress.com/content/w6r4226247q6p416/

- "From a critical survey of all known published measurement results of infrasoundfrom wind turbines it is found that wind turbines of contemporary design with therotor placed upwind produce very low levels of infrasound. Even quite close to theseturbines the infrasound level is far below relevant assessment criteria, including thelimit of perception."*Source: Jakobsen 2005 review* http://multi-science.metapress.com/content/w6r4226247q6p416/

- "With older downwind turbines, some infrasound also is emitted each time a rotor blade interacts with the disturbed wind behind the tower, but it is believed that the energy at these low frequencies is insufficient to pose a health hazard." *Source: NRC 2007* http://www.vawind.org/assets/nrc/nrc_wind_report_050307.pdf

Shadow flicker

- "Scientific evidence suggests that shadow flicker [from the rotating blades of wind turbines does not pose a risk for eliciting seizures as a result of photic stimulation." *Source: Massachusetts review* http://www.mass.gov/dep/energy/wind/turbine_impact_study.pdf

- Shadow flicker from wind turbines… is unlikely to cause adverse health impacts in the general population. The low flicker rate from wind turbines is unlikely to trigger seizures in people with photosensitive epilepsy. Further, the available scientific evidence suggests that very few individuals will be annoyed by the low flicker frequencies expected from most modern wind turbines." *Source: Oregon review* http://public.health.oregon.gov/HealthyEnvironments/TrackingAssessment/HealthImpa ctAssessment/Documents/Oregon%20Wind%20Energy%20HIA%20Public%20comment.pdf

- "Flicker frequency due to a turbine is on the order of the rotor frequency (i.e., 0.6-1.0 Hz), which is harmless to humans. According to the Epilepsy Foundation, only frequencies above 10 Hz are likely to cause epileptic seizures." *Source: NRC 2007* http://www.vawind.org/assets/nrc/nrc_wind_report_050307.pdf

Community & social response to wind turbines

- The perception of sound as noise is a subjective response that is influenced by factors related to the sound, the person, and the social/environmental setting. These factors result in considerable variability in how people perceive and respond to sound... Factors that are consistently associated with negative community response are fear of a noise source... [and noise sensitivity..." *Source: Oregon review* http://public.health.oregon.gov/HealthyEnvironments/TrackingAssessment/HealthImpactAssessment/Documents/Oregon%20Wind%20Energy%20HIA%20Public%20comment.pdf

- "Wind energy developments could indirectly result in positive health impacts... if they increase local employment, personal income, and community-wide income and revenue. However, these positive effects may be diminished if there are real or perceived increases in income inequality within a community." *Source: Oregon review* http://public.health.oregon.gov/HealthyEnvironments/TrackingAssessment/HealthImpactAssessment/Documents/Oregon%20Wind%20Energy%20HIA%20Public%20comment.pdf

- "Effective public participation in and direct benefits from wind energy projects (such as receiving electricity from the neighboring wind turbines) have been shown to result in less annoyance in general and better public acceptance overall." *Source: Massachusetts review* http://www.mass.gov/dep/energy/wind/turbine_impact_study.pdf

- "... people who benefit economically from wind turbines [are less likely to report noise annoyance, despite exposure to similar sound levels as those people who [are not economically benefiting." *Source: NHMRC 2010* http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

- "Landowners... may perceive and respond differently (potentially more favorably) to increased sound levels from a wind turbine facility, particularly if they benefit from the facility or have good relations with the developer..." *Source: Oregon review* http://public.health.oregon.gov/HealthyEnvironments/TrackingAssessment/HealthImpactAssessment/Documents/Oregon%20Wind%20Energy%20HIA%20Public%20comment.pdf

- "The level of annoyance or disturbance experienced by those hearing wind turbine sound is influenced by individuals' perceptions of other aspects of wind energy facilities, such as turbine visibility, visual impacts, trust, fairness and equity, and the level of community engagement during the planning process." *Source: Oregon review* http://public.health.oregon.gov/HealthyEnvironments/TrackingAssessment/HealthImpactAssessment/Documents/Oregon%20Wind%20Energy%20HIA%20Public%20comment.pdf

- "Wind energy facilities... can indirectly result in positive health impacts by reducing emissions of [green house gases and harmful air pollutants, and... Communities near fossil-fuel based power plants that are displaced by wind energy could experience reduced risks for respiratory illness, cardiovascular diseases, cancer, and premature death." *Source: Oregon review* http://public.health.oregon.gov/HealthyEnvironments/TrackingAssessment/HealthImpactAssessment/Documents/Oregon%20Wind%20Energy%20HIA%20Public%20comment.pdf

- "The environmental and human-health risk reduction benefits of wind-powered electricity generation accrue through its displacement of electricity generation using other energy sources (e.g., fossil fuels), thus displacing the adverse effects of those other generators." *Source: NRC 2007* http://www.vawind.org/assets/nrc/nrc_wind_report_050307.pdf

- "Community engagement at the outset of planning for wind turbines is important and may alleviate health concerns about wind farms. Concerns about fairness and equity may also influence attitudes towards wind farms and allegationsabout effects on health. These factors deserve greater attention in future developments." *Source: Ontario CMOH Report* http://www.health.gov.on.ca/en/public/publications/ministry_reports/wind_turbine/wind_turbine.pdf

Summary of 2013 VTA Finnish report

VTT Technical Research Centre of Finland has published a new study with a conclusion that wind turbines do not cause any adverse health effects. The study consisted of a review of nearly 50 scientific research articles conducted in Europe, USA, Australia and New Zealand over the past 10 years.

Due to the increased number of wind power projects in Finland, a growing concern has arisen among the public regarding the possible negative impacts wind energy production may have on human health. VTT Technical Research Centre of Finland conducted a comprehensive literature review covering nearly 50 scientific research articles. The review concluded that in the light of current scientific research, there is no evidence to show that the infrasound produced by modern wind turbines is anything but harmless.

The sound of a nearby wind farm is does not possess such qualities or volume that it would cause physical symptoms to humans. The study also concluded that the infra sounds below the auditory threshold does not constitute a health hazard. Additionally, most of the infra sound caused by a wind farm is mixed with other infra sound from the environment and does therefore not cause any additional exposure. According to the research articles reviewed, the low frequency sound with potential hazardous health impacts would have to be of a higher volume than that caused by wind farms, in order to have an impact on our health. Also, concern that shadow flicker may cause epileptic seizures are overruled in the research material. Such seizures cannot be caused by the type of flicker the slow rotation speed of the wind turbine blades produce.

Appendix C – Joint Statement – Pacific Hydro & The Acoustic Group regarding an acoustic study at the Cape Bridgewater Wind Farm, 16 February 2015

16 February 2015

Joint Statement – Pacific Hydro & The Acoustic Group

In 2014, Pacific Hydro commissioned The Acoustic Group to undertake an acoustic study at the Cape Bridgewater Wind Farm. The report, which was the culmination of this study, was publicly released on 21 January 2015.

The report has generated a substantial amount of interest from both the media and the public.

While we understand that some of the technical aspects of the study may be difficult to understand, both Pacific Hydro and Steven Cooper have been concerned and disappointed with some of the public commentary about the report and some of the media reporting.

Therefore Steven Cooper and Pacific Hydro have provided a joint statement that they hope will clarify a number of aspects of the study and the report.

- Pacific Hydro's brief to The Acoustic Group was to see whether any links could be established between certain wind conditions or sound levels at Cape Bridgewater and the disturbances being reported by these six local residents.
- The study did not require evaluating acoustic compliance with the permit conditions, as this had already been established by others.
- The Acoustic Group and Pacific Hydro agree that the study was not a scientific study.
- The Acoustic Group and Pacific Hydro agree that the report does not recommend or justify a change in regulations.
- The Acoustic Group and Pacific Hydro agree this was not a health study and did not seek or request any particulars as to health impacts. Therefore, we cannot enter into a debate about health issues or health impacts that have been raised in the media and the written questions. We note that a recent NHMRC statement indicates that they will be conducting further work in this area which may be an appropriate place for rigorous health research to take place.
- From the outset Pacific Hydro required the study to be transparent and acknowledged that the co-operation between the parties was paramount.
- The study had a limited budget and timeframe (which was exceeded). A lot more work than originally envisaged was required to satisfy the brief.
- The Acoustic Group was engaged as the sole participant in the study.
- The Draft report from the study was provided to residents and Pacific Hydro before public release.
- Both Pacific Hydro and Mr Cooper agree that the study is a new approach to assessing the acoustic environment as it relates to wind turbines, involves a number of hypotheses that are yet to be fully tested and contains information that may prove useful as a basis for further study.

- The study clearly states that no correlation has been found with standard acoustic parameters versus the wind farm but the report suggests a correlation of some parameters versus wind speed.

Three findings have to date been the subject of debate:

- The study indicates residents' observations in relation to sensation followed a pattern related to certain operations of the wind farm that can be related to wind speed. A hypothesis of certain wind farm operations versus high sensation severity was proposed and then investigated with respect to narrow band measurement results.

- Based on the hypothesis proposed by Mr Cooper, the study indicates, on the basis of limited data, that the narrow band infrasound results agree with spectra obtained for other wind farms and from the Cape Bridgewater. This limited data exhibits a trend line with concentration on sensation severity 5, adapted from the AECOM audible noise ranking system.

- Mr Cooper has nominated such a level as a worst case scenario and has suggested a new weighting parameter dB(WTS) with an unacceptable level assigned to the data.

Both Pacific Hydro and Mr Cooper agree that the results of the study identify that further study is required to obtain a rigour that would withstand scientific scrutiny and that would go well beyond the scope of work.

Both Pacific Hydro and Mr Cooper agree that the outcome of the study can lead to further discussion amongst the community, regulatory authorities, planning authorities, other researchers and the wind industry. It is at this point that we are at tonight, where we will explain what has been done to date, so as to move forward into those discussions.

\- End of Statement -