Chapter 7

The effect of wind power on retail electricity prices

7.1 The first term of reference for this inquiry directs the committee to examine the effect of wind power on household power prices and the merits of consumer subsidies for wind farm operators. Put another way, it asks the committee to consider the impact of wind power generation on consumers' electricity bills, and whether the Renewable Energy Target's (RET) assistance to wind power in Australia is justified on public policy grounds.

7.2 Significantly, there is no publicly available Australian evidence on the direct impact of wind power on retail electricity prices. There is limited information on the impact of wind on the wholesale price, and information on the impact of renewables on the retail price.

7.3 This chapter argues that isolating and analysing the impact of wind of retail electricity prices is an area worthy of research. It is important for the policy-makers, the energy sector and the public to know how different renewable energy sources affect household power prices, and how the cross subsidy through the RET from thermal power sources impacts on what households pay.

Structure of the chapter

7.4 This chapter has four parts:

(a) The first looks at some preliminary issues that set the scene for later discussion on the impact of subsidies on the wind industry, and of wind power on household prices. The key questions are:

- what proportion of total electricity generation comes from wind power and how does this contribution compare with generation from renewable and non-renewable sources;
- what has been the trend in wind power generation—relative to generation from other energy sources—over time; and
- what is the marginal long-run cost of wind energy and how does this compare with the costs incurred by other energy sources?

(b) The second part looks at how the RET supports wind power and the impact of the RET on wholesale and retail prices.

(c) The third part of the chapter considers the impact of renewables, and wind energy in particular, on retail prices.

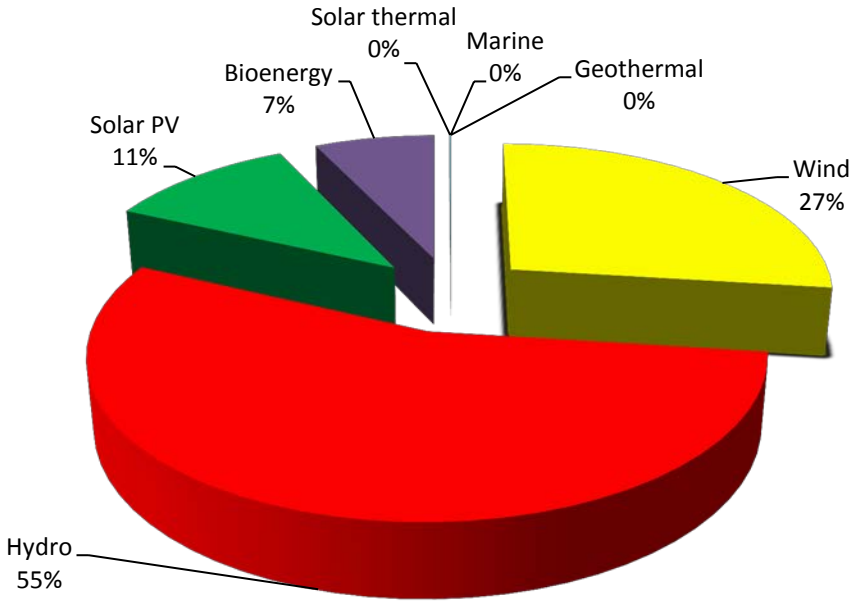
(d) The fourth part of this chapter considers the merit of consumer subsidies for wind farm operators. What is the public policy case for assisting wind companies through the RET? What is the case for reducing this assistance after the cost of capital is recovered?

(e) The final part of the chapter notes the long-term power purchase agreements between power generators and retailers.

Wind power in the renewables market

7.5 To begin, it is useful to place the contribution of wind power in the context of the renewable energy sector. Public policy in Australia has treated renewables—wind, solar and hydro energy—as a block rather than tailoring policies to particular industries. In 2013, wind power accounted for a little over one-quarter of the energy generated by renewables in Australia.[1]

Figure 7.1—Electricity generation by renewable energy source



Source: Clean Energy Council, Report 2013, p. 7

7.6 The Clean Energy Australia Report found that for the 2013 calendar year, renewables accounted for 14.76 per cent of all electricity generation in Australia. The contribution of wind energy to total Australian energy generation for the calendar year of 2013 was under four per cent.[2]

7.7 The Australian Energy Market Operator (AEMO) noted:

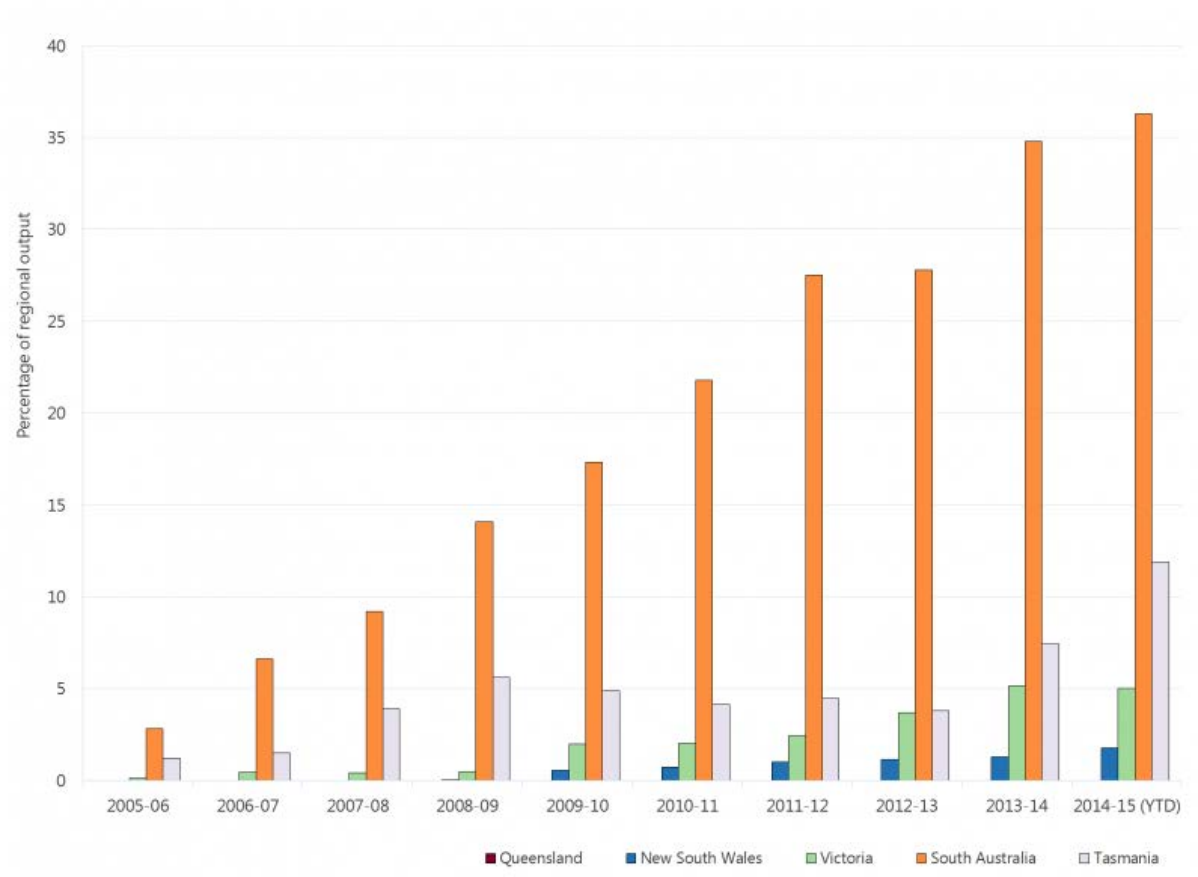
> In the 2014-15 year to 1 April, wind generated 4.7% of grid-connected NEM generation supply. As seen by the figure below, wind energy has been growing rapidly, and is most concentrated in the South Australian region of the NEM.[3]

1 Clean Energy Council, *Clean Energy Australia Report*, 2013, p. 7.

2 Clean Energy Council, *Clean Energy Australian Report*, 2013, p. 8.

3 Australian Energy Market Operator, *Submission 469*, p. 5.

Figure 7.2: Wind output as a percentage of regional output



Source: AER "State of the Energy Market' derived from AEMO data.

7.8 A spot check of the National Electricity Market (NEM) using RenewEconomy.com.au found that at 3.10 pm on 27 May 2015, wind power in the five eastern states was generating 1107 MW or 4.6 per cent of total power into the NEM. This was 32 per cent of the power generated by renewables—wind, hydro, large and small solar.[4]

7.9 However, as many submitters and witnesses to this inquiry have noted, the input of wind into the NEM is highly variable. On 2 June 2015 at 4.25pm, wind accounted for only 80 MWh in Tasmania, Victoria, South Australia and New South Wales. (Queensland did not record any wind power generation and South Australia

4 RenewEconomy, *NEM Watch*, http://reneweconomy.com.au/nem-watch (accessed 27 May 2015, 3.10pm). The site uses data published by the Australian Energy Market Operator (AEMO) and the Australian Photovoltaic Institute. On notice, the committee asked AEMO for its opinion of the accuracy and reliability of the analysis by RenewEconomy.com.au. AEMO responded in *Submission 469, Response to Question 2*, (received 29 June 2015):

> The site developed and maintained by RenewEconomy.com.au draws data from the NEMWatch tool produced by Global-Roam Pty Ltd. Global-Roam is a well-known and reputable firm specialising in repackaging AEMO data into readily accessible formats. AEMO has not audited the site and is not aware of the detailed definition of data displayed. However the data appears reasonable and we have no reason to question the veracity of the Global-Roam product.

recorded only 4 MWh). This represented only 0.3 per cent of total electricity generation (26 266 MWhs) in the NEM at the time.[5]

7.10 One submitter to the inquiry quantified the contribution of wind power to the grid for the whole of the 2014 calendar year. Mr Peter Bobroff personally analysed the five minute data from AEMO for every day of 2014. He found that:

- coal fired generators dispatched between 'about 12 and 20 Gigawatts with an average of 16.6 GW';
- gas fired generators dispatched between 'about 2 to 4 GW with an average of 2.9 GW';
- hydro generators dispatches 'about 1 to 3 GW with an average of 2.9 GW'; and
- wind generators dispatched less than 3 GW with an average of 0.96 GW.

7.11 Mr Bobroff concluded:

> …coal dominates the grid. It provides the base load power, never less than 12GW. Gas and hydro provide the peak loads with their reliable quick responses. Sometimes only a little peaking is required, but their rapid responsive reserve is always needed for overall grid reliability. Wind, with all it's [sic] special privileges, has over 40% probability of producing almost nothing.[6]

7.12 The committee asked AEMO to comment on the accuracy and reliability of Mr Bobroff's analysis. It responded:

> AEMO has reviewed this submission and a related blog. We have not attempted to verify Mr Bobroff's analysis, however the figures and quantities appear reasonable and broadly consistent with our own reports.[7]

7.13 The Australian Energy Regulator commented in a 2014 report:

> …almost 1200 megawatts (MW) of wind capacity have been added in the past two years. Nationally, wind generators accounted for 6.3 per cent of capacity and contributed 4.4 per cent of output in 2013–14. AEMO projected wind generation will drive much of the growth in electricity generation over the next 20 years.[8]

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5 Renew Economy, *NEM Watch*, http://reneweconomy.com.au/nem-watch. The average household lightbulb uses sixty watts. One thousand watts equals one kilowatt (kW); one thousand kilowatts (one million watts) equals one megawatt (MW); and one thousand megawatts (one billion watts) equals one gigawatt. Typically, the rate of energy generated (or consumed) per unit of time is measured as watt hours (wH), kilowatt hours (kWh), megawatt hours (MWh), and gigawatt hours (GWh).

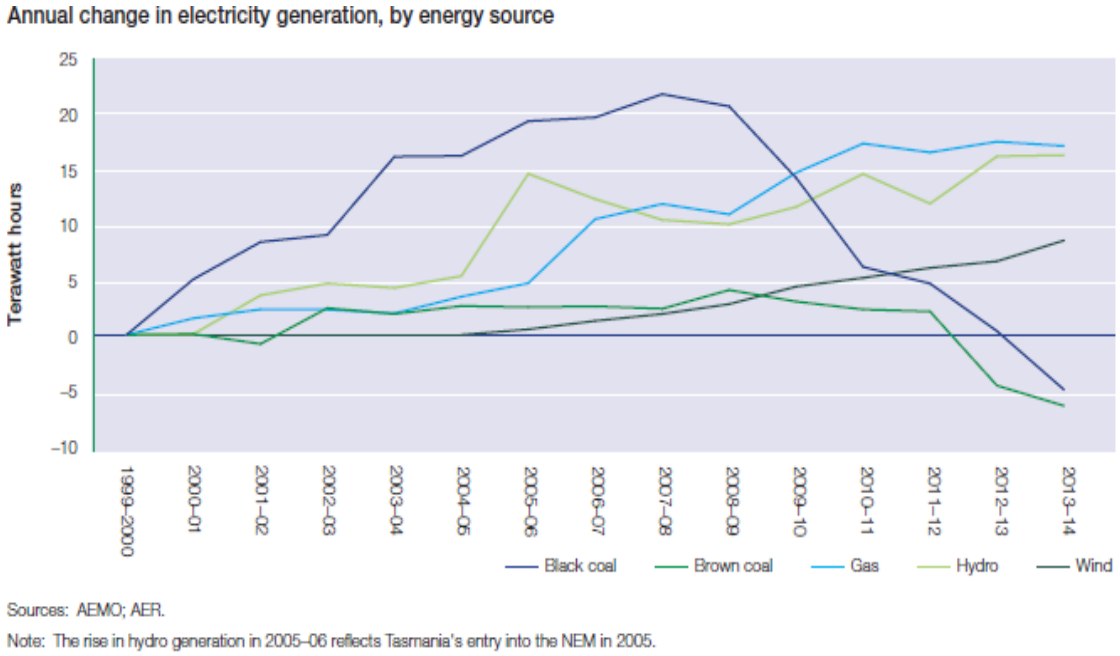
6 Mr Peter Bobroff, *Submission 91*, p. 2.

7 AEMO, *Submission 469, Response to Question 2*, received 29 June 2015.

8 Australian Energy Regulator, *State of the Energy Market*, 2014, p. 27.

7.14 Figure 7.3 below, from the same report, shows that since 2005, wind power is the only energy source to have annually increased the amount of power that it puts into the NEM. Further, the report noted that as of June 2014, wind power accounted for nearly 60 per cent of all major proposed generation investment in Australia.[9] Coal accounted for only 10.5 per cent.

Figure 7.3—Annual change in electricity generation by energy source



Source: Australian Energy Regulator, *State of the Energy Market*, 2014, p. 27.

The Renewable Energy Target cross subsidy

7.15 In 2001, the Howard Government introduced the Mandatory Renewable Energy Target. The goal of the MRET or RET as it is now known, was—and remains—to promote additional electricity generation from renewable sources with the aim of reducing greenhouse gas emissions in the electricity sector.[10]

7.16 The RET works by establishing a 'market' for renewable energy in the form of renewable energy certificates. One certificate is issued for one MW of power produced. The Clean Energy Regulator (CER) awards these certificates to accredited generators of renewable electricity when these generators feed renewable energy into the grid. Electricity retailers ('RET liable entities') are then required to purchase a certain amount of certificates from the generators and surrender them to the CER. The number of certificates that retailers are required to buy is set annually by the CER based on projections to meet the 2020 target. This is shown in Figure 7.4.

7.17 The certificate 'market' thereby creates an artificial demand for renewable energy in preference to thermal energy sources. Under the RET, renewable energy

9 Australian Energy Regulator, *State of the Energy Market*, 2014, p. 35.

10 Australian Energy Regulator, *State of the Energy Market*, 2014, p. 27.

companies can invest and produce energy in the knowledge that electricity retailers must purchase their product. Certainly, wind power companies have created many millions of large scale generation certificates (LGC) since the RET was introduced as Figures 7.5 and 7.6 show.[11] LGC's obtain the lion's share of the certificate market.

7.18 Effectively, therefore, the RET is a cross subsidy to the renewables sector. As the 2014 report into the Review of the RET stated:

> 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.[12]

7.19 The cost of investment in renewable energy is higher than investment in thermal energy sources (coal and gas). This reflects the substantial cost of building renewable energy infrastructure such as wind and solar farms. Energy retailers pass the cost of the RET onto consumers through their retail prices.

7.20 Wind energy has been the main form of energy invested in due to the RET. As AGL stated: 'most large scale projects under the RET to date have been wind farms, and virtually all wind farm development in Australia has occurred as a direct result of this scheme'.[13] RECs make up more than half the revenue that a wind farm earns. The other component is the wholesale price for electricity.[14]

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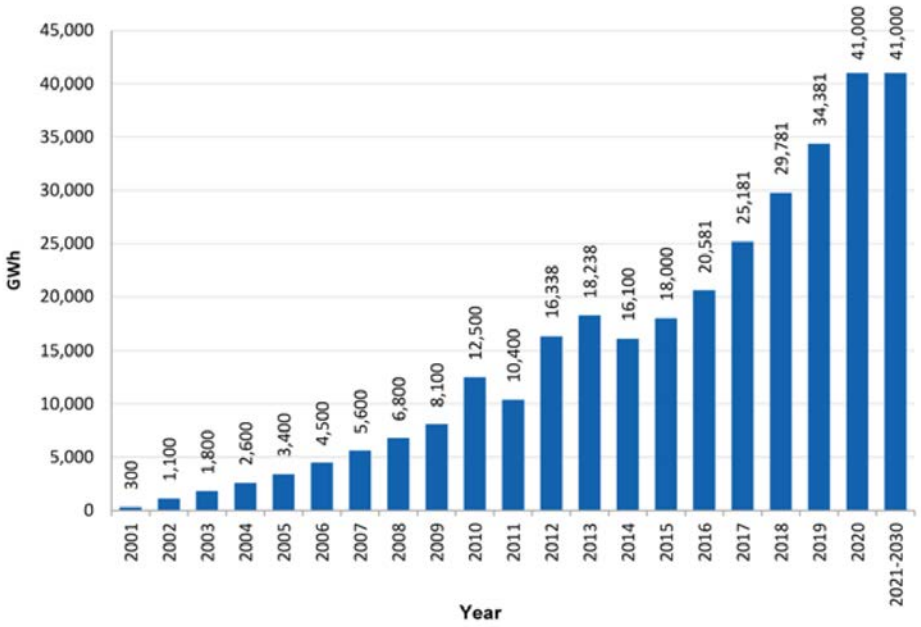
11 See: Australian Government Clean Energy Regulator, *Large Scale Generation Certificates* and *Small Scale Technology Certificates*, http://www.cleanenergyregulator.gov.au/RET/Scheme-participants-and-industry/Power-stations/ (accessed 13 July 2015). Large-scale generation certificates (LGC) are generally issued to commercial electricity generators such as wind and solar farms; whereas Small-scale technology certificates (STC) are generally issued to households with small scale renewable energy technology such as rooftop solar photovoltaic systems and solar water heaters.

12 Renewable Energy Target Scheme: Report of the Expert Panel, August 2014, p. 14.

13 AGL Energy, *Submission 83*, p. 2.

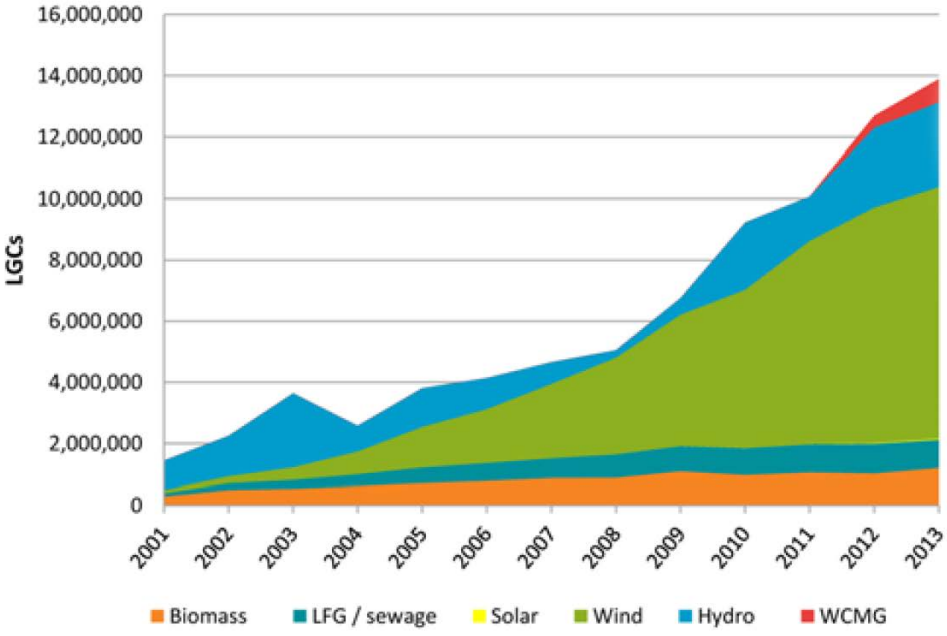
14 Tristan Edis, 'Ignore Abbott, renewable energy certificate prices should rise', *Business Spectator*, http://www.businessspectator.com.au/article/2014/7/2/renewable-energy/ignore-abbott-renewable-energy-certificate-prices-should-rise (accessed 13 July 2015).

Figure 7.4—Profile of annual targets under the RET[15]



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

Figure 7.5—LGCs created by fuel source, 2001–2013 [16]

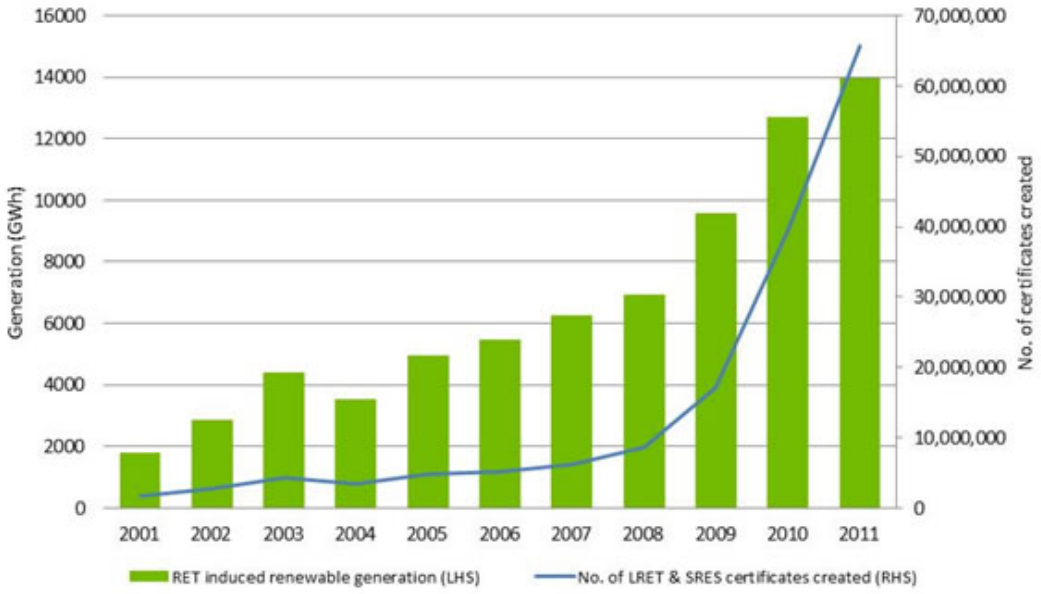


Source: Clean Energy Regulator *Register of Large-scale Generation Certificates, current at 3 June 2014*

15 See: *Renewable Energy Target Scheme: Report of the Expert Panel*, August 2014, p. 3, https://retreview.dpmc.gov.au/sites/default/files/files/RET_Review_Report.pdf (accessed 13 July 2015).

16 *Renewable Energy Target Scheme: Report of the Expert Panel*, August 2014, p. 9.

Figure 7.6—RET induced renewable generation and the number of LRET Large-scale Renewable Energy Target (LRET) and Small-scale Renewable Energy Scheme (SRES) certificates created[17]



REC prices in the LGC market

7.21 The spot price for LGCs (minimum parcel of 5000 certificates) in the six months from October 2014 to May 2015 is presented in Figure 7.7. Spot prices for certificates have increased sharply since February 2015 to $50 in March 2015 and again in May 2015.

7.22 If the marginal cost for a wind farm company to produce 1 MWh of energy is around $80, the RET at current prices offers a significant subsidy ($50 of the $80). In other words, at current REC prices, wind companies have only to raise $30 per MWh from the electricity itself.

7.23 The high REC price in the LGC market essentially reflects renewed confidence in the RET. One of the main brokers, Green Energy Market, has noted that the rising LGC REC price is an indicator of growing confidence that a political deal would be done on the RET.[18]

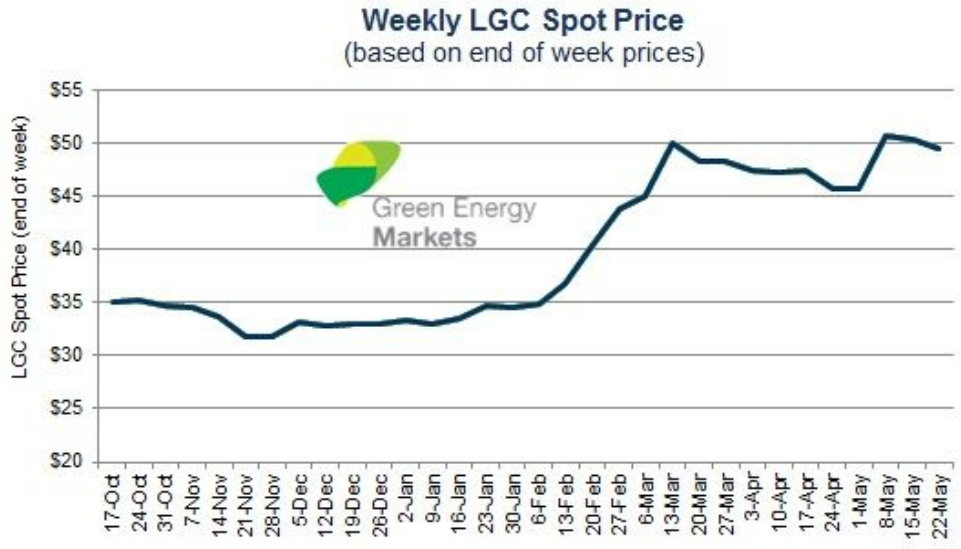
7.24 Green Energy Market has noted that at the time the Warburton Review was announced in early 2014, the spot price was around $32. It then fell to an equal record low of $21 in June 2014. Green Energy Market attributed the sharp rise in the spot

17 Climate Change Authority, *Final Report, Renewable Energy Target Review*, December 2012, p. 8, http://www.climatechangeauthority.gov.au/reviews/2012-renewable-energy-target-review (accessed 13 July 2015).

18 Green Energy Markets, *Quarterly Renewables Report, Q1 2015*, 17 April 2015 http://greenmarkets.com.au/news-events/quarterly-renewables-report-q1-2015 (accessed 2 June 2015).

price from June 2014 to the announcement by the Palmer United Party that it would not support changes to the RET.[19]

Figure 7.7—Weekly LGC spot price, October 2014 to May 2015



Source: Green Energy Markets http://greenmarkets.com.au/resources/lgc-market-prices

7.25 The steep rise in the price of the LGC will impact on the consumer as retailers pass on the price.

The impact of the RET on wholesale and retail electricity prices

7.26 In terms of the impact of the RET on wholesale and retail electricity prices, there is a higher retail price from the requirement for retailers to purchase RECs. Reflected in the cost of certificates is the higher infrastructure cost of establishing energy from renewable sources.

The wholesale market

7.27 In Australia, future energy generation is offered to the market by generators to AEMO in five minute intervals. The bids of generators are then accepted starting with the lowest cost generator and finishing with the highest cost. This is called the 'merit order effect'. This effect essentially reflects that the low marginal cost generation of renewables can underbid coal and gas-fired generators. The extent to which renewables outbid thermal sources will determine who bears the financial cost of the RET. The committee asked Frontier Economics who pays for the large-scale renewable energy subsidy. It responded: 'It is the retail electricity customers via a levy on their electricity bills'.[20]

7.28 As part of the 2014 review of the RET, ACIL Allen found that in most cases, scenarios modelled with a higher RET resulted in lower annual residential bills by 2030. This is largely explained by the downward pressure that large generators such as

19 Green Energy Markets, *Quarterly Renewables Report, Q1 2015*, 17 April 2015.

20 Mr Matt Harris, Frontier Economics, *Proof Committee Hansard*, 29 June 2015, p. 17.

windfarms would exert on the wholesale price of electricity. In terms of the wholesale price over the next decade, the report stated:

> NEM regions commence with prices around $44/MWh in calendar year 2014 and fall to mostly below $33/MWh in 2015 due to it being the first full year without carbon pricing. Prices rise slightly through 2016 and 2017, influenced by additional demand in Queensland and reduced output from gas-fired generation. Through 2017 to 2020 significant amounts of new wind capacity enter the market driven by the LRET and this tends to hold prices at an average of around $30/MWh until around 2025. Some incumbent capacity is mothballed late in the decade due to low profitability as observed within our simulation model. Capacity withdrawal is required to accommodate the additional wind entry and to increase wholesale prices to a sustainable level for incumbent plant operators. Prices begin to slowly rise from 2025 onwards as demand growth has largely absorbed the additional renewable capacity and mothballed plant is reintroduced to service.[21]

7.29 AEMO noted in its submission that it does not publish any data or research on the extent to which renewables (and wind in particular) 'push out' other generation. It did note that 'it can be reasonably assumed that all renewable output in the NEM substitutes for non-renewable output'.[22]

7.30 AEMO also noted that some commentators have analysed AEMO's data on individual days and postulated wholesale prices would have been higher had renewable energy not been operating. However:

> Such analyses should be treated with caution, as they do not consider the complex long-term feedback loops that exist in the real market. For example, when wholesale prices are suppressed for a period of time, non-subsidised plant is likely to withdraw. This in turn has the effect of bringing wholesale prices back up to a new equilibrium over time.[23]

7.31 The extent to which renewables lower the wholesale price will affect the revenue that generators receive and the overall impact of the RET. As the Climate Change Authority commented in its 2014 review of the RET:

> 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

21 ACIL Allen, *Report to RET Review Expert Panel: RET Review Modelling—Market modelling of various RET policy options*, August 2014, p. 9, https://retreview.dpmc.gov.au/sites/default/files/files/ACIL_Report.pdf (accessed 13 July 2015).

22 Australian Energy Market Operator, *Submission 469*, p. 9.

23 Australian Energy Market Operator, *Submission 469*, pp 8–9.

> price effects. For a particular level of renewable capacity, the larger the wholesale price effect, the smaller the overall cost impact on consumers…[24]

7.32 The downward pressure that wind energy places on wholesale prices may only be temporary if its effect is to force wholesale generators out of business. As the Australian Energy Market Commission (AEMC) noted in its 2014 Residential Price Trends report:

> In the short term, subsidised wind generation under the LRET has the effect of increasing supply and putting downward pressure on wholesale energy purchase costs. However, this may only be temporary, as depressed wholesale prices will likely force unprofitable generators to exit the market and the consequent reduction in supply will eventually put upward pressure on wholesale prices. Without lower wholesale prices, the costs of the LRET will become more apparent to consumers through their retail bills.[25]

7.33 The AEMC report also noted that in jurisdictions where the share of wind as a proportion of total energy generation is higher, the impact of the RET is likely to be less given greater reductions in the wholesale price. As it explained:

> …LRET costs are spread equally between retailers in Australia, and therefore consumers, based on their total consumption. As investment in renewable generation has primarily been concentrated in the southern states, any reduction in wholesale energy costs in one jurisdiction is unlikely to be proportionate to the share of the scheme's costs recovered in that jurisdiction.
>
> Consumers in jurisdictions with a high proportion of wind generation subsidised under the LRET, such as South Australia and Victoria, may experience a decrease in wholesale energy costs that offset the costs of the policy in the short term. Conversely, consumers in jurisdictions without significant wind investment from the LRET will not experience lower wholesale energy costs to the same degree, and are therefore likely to face a higher proportion of the costs of meeting the LRET.[26]

7.34 AEMC concluded in its 2014 *Residential Price Trends* report that environmental policies account for eight per cent of a consumer's retail electricity bill. It noted that while the repeal of the carbon tax led to a fall in residential electricity prices in 2014–15 in most states and territories, the cost of the RET is 'expected to increase in the years ahead'. The following table, drawn from the report, shows the anticipated price increases in each jurisdiction.

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24 Climate Change Authority, *Renewable Energy Target Review Report*, December 2014, http://www.climatechangeauthority.gov.au/sites/prod.climatechangeauthority.gov.au/files/files/CCA-RET-Review-published-updated.pdf (accessed 27 May 2015).

25 AEMC, *Residential Price Trends*, 2014, pp 16–17, http://www.aemc.gov.au/getattachment/ae5d0665-7300-4a0d-b3b2-bd42d82cf737/2014-Residential-Electricity-Price-Trends-report.aspx (accessed 13 July 2015).

26 AEMC, *Residential Price Trends*, 2014, pp 16–17.

Table 7.1—Impact of the RET by jurisdiction

	2013–14	2014–15	2015–16	2016–17
New South Wales	0.60	0.65	0.77	0.97
Victoria	0.59	0.64	0.77	0.96
South Australia	0.63	0.68	0.82	1.03
Tasmania	0.81	0.79	0.88	1.03
Queensland	0.58	0.63	0.75	0.94

Source: AEMC, Residential Price Trends, 2014

7.35 The 2014 ACIL Allen report provided modelling of the breakdown of retail price components for average residential electricity bills. It found that:

> Network costs remain by far the largest cost component, accounting for 50-55%, followed by wholesale energy costs at 20-25%. The RET currently comprises around 3.7% of total costs, with this projected to rise to around 6.6% by 2020. After 2020, RET costs decline as a proportion of total retail prices…[27]

The impact of the RET on retail prices

7.36 In August 2014, the expert panel commissioned to review the RET reported to the government. The Review commented on the impact of renewables on the wholesale price and the impact of the RET on retail prices. Significantly, it noted that the wholesale price is also affected by the impact of the RET in generating greater electricity supply and the lower demand for electricity in Australia:

> 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.[28]

7.37 The ACIL Allen report, on which the final report to Government was based, noted that the RET causes wealth transfers from existing generators to both renewable proponents and consumers. However, it added that:

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27 *Renewable Energy Target Scheme: Report of the Expert Panel*, August 2014, p. 22.

28 *Renewable Energy Target Scheme: Report of the Expert Panel*, August 2014, p. i.

7.38 This pattern of price changes does not hold under low demand conditions. This is due to the inability of new renewable generation to further suppress wholesale prices below levels which are unsustainable for incumbent generators to keep operating. Under these conditions, removal of the direct compliance costs is not offset by wholesale price movements and consumers are better off under a Repeal scenario. This is particularly interesting in the current NEM environment in which demand for electricity has fallen every year since 2008–2009 and the largest uncertainty is with respect to future demand growth/decline.[29] Ergon Energy noted in its submission that:

> …across the 2010-2015 regulatory control period green schemes such as the Carbon Tax, Large Scale Renewable Energy Target (LRET), Small Scale Renewable Energy Scheme (SRES), Gas Electricity Certificates (GECs) and the Solar Feed in Tariff (FiT) will cost regional Queensland customers around $1580 million. This equates to an average liability per customer of $2,229 over the five year period. Prior to the removal of the carbon tax this average liability was expected to be $2,654 per customer, noting actual impacts vary according to consumption. For the average residential customer these costs represent approximately 8.5% of their retail bill. Environmental allowances such as the LRET, SRES and GECs account for 37 per cent of the impact and the costs of the Solar FiT and associated network costs account for around 26 per cent. Specifically the estimated cost of the FiT and associated costs is $413 million, with the costs of the SRES estimated to be $280 million. This equates to an average cost of $990.49 per customer over the five years, with the average cost being $311.87 in 2013-14 alone.[30]

7.39 The committee notes that there is some conjecture as to whether electricity retailers pass on the lower wholesale costs from renewable energy to the consumer. Wind Prospect Pty Ltd noted in its submission that:

> South Australia's Essential Services Commission has directed energy companies to pass on the savings from lower wholesale prices and cut retail prices by 8.1 percent effectively lowering the average power bill by $160 a year. This coincides with the growth of wind energy in South Australia where wind energy currently contributes 35% of the state's electricity requirements. [31]

The effect of lowering the RET

7.40 In June 2015, during the course of this committee's inquiry, the Australian Parliament passed the Renewable Energy (Electricity) Amendment Bill 2015. The bill reduces the RET from 41 000 GWh to 33 000 GWh by 2020.[32]

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29 ACIL Allen, *Report to RET Review Expert Panel: RET Review Modelling—Market modelling of various RET policy options*, August 2014, p. 127.

30 Ergon Energy, *Submission 84*, p. 3.

31 Wind Prospect Pty Ltd, *Submission 167*, p. 2.

32 Parliament of Australia, *Renewable Energy (Electricty) Amendment Bill 2015*, http://www.aph.gov.au/Parliamentary_Business/Bills_Legislation/Bills_Search_Results/Result?bId=r5463 (accessed 13 July 2015).

7.41 The effect of lowering the RET would be to curb the excess supply of electricity in the market. There will be fewer RECs created than would otherwise have been the case and the downward pressure on the wholesale price will not be as pronounced.

7.42 In 2014, Schneider Electric was commissioned by five large energy users to examine the electricity price impact of key price drivers in the electricity market—such as the carbon price, the RET scheme, decreasing electricity demand, and increasing gas prices. The study found that reducing the LRET target would result in a minimal reduction in electricity prices in 2016 followed by much larger increases later.[33]

7.43 Figure 7.8 shows the sensitivity of wind power generation to changes in the RET. As the Schneider Electric report noted:

> Increasing the LRET target (LRET Increased) results in a significant increase of wind generation capacity (~40%). In contrast, decreasing the LRET target (LRET Decreased) reduces the amount of installed wind generation capacity by ~40% compared to the Reference scenario [the status quo], whilst removing the scheme reduces the amount of installed wind generation capacity by 53% compared to the Reference scenario.[34]

7.44 The South Australian Government noted in its submission the ACIL Allen analysis showing that the effect of removing the RET would be to increase power prices in the longer-term:

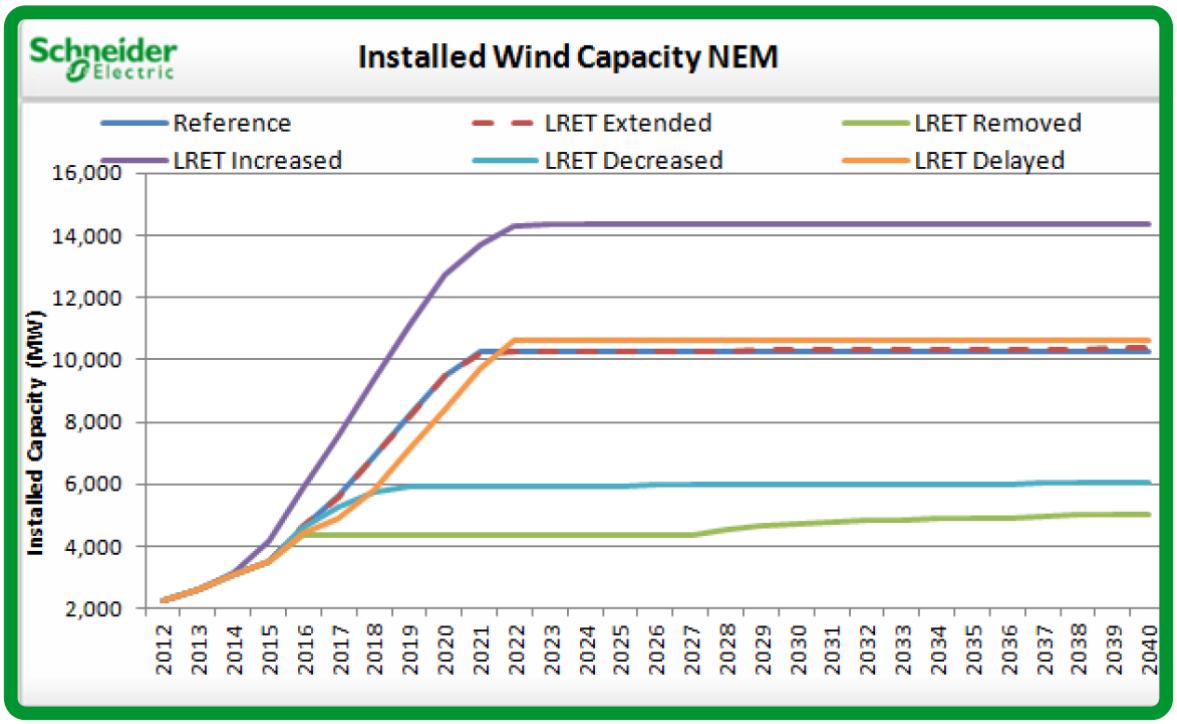
> The subsequent modelling showed the removal of the RET would initially lead to lower retail electricity prices, but in the longer term, as a result of additional low marginal cost renewable energy generation, retail prices would be on average 3.1% higher for residential, commercial and industrial customers.[35]

33 Jasper Noort, Simon Venderzalm, Brian Morris and Lisa Zembrodt, Schneider Electric, *Australia's large-scale renewable energy target: Three Consumer Benefits*, 2014.

34 Jasper Noort, Simon Venderzalm, Brian Morris and Lisa Zembrodt, Schneider Electric, *Australia's large-scale renewable energy target: Three Consumer Benefits*, 2014, pp 6–7.

35 South Australian Government, *Submission 59*, p. 5.

Figure 7.8—Sensitivity of wind power generation to changes in the RET



Source: Jasper Noort, Simon Venderzalm, Brian Morris and Lisa Zembrodt, Schneider Electric, Australia's large-scale renewable energy target: Three Consumer Benefits, 2014, pp 6–7.

The impact of wind energy on retail prices

7.45 The terms of reference for this inquiry direct the committee to consider the impact of wind energy on household electricity prices. The committee notes the lacuna of research in Australia that isolates the impact of wind on household electricity prices. The information before the committee is a judgment of this impact based on research into the impact of renewable energy on retail prices.

7.46 Various submitters have drawn the committee's attention to a June 2013 report by the consultancy Sinclair Knight Merz titled *Estimating the impact of Renewable Energy Generation on Retail Prices*. This report assessed the impact of the RET on electricity retail prices by calculating 'the changes to wholesale prices caused by the injection of new supply into the market, minus the cost of running the scheme and paying for the certificates that are created under the scheme'. The report found that:

> …customers in Australia are on average likely to have a price reduction over the period to 2020 as a result of the LRET, albeit that there may be a modest increase in prices from sometime after 2020…
>
> The price reduction is due to the wholesale price effect of the LRET, which - at approximately $12/MWh over the period 2011-2025 (in real mid-2012

> dollars) - more than outweighs the impact of increased liabilities for certificates as the target grows.[36]

7.47 The report added:

> In addition, to the extent that competition amongst retailers is limited, and to the extent that the LRET creates greater contestability through the creation of economically sustainable new entrant retailers, there will be further downward pressure on the retail margins. Under such conditions, the RET scheme may, by providing an opportunity for the creation of integrated new entrants, increase retail contestability and, hence, retail prices. SKM has not sought to quantify this effect in this report, but recognises that this may be a further benefit of the RET.[37]

7.48 Another study found that the price impact of renewables differs depending on the type of consumer (residential consumers and small businesses). Dr Iain MacGill, Ms Johanna Cludius and Mr Sam Forrest from the Centre for Energy and Environmental Markets at the University of Sydney found that:

> …some energy-intensive industries are benefiting from lower wholesale electricity prices whilst being largely exempted from contributing to the costs of the scheme. By contrast, many households are paying significant RET pass through costs whilst not necessarily benefiting from lower wholesale prices. A more equitable distribution of RET costs and benefits could be achieved by reviewing the scope and extent of industry exemptions and ensuring that methodologies to estimate wholesale price components in regulated electricity tariffs reflect more closely actual market conditions.[38]

7.49 As of June 2015, the Independent Pricing and Regulatory Tribunal (IPART) of NSW estimates that in New South Wales, around 21 per cent of retail electricity customers pay regulated retail prices—that is, they pay prices not set by the competitive market. For those customers paying regulated prices, IPART makes a decision as to the appropriate price band. It noted:

> In June 2014 we made a decision on the average changes each Standard Retailer could make in these regulated retail prices for the next two years, after an extensive public consultation and review process. We assessed the Standard Retailers' proposals against our own estimate of the change in the efficient costs of supplying gas over the two-year period – including

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36 Sinclair Knight Merz, *Estimating the Impact of Renewable Energy Generation on Retail Prices: Final Report*, 20 June 2013, p. 1, http://images.smh.com.au/file/2013/06/25/4518185/SKM.pdf (accessed 13 July 2015).

37 Sinclair Knight Merz, *Estimating the Impact of Renewable Energy Generation on Retail Prices: Final Report*, 20 June 2013, p. 1.

38 Centre for Energy and Environmental Markets, *Distributional Effects of the Australian renewable Energy Target (RET) through Wholesale and Retail Electricity Price Impacts*, November 2013, p. 2, http://ceem.unsw.edu.au/sites/default/files/documents/13_11_20_CEEM_RET_Distribution_FINAL.pdf (accessed 13 July 2015).

> wholesale gas costs, network prices and retail costs. We decided regulated retail prices could increase by an average of 11.2% across NSW in 2014-15, and by a further average of 4.2% in 2015-16. We also undertook to update our decision on the average price changes in 2015-16 in June 2015 to take account of the latest information on gas network prices and forecast inflation.[39]

7.50 Australian retail electricity provider Ergon Energy noted in its submission the cost of 'green schemes' for electricity consumers. It stated:

> …policies that seek to stimulate renewable energy increase costs to consumers under current pricing arrangements. Ergon Energy analysis shows that across the 2010-2015 regulatory control period green schemes such as the Carbon Tax, Large Scale Renewable Energy Target (LRET), Small Scale Renewable Energy Scheme (SRES), Gas Electricity Certificates (GECs) and the Solar Feed in Tariff (FiT) will cost regional Queensland customers around $1580 million. This equates to an average liability per customer of $2,229 over the five year period. Prior to the removal of the carbon tax this average liability was expected to be $2,654 per customer, noting actual impacts vary according to consumption. For the average residential customer these costs represent approximately 8.5% of their retail bill. Environmental allowances such as the LRET, SRES and GECs account for 37 per cent of the impact and the costs of the Solar FiT and associated network costs account for around 26 per cent. Specifically the estimated cost of the FiT and associated costs is $413 million, with the costs of the SRES estimated to be $280 million. This equates to an average cost of $990.49 per customer over the five years, with the average cost being $311.87 in 2013-14 alone.[40]

The merit of the RET cross-subsidy

7.51 The terms of reference for this inquiry direct the committee to consider the merit of consumer subsidies for the wind industry. Several submitters to this inquiry have questioned the underlying principle for these subsidies. Even if one accepts the need to promote renewables, in a free market, should the renewables sector be supported through the generous RET scheme, with the cost ultimately borne by the consumer? More specifically, is it fair that highly profitable wind companies effectively receive subsidies (through the creation of a market for certificates) that effectively cover up to 60 per cent of the cost of producing a MWh of wind energy?

7.52 The economic case against current RET arrangements and the benefit that it provides the wind industry is built on the following five criticisms:

- that the RET distorts the market by diverting investment from elsewhere in the economy and by increasing energy supply above existing demand;

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39 IPART, *Review in regulated retail gas tariffs and charges for 2015–16*, June 2015, http://www.ipart.nsw.gov.au/Home/Industries/Gas/Reviews/Retail_Pricing/Review_of_regulated_retail_gas_tariffs_and_charges_for_2015-16 (accessed 13 July 2015).

40 Ergon Energy, *Submission 84*, p. 2.

- that wind should be—and on some assessments will soon be—self-sufficient and capable of competing in the energy market without subsidies;
- that the RET promotes an unbalanced mix in the development of renewables, disproportionately promoting the development of wind above other renewable energy sources;
- that the RET is not the most cost-effective option for reducing emissions; and
- that large-scale wind turbines will not be as effective a mechanism to reduce emissions in the future.

Market distortions

7.53 By any reckoning, the wind industry receives a substantial and generous cross subsidy from the RET. On a conservative estimate, each RET-eligible company receives in excess of $500 000 a year for each turbine. On the basis of there being 2 077 wind turbines in Australia, the RET provides $1.09 billion per annum to the wind industry. On this basis, and assuming the RET operates for another 15 years, the RET cross-subsidy for existing turbines from now until 2030 will be in the vicinity of $9.3 billion. Given that the wind industry plans significant future investment, the subsidy is likely to be considerably more than $9.3 billion.

7.54 The 2014 Review of the RET estimated that the future cost of the RET across all renewables:

> …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.[41]

7.55 Several submitters and witnesses to this inquiry have argued that these subsidies should stop on the basis that they distort the market. Regulation Economics, for example, argued that subsidised renewable energy has been 'sucking capital into worthless investments'.[42] It added:

> The costs to Australia in continuing to force electricity customers to incorporate uncommercial renewable energy within their aggregate supply are considerable. By 2020 they will amount to over $3.5 billion a year in electricity bills plus expenditures via the budget which are also paid for by consumers. The program, should it run its course, will impose an aggregate cost on the economy of between $30 and $53 billion. Not only does this inflict a direct cost on electricity consumers but it also undermines

41 *Renewable Energy Target Scheme: Report of the Expert Panel*, August 2014, p. i.

42 Regulation Economics, *Submission 4*, p. 3.

> Australia's comparative advantage as a low cost electricity supply source, with adverse implications for industry development.[43]

7.56 Dr Alan Moran of Regulation Economics noted that a renewables subsidy could be borne by taxpayers without there being any increase in the underlying market price. He explained that the subsidy:

> …would need to be set at the difference between the long run marginal cost of commercially available power and the long run marginal cost of the cheapest form of renewable energy that is eligible for the subsidy. And for it to have no effect on prices it would need to be in the form of a direct subsidy from taxpayers rather than, as is largely the case at present, the subsidy coming about by regulatory requirements that retailers include specific proportions of designated renewable energy.[44]

Wind should be self-sufficient

7.57 Several submitters to this inquiry emphasised that the wind industry would not be economically viable in Australia without the certificate market. The noted Australian geologist, Professor Ian Plimer, argued:

> No wind farm could operate without generous taxpayer subsidies and increased electricity charges to consumers and employers. These subsidies are given irrespective of whether the wind farm produces any consumable energy or not and are paid even when a wind farm is shut down due to strong winds. Wind farmers have been more successful in harvesting massive subsidies from taxpayers than harvesting the wind.[45]

7.58 Parkesbourne/Mummel Landscape Guardians argued in its submission that wind power is an inefficient form of energy production and uncompetitive in the open market. It queried:

> Why does wind energy need this indirect subsidy? It is not because of high research and development costs, or high construction costs, or high labour costs. It is because wind farms are a very inefficient producer of their own product. Because they cannot produce reliable power, given the intermittency and variability of the wind, they cannot compete in the open market.
>
> For the same reason, their inefficiency and unreliability, they are an ineffective way to reduce greenhouse gas emissions. Because they need constant back-up (coal-fired plants in 'spinning reserve' or open cycle gas turbines), the net reduction of greenhouse gas emissions becomes negligible in comparison with other, more reliable sources of power. If we wish to reduce greenhouse gas emissions, the only serious options are closed cycle gas turbines, hydro, and nuclear.

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43 Regulation Economics, *Submission 4*, p. 1.

44 Pyrenees Shire Council, *Answer to question on notice number 3*, received 7 April 2015.

45 Professor Ian Plimer, *Submission 381*, Extract from *Not for Greens*, Connor Court Publishing, 2014, p. 91.

> …
>
> If wind farms cannot serve any useful function, then they should not be subsidized.[46]

7.59 Mr Mike Baner argued in his submission that current subsidies through the RET should be redirected:

> The dollar value placed towards subsidies would be better utilised in research and development activities to improve generating technologies and power storage facilities which would lead to a more efficient use of existing resources resulting in a reduction of Australia's carbon emissions.[47]

7.60 Other submissions highlighted the international experience to urge that Australia should discontinue subsidies through the RET. Ms Jenny Holcombe noted the Spanish experience where, following the removal of subsidies to the wind industry in 2012, projects proceeded based on their economic viability. As she explained:

> In January 2012, the Spanish Government abolished subsidies to windfarms. In Spain's least windy State, Extremadura, a hundred wind projects that had applied for approval abruptly decided not to proceed.
>
> In contrast, last Wednesday, 18th March, the first windfarm to operate without subsidies began operating in the State of Galicia, Spain's windiest region. And 83 per cent of windfarms in the pipeline for Galicia at the time the subsidies ceased will also be built. All without subsidies. They will be backed up by four reversible hydro-electrical plants to store the energy produced when not needed.
>
> For years, wind farms in Spain had been paid twice for the electricity they produced: the market price and an equivalent amount as subsidy. With subsidies withdrawn, the former wastage is revealed: non-viable projects do not proceed; viable projects proceed without need of subsidies.[48]

7.61 Ms Marie Burton expressed her concern with the international evidence of the long-term dependence of wind power on subsidies:

> Consumer subsidies are backing a non helpful business with the wind industry because overseas they are turning away from wind due to the enormous costs involved. Emily Gosden (12 No.2014) stated wind farm developers receive 115,000 pounds for every person employed and is now expected to be 1.8 billion pounds annually. John Constable said "large numbers of soft subsidized jobs indicates low productivity, high cost energy" is supported by the UK Energy Research Centre (govt. funded).[49]

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46 Parkesbourne/Mummel Landscape Guardians, *Submission 119*, p. 5.

47 Mr Mike Baner, *Submission 334*, p. 2.

48 Ms Marie Burton, *Submission 66*, p. 1.

49 Ms Marie Burton, *Submission 66ss*, p. [2].

7.62 Interestingly, there are some strong advocates for renewables who argue that the wind industry may not need the assistance of the RET. For example, environmental consultant Dr Kim Forde told the committee:

> The phenomenal drop in the cost of solar generation in the last five years is evidence that with investment and a profile, and sales to a willing public will ensure the viability of these industries. Wind generation costs have also dropped significantly over the last 15 years. The need for any 'subsidy' is almost past, as the price parity of solar and wind has been achieved, or exceeded, traditional costs.[50]

The RET and the renewables mix

7.63 Another theme of this inquiry has been that the RET has promoted wind power above other forms of renewable energy. Clearly, wind has been the major benefactor of the RET. It has been the cheapest of the renewable energy sources in Australia and has therefore benefitted disproportionately from the RET. It also has the lowest current capital costs. Questions must be asked, however, about whether government assistance should be promoting a better mix of renewable energy sources:

- should policy-makers reconsider the policy mix to see how it is currently advantaging the development of wind power over other renewables?
- should the RET be redesigned to cap the subsidies from any given renewable source, thereby promoting a more diverse renewables mix?

7.64 In this context, CWP Renewables recognised that a higher RET would disproportionately benefit consumers without rooftop solar panels:

> The reduction in household electricity costs, although acknowledged to be modest, will result in greater benefit to those households without rooftop solar panels as they pay a larger relative residential bill than those that have invested in rooftop solar.[51]

7.65 Frontier Economics noted that eligibility for the RET could be broadened to include low emissions energy sources and have a similar cost impact on consumers as the present scheme. It explained the impact of a broadened RET scheme as follows:

> We consider that a [Low Emissions Target] LET, which broadens the criteria for eligible creation of LGCs, is a "no-regrets" option: if future gas prices are much higher than what was assumed in our modelling of a LET then there would still be the option to invest in new wind, solar and other renewables. At worst a LET would have a similar resource cost/impact on consumers as the existing RET scheme, but no higher. However, if gas does continue to provide a cheaper abatement option than wind or solar then the LET would entail lower resource/consumer costs than the RET while still delivering emissions abatement, as our modelling found.[52]

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50 Dr Kim Forde, *Answers to Questions on Notice no. 15*, 10 June 2015, p. 10.

51 CWPR, *Submission 261*, p. 3.

52 See: Frontier Economics, *2014 Residential Electricity Price Trends—Final Report*, September 2014, p. 36.

7.66 The August 2014 ACIL Allen report found that:

> Wind entry over the period 2016-2020 is significant and displaces primarily black coal generation. Once the wind build necessary to meet the LRET target is completed however, the future fuel mix is relatively static throughout the remainder of the modelling horizon, with most growth met by increased output from existing coal-fired stations.[53]

Wind and emissions reductions

7.67 The main policy objectives of the RET are to reduce greenhouse gas emissions in the electricity sector through encouraging the additional generation of electricity from renewable sources. The 2014 review of the RET noted ACIL Allen's modelling of the cost of abatement under the (2014) RET. It found that:

> 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.[54]

7.68 ACIL Allen used two models to calculate the cost of abatement from the RET:

> Both used the present value of the change in resource costs (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.[55]

7.69 The committee has received evidence from Dr Joseph Wheatley, the Managing Director of the Irish consultancy *Biospherica Risk Ltd*. Dr Wheatley's research shows that as the proportion of wind generation increases, the CO^2 abatement effectiveness of wind energy decreases. As he states in his submission:

> The best empirical estimate is that wind power avoided 6.2MtCO2-e, a reduction in total emissions of 3.5%. Wind power contributed 4.5% of system demand and therefore the emissions displacement effectiveness of wind power was 3.5%/4.5% or 78% in 2014. Several factors acted to limit the effectiveness of wind power in reducing emissions in 2014. A significant fraction of South Australia's wind output displaced low-emissions gas generation. Wind power tended to displace black coal plant in New South Wales rather than higher emissions brown coal plant in Victoria. Part-load inefficiency costs and system losses also degraded effectiveness. Wind power becomes less effective in displacing emissions from thermal plant as installed capacity increases. The evidence in this

53 Frontier Economics, *Submission 87*, p. 3.

54 *Renewable Energy Target Scheme: Report of the Expert Panel*, August 2014, p. 42.

55 *Renewable Energy Target Scheme: Report of the Expert Panel*, August 2014, p. 42.

> study suggests that effectiveness in the NEM would fall to 70% if the proportion of energy provided by wind is doubled from 2014 levels.[56]

7.70 Other submitters and witnesses have highlighted the findings of Dr Wheatley's research. With reference to Dr Wheatley's work, Mr Peter Lang argued that by ignoring the factors listed below, analyses have over-estimated the carbon emissions avoided from wind power and, therefore, overestimate carbon abatement effectiveness.

(a) Wind energy displaces the highest marginal cost generator at the time. This tends to be gas and black coal, rather than brown coal. So wind tends to displace generators whose emissions intensity is less than the grid average emissions intensity.

(b) Ramping—power stations consume more fuel and emit more CO^2 per MWh when they are operating at below optimum power and when ramping power up and down to balance the fluctuating power supplied by wind. For comparison a car has higher fuel consumption when continually accelerating and decelerating rather than running at constant speed.

(c) Cycling—that is, shutting down, starting up, or on standby not generating electricity but consuming fuel waiting to be dispatched to supply power when the wind power drops. This is equivalent to the effect of idling at the traffic lights on your car's average fuel consumption for the trip.

(d) Transmission losses tend to be higher for wind generation than for fossil fuel generators.

(e) Auxiliaries refers to the power stations own use of electricity for fans, pumps, conveyor belts, etc. The AEMO figures for the proportion of power used by auxiliaries assumes a linear relationship between electricity generated and the power stations own use (auxiliaries). However some of the own use is proportional to electricity as generated but some is not. The linear assumption understates the emissions at low power (high wind power).[57]

7.71 Mr Lang argued that using the results of Dr Wheatley's analysis and projecting the CO^2 abatement effectiveness to 2020, 'the estimates of CO^2 abatement cost quoted in the Warburton Review may need to be increased by around 67%'.[58]

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56 Dr Joseph Wheatley, *Submission 348*, pp 5–6. See also: Dr Joseph Wheatley, *Proof Committee Hansard*, Canberra, 19 May 2015, p. 77.

57 Mr Peter Lang, *Answers to questions on notice no.21*, 15 June 2015.
See also: Mr Peter Lang, *Committee Hansard*, Canberra, 19 May 2015, p. 60.

58 Mr Peter Lang, *Answers to questions on notice*, 15 June 2015, p. 3.

7.72 Mr Lang recommended that the CO^2 abatement cost estimates in the RET Review should be re-estimated taking CO^2 abatement effectiveness into account. He also argued the need for:

- Australia to collect the data needed to estimate CO^2 emissions accurately at the frequency needed to estimate the emissions avoided by wind energy; and
- the CER and other agencies to provide guidelines on how to estimate emissions avoided by wind energy and require that economic analyses of abatement cost take the CO^2 abatement effectiveness into account in their analyses.[59]

Does the geographic dispersion of wind farms in Australia pose a threat to the security and reliability of the National Electricity Market?

7.73 The committee is aware of claims that the geographically large and highly dispersed nature of Australia's wind farm fleet poses 'significant security and reliability concerns to the eastern Australian grid'.[60] The committee asked AEMO for its comment on this view. AEMO responded:

> South East Australia does have occasional very widespread high and low wind patterns, including calms that can affect every large NEM windfarm simultaneously.
>
> Whilst this creates challenges for the NEM, AEMO would not say that it poses "significant security and reliability concerns". AEMO is responsible for overseeing reliability (adequacy of generation to meet demand) and system security (the grid's ability to withstand credible disturbances) and carefully analyses the technical challenges of integrating the current and future levels of renewable energy. When issues arise or are anticipated, AEMO has mechanisms through which they can be addressed.[61]

7.74 AEMO did note that it only counts a small percentage of wind generation capacity as reliable to meet peak demand in reliability forecasts:

> This means that installation of wind generation capacity only slightly offsets the need for other generation to meet the reliability standard. This should not be interpreted to mean that reliability is necessarily threatened by it. The market is designed to reward generation as required to meet demand, with the high market price cap intentionally selected to provide sufficient income to reward non-intermittent plant that may operate only very occasionally.[62]

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59 Mr Peter Lang, *Submission 259*, pp 1–4.

60 Paul Miskelly, 'Wind farms in eastern Australia—Recent lessons', *Energy and Environment*, Volume 23, No. 8, 2012, p. 1233.

61 Australian Energy Market Operator, *Submission 469*, p. 10.

62 Australian Energy Market Operator, *Submission 469*, p. 11.

The Clean Energy Finance Corporation

7.75 The Clean Energy Finance Corporation (CEFC) is a statutory authority established under the *Clean Energy Finance Corporation Act 2012*. The primary function of the CEFC is to invest, directly and indirectly, in clean energy technologies, which are further defined as energy-efficient technologies, low-emission technologies and renewable energy technologies.

7.76 The CEFC utilises a commercial approach to investment (investing for a positive financial return) to overcome market barriers and encourage investment in renewable energy, energy efficiency and low emission technologies. The CEFC focuses its investment in projects and technologies at the later stage of development which have a positive expected rate of return and therefore have the capacity to service and repay capital.

7.77 The CEFC was intended by the former Australian Government to supplement existing initiatives such as the Renewable Energy Target, to counteract barriers to private investment in the clean energy sector, including the then global financial conditions, the cost of renewable energy and the complex nature of Australia's electricity markets.

7.78 In setting a new policy direction, the Australian Government put forward a package of bills in 2013 collectively known as the carbon tax repeal package. One of the bills sought to abolish the CEFC and transfer its assets and liabilities to the Commonwealth. This reflected the Australian Government's policy change to support clean energy projects through direct action such as the Emissions Reduction Fund and providing strong investment incentives to business through the renewable energy target. This aspect of the amendment package did not pass the Senate and was not enacted.

7.79 While still maintaining its policy position that the CEFC should be abolished, the Australian Government has recently directed the CEFC to change its mandate to restrict investment to new and emerging clean energy technologies, on the basis that projects that are economically viable should be funded through the usual investment mechanisms. This will preclude CEFC investment in existing clean energy projects such as wind farms.

Long-term Power Purchase Agreements

7.80 The material presented above does not reference the rates set between power generators and retailers under long term power purchase agreements (PPAs). PPAs are an avenue through which power generators can mitigate risk associated with selling their product. As the Parliamentary Library has noted:

> Because the RET legislation does not guarantee connection to the grid, renewable energy developers must negotiate long-term power purchase agreements (PPAs) with electricity retailers. The availability of these PPAs

> is hampered by policy uncertainty as energy retailers are wary of committing to long-term contracts.[63]

7.81 The committee has viewed one document, tabled in the Senate on 3 September 2014, which gives a strong indication about the effect of wind on retail prices:

> Paying ca. [(approximately)] $32/MWh above market price
>
> AGK booked ca. [approximately] $280m[illion] of wind development profits in FY [(Financial Year)]07–12 from wind farms it had developed and sold with 25yr offtake contracts, priced at ca. $112/MWh. As a result, we estimate that AGK is committed to buying ca 1.3TWh/yr through its various wind PPAs at ca. $32/MWh above the FY15 wholesale market (ex-carbon). At a headline level, it will pay $40m/yr more for electricity than it would have had to without the wind strategy, resulting in 4–5% NPAT [(Net Profit After Tax)] reduction in FY15E.[64]

7.82 The committee made requests for the production of such agreements from operators. However, those requests have not been forthcoming. Accordingly, the committee cannot make any meaningful finding about the true impact of large-scale wind turbines on household power prices.

7.83 The representations made, and set out above, focus on wholesale power prices which have been declining for a number of reasons. However, they do not address the impact of the cost of the large-scale generation certificates issued to wind power generators of which cost comprises the subsidy paid and which is recovered by retail power bills.

7.84 In the absence of PPAs as requested, the committee recommends that PPAs be made available for the purpose of determining the impact of wind power supplied under the LRET on retail power prices. The Productivity Commission should have free access to PPAs and the NEM data comprising pricing in all relevant electricity markets, including the dispatch, wholesale, retail and derivative markets. Further, the Productivity Commission should investigate and determine the cost impacts arising from:

- improved and/or expanded net worth and grid infrastructure capacity payments required to maintain sufficient reserve capacity to accommodate fluctuations in wind power output, including generators holding spinning reserve, capital costs for reserve capacity held by generators using peaking power plants, such as open-cycle gas turbines; and

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63 Ms Anita Talberg, 'Support for renewable energy', *Parliamentary Library*, http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/BriefingBook44p/RenewableEnergy (accessed 25 July 2015).

64 Bank of America, Merill Lynch, 'AGL Energy: Wind strategy biting back', Tabled in the Senate, 23 September 2014. AGK is the Australian Stock Exchange (ASX) abbreviation for AGL Energy.

- any other matter relevant to, and associated with, increasing installed wind power capacity as required to satisfy the LRET.

Recommendation 13

7.85 The committee recommends that the Australian National Audit Office (ANAO) conduct a performance audit of the Clean Energy Regulator's (CER) compliance with its role under the legislation. In particular, the committee recommends that the ANAO examine:

- **the information held by the CER on wind effectiveness in offsetting carbon dioxide emissions at both 30 June 2014 (end of financial year) and 3 May 2015;**
- **the risk management and fraud mitigation practices and processes that are in place and whether they have been appropriate;**
- **whether all public monies collected in respect of the *Renewable Energy (Electricity) Act 2000* are appropriate;**
- **whether there are financial or other incentives, including but not limited to, the collection of public monies under the *Renewable Energy (Electricity) Act 2000* that are distorting the CER's role in achieving the objectives of the Act; and**
- **whether the expenditure of public monies by the CER has been appropriately focused on achieving the *Renewable Energy (Electricity) Act 2000* objectives.**

Committee view

7.86 The committee agrees that Government investment in clean energy is best directed at supporting emerging technologies that would otherwise struggle to find early-stage investment. It is only through such investments that existing energy technologies, such as wind farms and solar power, passed the research and development phases to become financially viable energy sources.

7.87 This chapter notes the lack of research isolating the effect of wind power on retail electricity prices. This information is important. It would address many of the issues and concerns raised in this chapter. Accordingly, the committee recommends that the Australian Government direct the Productivity Commission to investigate the impact of wind energy on retail prices.

Recommendation 14

7.88 The committee recommends that the Australian Government direct the Productivity Commission to conduct research into the impact of wind power electricity generation on retail electricity prices.

Renewables and the Emissions Reduction Fund

7.89 One of the key objectives of the Renewable Energy Target is to reduce carbon emissions in the electricity sector. The other objectives, listed under section 3 of the *Renewable Energy (Electricity) Act 2000* are to encourage the additional generation of

electricity from renewable sources and to ensure that renewable energy sources are ecologically sustainable.

7.90 The Renewable Energy Target, however, is a blunt means of reducing carbon emissions. The installation of renewable energy is but one way of reducing carbon emissions among many. Investments in energy efficiency, destroying methane or waste gas in industrial activities, more transport efficient vehicles, vegetation management and agricultural practices to retain more carbon in soils are other ways of achieving the same goal. By restricting the ways of meeting the end goal of reducing emissions, the Renewable Energy Target has the potential to increase the cost of meeting any particular emission reduction target.

7.91 Indeed, the risk of the Renewable Energy Target being a costly way of reducing emissions in the Australian context is higher given the structure of our electricity market. Australian electricity production is dominated by coal fired power stations, our gas resources tend to be more expensive to exploit than those in other countries such as the United States and we have limited sources of hydropower. These intrinsic characteristics of Australia's resource endowments makes the cost of moving the electricity sector from existing sources to low carbon emission sources a costly exercise. As the former Chairman of the Productivity Commission, Gary Banks, said:

> Crucially — and this point seems not to be widely understood — it will not be efficient from a global perspective (let alone a domestic one) for a carbon-intensive economy, such as ours, to abate as much as countries that are less reliant on cheap, high-emission, energy sources … it's commonsense that achieving any given level of abatement is likely to be costlier in a country with a comparative advantage in fossil fuels.[65]

7.92 The limitations of the Renewable Energy Target are not a surprise. Its original design envisaged that it would be a temporary measure until more generic carbon reduction policies had been adopted. In 2009, COAG made a decision to replace various state and territory renewable energy programs with an expanded Renewable Energy Target. In making the decision COAG announced that:

> It is expected that renewable energy targets will no longer be required after 2030 as the CPRS [Carbon Pollution Reduction Scheme] will drive the deployment of renewable energy.[66]

7.93 Australian governments have adopted more generic and widespread ways of reducing carbon emissions so the ongoing rationale for the Renewable Energy Target is not clear to the Committee. The former Gillard Labor government established a carbon tax in 2012. While this has been removed by the Abbott Coalition government, the Coalition government has adopted an Emissions Reduction Fund that provides subsidies for carbon emission projects on a "reverse auction" basis. Climate change policies are likely to remain a matter of political controversy, however, both major

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65 Banks, G. 2011, Presentation to BCA/AIGN Carbon Pricing Forum, Parliament House, Canberra, 23 March.

66 Council of Australian Governments, Hobart Meeting Communique, 30 April 2009, p. 8, https://www.coag.gov.au/sites/default/files/2009-04-30.pdf (accessed 2 August 2015).

political parties are committed to policies that seek to reduce emissions from a range of projects rather than focus on individual sectors. In that context, maintaining a policy that narrowly seeks to reduce emissions through only investment in renewable energy is anomalous.

7.94 The Committee considers that these issues can be addressed through targeted modifications to the Government's existing carbon emissions policies—the Renewable Energy Target and Emissions Reduction Fund subject to annual audits of compliance.

7.95 The Renewable Energy Target should be amended so that all new investments in renewable energy between 2015 and 2020 will be eligible to create renewable energy certificates for a period of no more than five years. Existing investments in renewable energy should be grandfathered so that they continue to receive renewable energy certificates under the Act.

7.96 In conjunction with this change, eligibility criteria for the Emissions Reduction Fund should be amended to allow renewable energy projects to receive funding. In practical terms, this would mean that the Government would develop a methodology that would detail how many carbon credits[67] would be created for investment in different types of renewable energy. Under this model, renewable energy investors could "bid" in Emission Reduction Fund auctions for a subsidy for a given level of carbon reduction according to the approved methodologies. A renewable energy investment would only receive government funding if it could compete against other forms of carbon emission reduction and demonstrate that it was the lowest cost way of reducing carbon emissions.

7.97 Consistent with evidence provided to this Committee, any methodology under the Emissions Reduction Fund should consider the net lifecycle reductions in carbon emissions from renewable technologies. That is, the estimated reductions in carbon emissions from a specific renewable energy investment should consider the carbon emissions generated in its construction (for example, steel, concrete, etc), the displacement of more carbon intensive forms of electricity generation and the need for any power generation backup to renewables.

7.98 The Committee sought information on the carbon payback period for the carbon costs associated with the manufacturing process of wind turbines. Mr Terry James Johannesen, Project Development Manager, RATCH-Australia Corporation Ltd. stated:

> [W]e are guided by the information we have received from wind turbine suppliers. We asked them how long it takes to pay back the manufacturing costs, the transport costs, the installation costs and all the fuel that is burnt incorporated in that. A number of those companies that provide the turbines to us have undertaken studies in that regard. Generally, they look at it being

67 Or 'Australian Carbon Credit Units' under the Emission Reduction Fund.

> around about a 12- to 18-month period for all of that carbon intensive manufacturing cost to be paid back.[68]

7.99 On the question of intermittency of power generated by wind turbines, Dr Moran told the Committee:

> [T]here are some backup costs caused by the inherent unreliability of wind and indeed of solar, and these increase exponentially with the increased share of renewables.[69]

7.100 Another cost that would also need to be considered is the carbon cost in additional transmission infrastructure required by renewables to bring the power to where it is used due to the need to locate the generating capacity in sites with suitable wind characteristics and available land which are often farther away from the major cities than traditional forms of electricity generation.

7.101 These are important questions. While definitive answers are beyond the scope of this Committee, resolving such issues is essential for promoting sound energy policy in Australia and would appropriately be considered in the development of an Emissions Reduction Fund methodology.

7.102 A methodology for renewable energy technologies will require some consultation and there should be a transition period between moving new renewable projects from the narrow Renewable Energy Target to a broader policy such as the Emissions Reduction Fund. The appropriate period of time is a matter of judgement, but the Committee views that a period of around five years should be sufficient to develop the methodology and provide time for renewable energy operators to adjust. This would mean that the Renewable Energy Target would cease to be open to new entrants by the end of 2020. One rationale for employing such a timeframe is that it matches the existing structure and timeline of the Renewable Energy Target, which has been designed to increase until 2020 and then be maintained at the level of 33 000 GWh. (Originally the target was 41 000 GWh).

Committee view

7.103 In the view of the Committee the changes outlined above would, if implemented as a package, provide a more efficient, consistent and sustainable policy framework for reducing Australia's carbon emissions going forward, which would provide substantial benefits to businesses and individuals across Australia. In particular, it provides a means of addressing the clear anomaly resulting from current policy settings which partition the renewables sector apart from other ways of reducing carbon emissions and thus unnecessarily inflate the costs of achieving carbon reduction outcomes.

7.104 It is the view of the Committee that if the Government rejects the approach outlined above, the Government should instead seek to limit eligibility for receipt of Renewable Energy Certificates to five years after the commissioning of turbines in the

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68 Mr Terry Johannesen, RATCH, *Proof Committee Hansard*, Cairns, 18 May, p.7.

69 Dr Alan Moran, *Proof Committee Hansard*, Canberra 19 May, p.23.

electricity sectors. This would help constrain the additional costs of the Renewable Energy Target to a defined period.

Recommendation 15

7.105 The Renewable Energy Target should be amended so that all new investments in renewable energy between 2015 and 2020 will be eligible to create renewable energy certificates for a period of no more than five years. Existing investments in renewable energy should be grandfathered so that they continue to receive renewable energy certificates under the Act subject to annual audits of compliance.

7.106 The Government should develop a methodology for renewable energy projects so that they can qualify for Australian Carbon Credit Units. The Government should develop this methodology over a five year period in consultation with the renewable energy industry and the methodology should consider the net, lifecycle carbon emission impacts of renewable energy.

7.107 If the Government does not adopt the above changes, the Government should instead limit eligibility for receipt of Renewable Energy Certificates to five years after the commissioning of turbines.

Senator John Madigan
Chair