REGULATION ECONOMICS

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Submission to Senate Committee on Wind Turbines

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Introduction and Summary

I confine my remarks to the first of the terms of reference, that which addresses the economic effects of windfarms. These effects work through higher electricity prices and through taxes paid to subsidise windpower's intrinsically high cost.

The promotion of subsidies for wind power is part of a triptych comprising:

- Potentially catastrophic human induced global warming is underway;
- Virtually all nations are taking steps, particularly by promoting reneawable energy, to reduce their emissions of carbon dioxide and other greenhouse gases; and
- Renewable energy is becoming more affordable, possibly even cheaper than fossil fuel sourced electricity.

No parts of this picture accurately portray reality.

The world was warming for two centruries before human induced emissions of greenhouse gases were at a level that might influence climate and the possible augmentation these may cause is small[1]. Moreover, the world has not shown any discernable warming for the past 15 years in spite of increased emissions of greenhouse gases.

The failure of the Copenhagen conference in 2009 brought a realisation that an international agreement (without which actions by individual nations are ineffective) would not be likely. Events since then have confirmed the unlikelihood of an agreement, with developing countries totally rejecting actions that might reduce their own emissions and countries like Japan and Canada have withdrawn their previous commitments to take action.

Renewable energy, at least in its dominant form through wind turbines is not becoming relatively cheaper compared with other forms of electricity.

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

The History of Renewable Regulations in Australia: a Story of Political Incompetency

Subsidies to renewable energy were once touted not only as a key to reducing emissions of carbon dioxide but also as paving the way to a future source of electricity that would become competitive in price and reliability with fossil fuels. After two decades, this optimism has proven to be unfounded.

[1] See Lindzen R.S., *Global warming: models and language*, in *Climate Change: the facts 2014*, edited by Moran, A. Institute of Public Affairs.

Instead we have seen subsidised renewable energy sucking capital into worthless investments.

The 2001 Mandatory Renewable Energy Target (MRET) required that 9,500 GWh of selectively designated new renewable energy be used in Australia by 2010. When Prime Minister John Howard announced the proposal to introduce an MRET scheme in 1997 he said it was for an additional two per cent of electricity that was to come from "renewable or specified waste energy". Lobbyists ensured this was redefined into 9,500 GWh by 2010, which was in fact far more than "an additional two per cent", and was indeed over four per cent of total projected electricity supply.

A review of the scheme in 2004 (the Tambling Review) recommended the target be increased to 20,000 GWh by 2020. In June 2004 the Commonwealth rejected that, announcing that it did not believe expanding the target was economically justified.

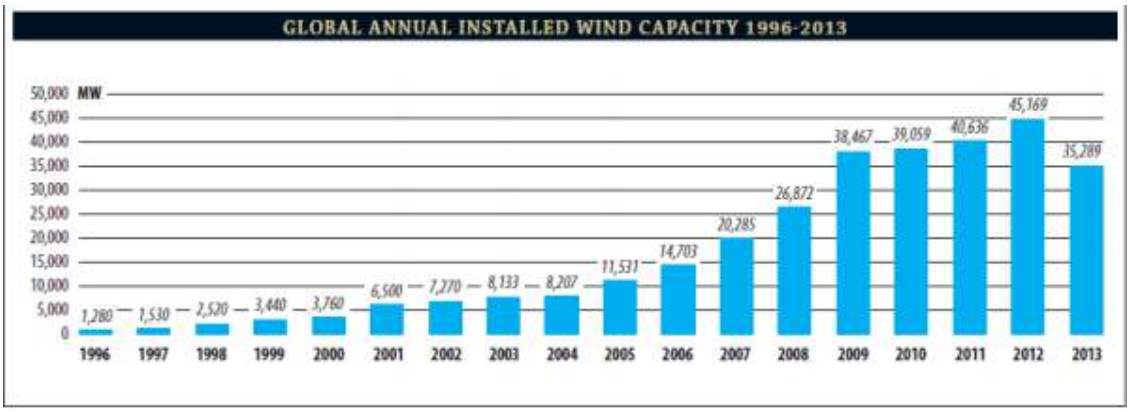
State governments took a contrary view and introduced their own schemes. The Victorian Government announced its proposals in a Press Release by the Premier (2 November 2005)[2]. This argued that there was a "lack of national leadership" by the Federal Government in not increasing the MRET scheme from the 9500 GWh target set. Mr Bracks said this, "is costing Victoria – economically and environmentally - and cannot be allowed to continue." And he set out to double "the proportion of renewable energy used by Victorians to 10 per cent by 2010". Mr Bracks said, "Victoria's aim is to facilitate the development of up to 1000 megawatts of wind energy by 2006 represents $2 billion worth of capital investment. Then there are the jobs and the other economic spinoffs that accompany such a significant outlay". One such spin-off, a subsidized blade factory, was closed within a few months.

The Rudd government in 2007 increased the Commonwealth renewables requirements to 20 per cent of total energy. This was quantified at 45,000 GWh of "exotic" renewables (in addition to the existing 15,000 GWh of commercially provided hydro) by 2020, though partly due to the energy cost increases stemming from regulatory activity, the specified amounts will exceed the 20 per cent level. The Rudd Government also split the scheme into its present large scale (LRET) at 41,000 GWh and small scale (SRES) categories at 4,000 GWh.

Wind power has been growing strongly and accounts for about 4 per cent of electricity supply in Australia (it is over 6 per cent in the EU). Globally additions to wind capacity appear to be decelerating.

[2] http://www.greenhouse.vic.gov.au/images/VicGreenhouse-ActionPlan.pdf

Chart 1



Source: http://www.gwec.net/wp-content/uploads/2014/04/GWEC-Global-Wind-Report_9-April-2014.pdf

Australia as an Energy Supplier

In overall terms Australian electricity had been among the cheapest in the world a decade ago. As of 2013 it had moved to become one of the highest. The consultancy NUS has tracked these prices, finding that Australia was among the cheapest in 2001 but had risen to become one of the most expensive by 2013. This is partially due to the increasing bite of the renewables program over the course of those years

Chart 2 Residential electricity prices 2001

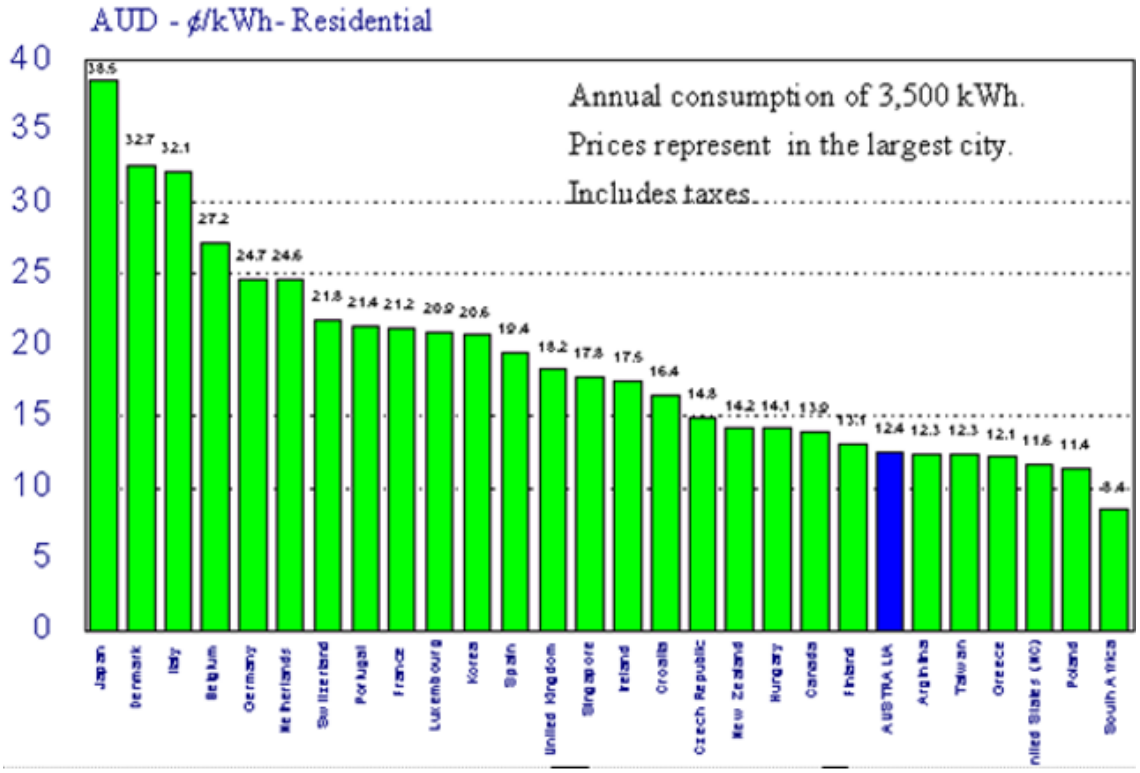
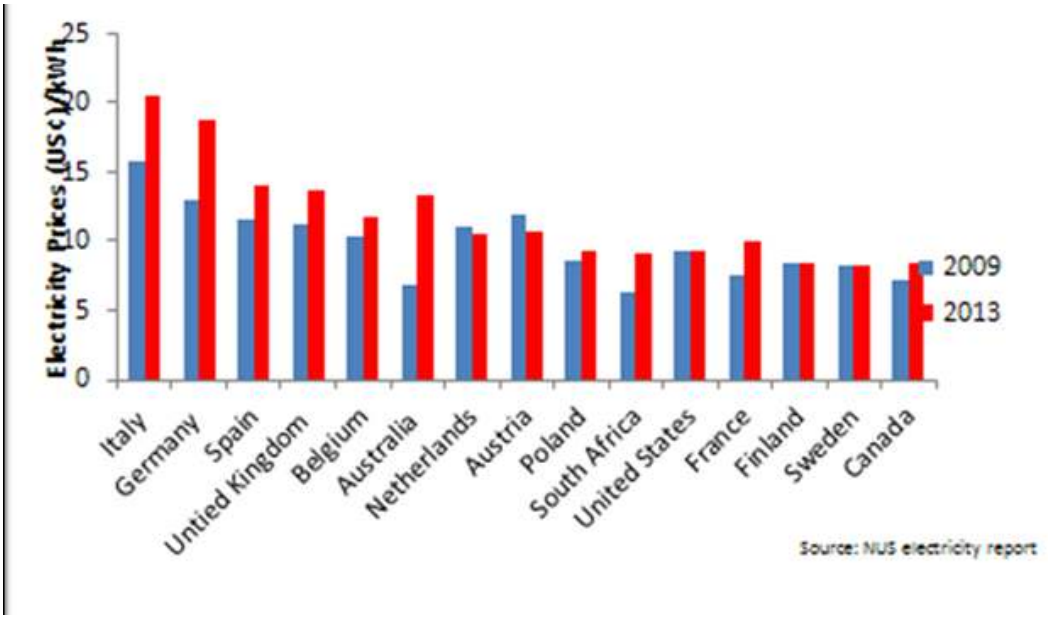


Chart 3 Residential electricity prices 2009 and 2013



Establishing the Basic Costs of the RET

The costs of alternative sources of electricity generation is well documented for Australia and elsewhere. Those for Australia are shown below (Nuclear costs are based on those in the US and the cost estimate at under $60 per MWh[3], is understated because of regulatory approval issues.

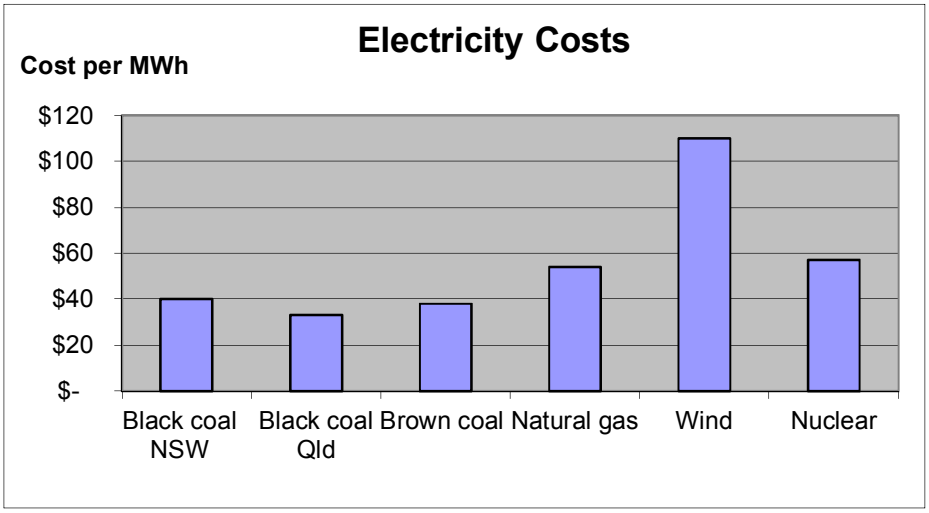
The abundant supplies of black and brown coal mean that east coast Australia can supply electrcity ex-generator from these fuels at between $35 and $40 per MWh. That cost is not greatly affected by international energy prices since the domestically used thermal coals themselves are not readily tradeable.

Gas costs are influenced by international price movements but at present levels a new gas generator would produce electricity at $55-60 per MWh.

Wind costs exceed $100 per MWh.

[3] *The Economic Future of Nuclear Power*, a study conducted at the University of Chicago, August 2004

Chart 4 Australian electricity costs



All of the above supply types are mature technologies and they will see gradual and modest cost reductions. In the case of wind, however, any technological gains are likely to be offset by new locations having inferior wind characterisics compared to those already taken.

Over 30 years ago,Christopher Flavin, the present President emeritus of the Worldwatch Institute, said that in a few years' time wind energy will not need to be subsidised. Others voiced similar sentiments. These included Booz, Allen & Hamilton, Amory Lovins and the American Wind Energy Association.

Although time has not treated such statements kindly, they continue to be voiced. Indeed, late last year there was an "emergency Clean Energy Summit" meeting called by the South Australian Premier. According to its Communique, seventy "clean energy and community leaders" attended but, in addition to the usual array of state public servants, these seem to have been confined to the renewable industry royalty and their advisers.

Speakers included John Hewson, who has financial interests in the renewable industry and Ross Garnaut who "discussed the underlying economics influencing the sector and explained that Australia has a natural advantage for low-cost production of renewable energy. He maintained that the low cost of renewables would create a cost advantage for local industry into the long-term future." The Summit Communique urged the government to keep forcing consumers to give money to the industry.

Costs of renewable electricity to Australian consumers

Costs within the consumer's bill

The market manager the AEMC estimates the costs of electricity to consumers in each jurisdiction. It does so by establishing values for each of the components. Those for Victoria are illustrated in Chart 5.

Chart 5 Cost Estimates in Victoria's electricity supply

		2013/14 Base year	2014/15 Current year	2015/16	2016/17
Environmental policies	**c/kWh**	**4.59**	**2.07**	**2.07**	**2.22**
Carbon	c/kWh	2.29	0.00	0.00	0.00
LRET	c/kWh	0.59	0.64	0.77	0.96
SRES	c/kWh	0.64	0.44	0.43	0.44
Feed in Tariff schemes	c/kWh	0.86	0.84	0.83	0.82
Victorian Energy Efficiency Target	c/kWh	0.21	0.15	0.04	0.00
Regulated networks	**c/kWh**	**11.64**	**12.50**	**13.07**	**13.09**
Transmission	c/kWh	1.35	1.36	1.36	1.36
Distribution	c/kWh	10.29	11.15	11.71	11.72
Competitive market Wholesale and retail	**c/kWh**	**12.59**	**12.67**	**12.72**	**12.98**
Total	**c/kWh**	**28.82**	**27.24**	**27.86**	**28.29**

On this analysis the windfarm (basically all of LRET) costs in the current year for Victoria are 0.64 cents out of 27.24 cents and 0.44 cents for SRES, adding 2.7 per cent and 1.6 per cent respectively to the costs to the household. The combined effect of these costs are around $100 per annum and with other associated regulatory interventions add 8 per cent to the total (or around $160)

The aggregate costs of renewable energy

Using wind as the lowest cost renewable option, additional costs fall within three components:

- The premium required for wind over the least cost energy supply of $60 per MWh ($100 less than $40 for coal)
- The costs of the additional back-up for wind supply. Wind's reliability according to AEMO is only 7 per cent. In order to ensure the system is maintained, fast start (gas) back-up plant is required. The most market-oriented means of establishing the cost of this is to use the $300 base cap traded through the over-the-counter market, which gives traders the certainty that they can avoid losses in the event of their supply not performing. The price of the $300 cap varies between $11 and $15 per MWh, with the average at $12.[4]
- Additional costs stemming from the increased transmission likely to be required as a result of the lower average flow of electricity from wind sites. In marginal cost terms this is likely to be low since the wind farms locate in areas where transmission is amply available. Where new lines need to be built or existing lines reinforced, the costs do become significant. However for the purpose of this analysis these costs are not included.

The premium costs per MWh for wind are therefore estimated at $72 ($72,000 per GWh).

For large scale facilities, this premium would need to be applied to the legislated 41,000 GWh and would amount to a cost $3,550 million per annum in 2020,[5] with this rising in

[4] Personal communications with electricity traders, though a price can be estimated from the d-cypha site http://www.d-cyphatrade.com.au/market_options

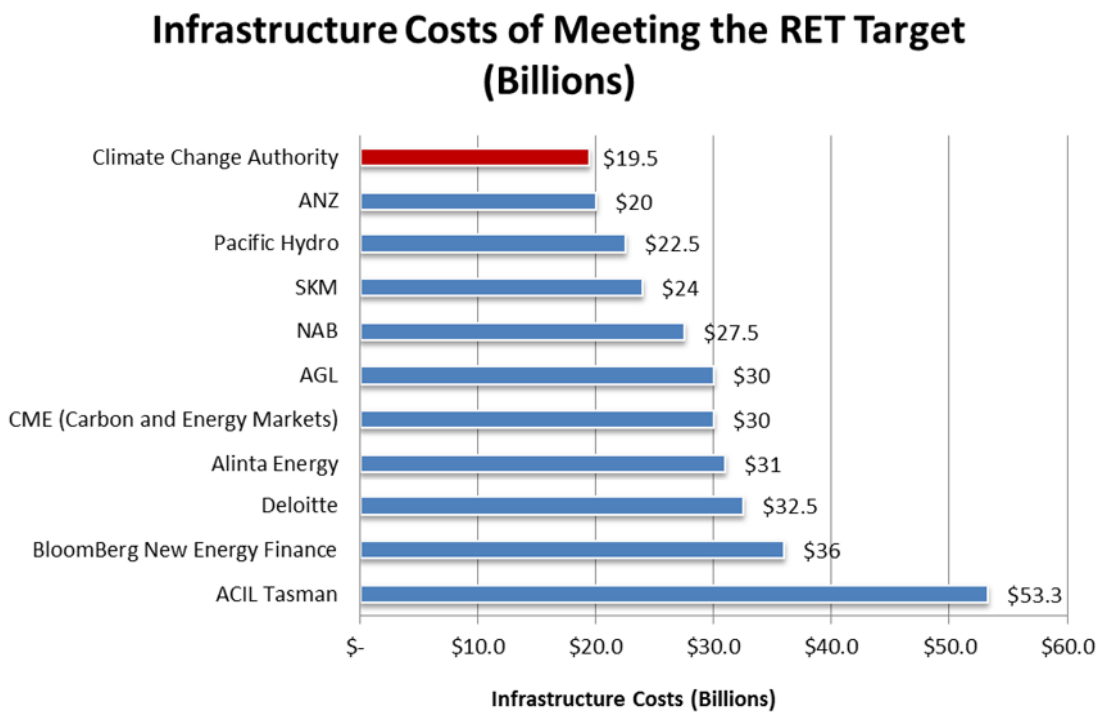
[5] This cost may be reduced by renewables featuring less uncompetitive sources like bagasse (which have limited availability) and, if the practice is allowed to continue, by Snowy and Hydro Tasmania manipulating the scheme by oscillating their production from year to year so that every second year they produce above baseline. It would be increased to the degree that solar panels (with a cost over fourfold that of wind) fulfil part of the 20 per cent quota.

subsequent years if the 20 per cent target is maintained. Even if the numbers were to be reduced to, say 26,000 GWh, in line with the reduced level of demand that is due in part to the cost increase energy regulations have brought, the annual cost would approach $3 billion a year. The cost of the renewable option is not greatly dissimilar from substituting nuclear for coal of $1,580 million, though nuclear might show considerable cost reductions, perhaps amounting to 40 per cent.[6]

In addition to these costs there would be consequential magnification effects from the penalty placed on the comparative advantage of Australian industry.

In overall costs, Alinta Energy pulled together different estimates which were as follows.

Chart 6



Some argue that the costs are offset by the downward pressure on prices caused by the government subsidy to renewable energy. This is a quixotic attempt to justify the impost. It is true that an influx of subsidised product will depress the price of commercially offered alternatives. This is equally likely for confectionery as it is for energy. But the influx of subsidised product means that eventually as replacement and augmented commercial supply is called for, this will be produced with a risk amplification that takes into consideration the lower prices forced on the market by government intervention.

Ultimately, all the costs directly or indirectly incurred as a result of regulatory requirements or direct expenditures in pursuit of renewable energy are incurred by Australian households. Markets inexorably ensure costs are passed on from business to the consumer or taxpayer. No costs are absorbed, other than transiently by businesses, since any business

[6] *The Economic Future of Nuclear Power,* a study conducted at the University of Chicago, August 2004

permanently reducing its prices below costs so would see its share price fall and be vulnerable to takeover or even insolvency. Imposing a supply shock on existing producers devalues their assets and future investment will not take place until prices have risen to allow financial viability.

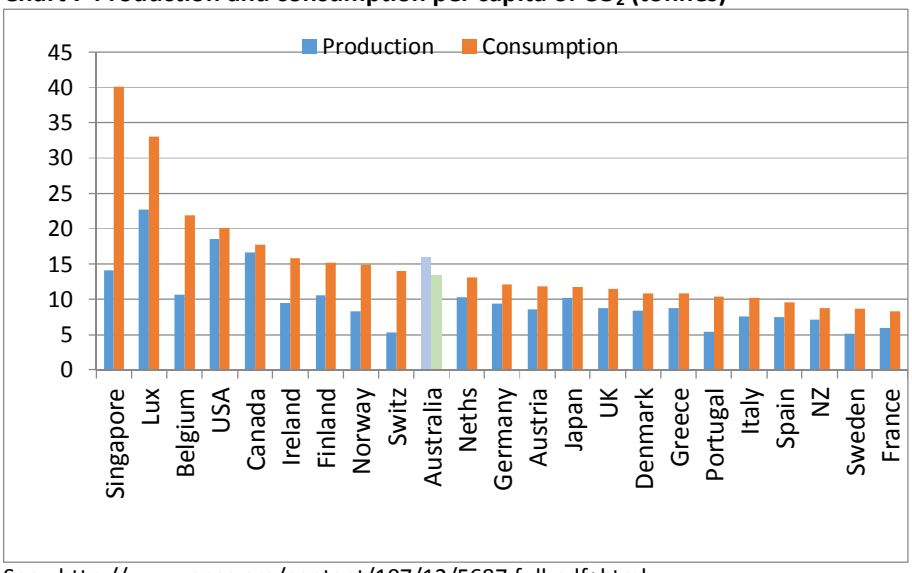
Australian Policies in a Global Context

It is sometimes argued that Australia is a relatively high emitter of greenhouse gases and therefore should play a larger role than others in mitigating these emissions. However, Australia is – or has been – a relatively larger producer of emissions but is not a particularly large consumer. Australia is a largish producer because of the structure of our industries and alone among developed countries was a net exporter of aluminium and iron and steel, two product groups that require considerable energy inputs. Policies involving energy penalties have brought adverse changes to competitiveness and vast reductions in smelting and the future will, unfortunately, show a more typical developed country pattern of imports and exports.

In addition, Australia has banned the use of nuclear power and has relatively minor potential, which it has also constrained, in hydro renewables.

In fact Australian levels of consumption of carbon dioxide are similar to those of other countries – more than Germany, the UK, Sweden and Italy but less than Switzerland, the US and Singapore.

Chart 7 Production and consumption per capita of CO_2 (tonnes)



See: http://www.pnas.org/content/107/12/5687.full.pdf+html

Appendix

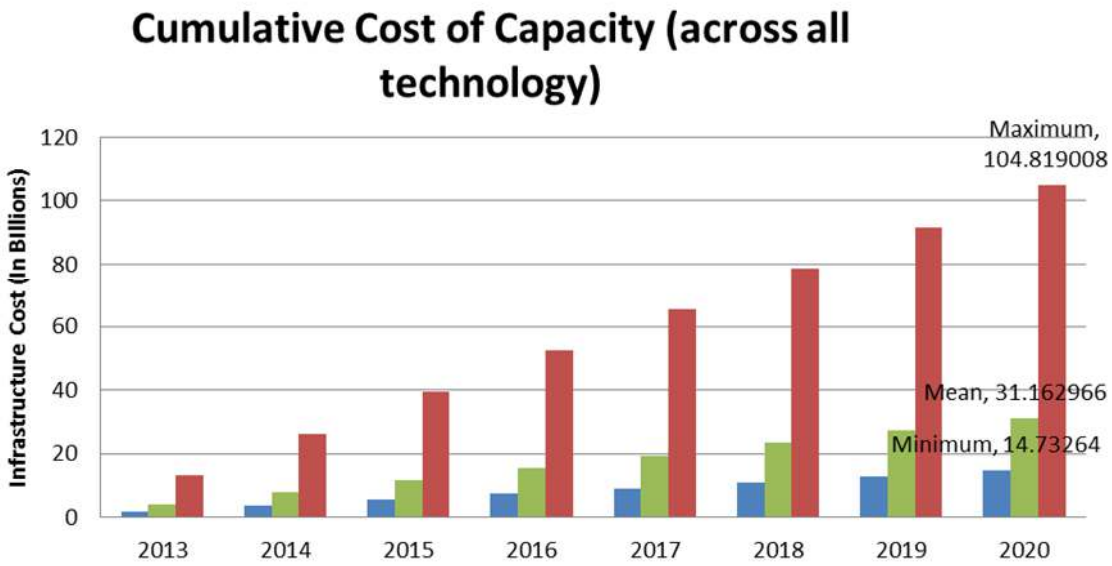
To calculate the infrastructure cost of building capital Alinta Energy used the AEMO produced spread sheet "2013 New Generation Technical data – Capital costs of new technology". This spread sheet provides estimated capital costs for year of completion and new capacity infrastructure projects (real 2013-14 $/kw) across all technology types.

We then estimated, according to the "Clean Energy Future Scenario" modelling done by SKM[7] (which much of the initial RET discussions revolved around), the proportion of new renewable infrastructure capacity that needs to be built in each of these technology areas to meet the 20% target, namely wind, bio-gas and solar.

In reality almost all of the new capacity build will realistically be sourced from wind, however for consistency with past SKM projections we estimated the infrastructure costs using a balanced basket of new technology types (of which wind comprised approximately 65% of new build).

Using the cost variables in conjunction with the projected build of new technology types, Alinta conservatively assumed that the new capacity required would be consistently and evenly built in the 8 years from 2013-2020. In reality meeting the RET would most likely require most infrastructure to be built in the last few years before 2020 (resulting in blow out build costs).

Using this method Alinta calculated a maximum ($104 billion), a mean ($31 billion) and a minimum (14.7billion) of infrastructure costs associated with meeting the RET. Alinta appreciates the AEMO maximum profile out to 2020 provides an extreme scenario that is particularly unlikely.



Sources

ANZ

"*We understand that in order to meet Australia's 2020 target of having 20% of electricity generated from renewable sources, approximately $20 billion in renewable energy investment will be required over the next 10 years.*"

[7] Source:http://archive.treasury.gov.au/carbonpricemodelling/content/chart_table_data/chapter5.asp

http://www.anz.com.au/about-us/corporate-responsibility/customers/products-services/sustainable-product-services/ - Under the 2011 results drop down menu.

Pacific Hydro
"*Already around 18.5 billion has been invested in new renewable generation……A further $20-25Billion (20+25 / 2 = 22.5 billion) will be invested to meet the 45,000 GWH target*"

http://climatechangeauthority.gov.au/sites/climatechangeauthority.gov.au/files/SUB-RET-2012-076.pdf

SKM
"*Meeting the targets under the schemes will require further investment of around A$19 billion in large-scale generation and around A$5 billion of small-scale generation, on top of the A$18 billion already spent/invested*."

http://www.globalskm.com/Insights/Achieve-Articles/Items/2012/Strengthening-the-Renewable-Energy-Target-scheme.aspx

AGL
"*The target requires 41,000 GWh of large scale renewable generation by 2020 to 2030. Meeting the 20% target by 2020 will require an estimated $30 billion of investment in new renewable energy generation*"

http://www.agl.com.au/about/Pages/RenewableEnergy.aspx

CME
"The question of whether the target will be met seems to depend on whether the wind generation industry will be able to expand from its current size of 1,870 MW to 11,800 MW by 2020. The capital required to achieve this – around $30bn – is about four times the total capital that has been invested in generation capacity in the National Electricity Market over the last decade."

http://www.euaa.com.au/wp-content/uploads/2011/02/111014-FINAL-RENEWABLE-ELECTRICITY-IN-AUSTRALIA-1.pdf page 29

Deloitte
"*The Australian government's total investment in renewable and clean energy efficiency is expected to exceed $10 billion. However, total capital expenditure to meet the RET could be in the range of $20 billion to $45 billion (20+45 / 2 = 32.5 billion) over the ten years to 2020*."

http://www.deloitte.com/assets/Dcom-Australia/Local%20Assets/Documents/Industries/Government%20Services/Public%20Sector/Deloitte_regulated_assets.pdf

Bloomberg New Energy Finance
"*According to forecasts by Bloomberg New Energy Finance, there will be $36 billion investment in renewable energies across Australia in the decade to 2020*."

http://www.corrs.com.au/assets/thinking/downloads/Renewable-Energy-Is-20-percent-by-2020-really-achievable.pdf

ACIL Tasman
"In its current form, the RET is a significant subsidy with an estimated total direct value of $53.3 billion (in nominal terms) from years 2012-2030".

ACIL Tasman Report: "Achieving a 20% target", page 14

CCA

"*Bloomberg New Energy Finance estimates that around 11GW of additional generation capacity (based on their projected mix of renewable generation), equating to around $19.5 billion worth of investment to 2020, will be needed to reach the 41,000 GWh target*".[8]

Renewable Energy Target Review - Issues Paper - August 2012 page 22

[8] They have also quoted a figure very similar to this several times across different forums. So although they did not generate this figure, they accept this figure and are happy to quote it.