Submission

to the review of the

Renewable Energy Target

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Engineers Australia Submission – Renewable Energy Target Review

About Engineers Australia

Engineers Australia is the peak body for engineering practitioners in Australia, representing all disciplines and branches of engineering. With membership of over 100,000 Australia wide, Engineers Australia is the largest and most diverse professional engineering body in Australia. All Engineers Australia members are bound by Royal Charter to promote engineering and to facilitate its practice for the common good. Engineers Australia maintains representation in every state and territory.

Engineers Australia is organised geographically and into Colleges, National Committees and Technical Societies that facilitate the conduct of its learned society functions. This submission has been prepared under the guidance of the Sustainable Engineering Society.

The Sustainable Engineering Society exists to promote information transfer regarding environmental issues of relevance to the environmental engineering profession and other environmental practitioners. Environmental Engineers are involved with all aspects of the natural and built environment and the Sustainable Engineering Society provides opportunities for members to network within their profession, as well as maintaining programs for continual professional education.

Introduction and Context

> "*Policymakers need to look beyond short-term economic considerations in the interests of some of the big companies to longer-term community interests. And that's what governments are supposed to do, but unfortunately it's not happening at the present time.*"
>
> Bernie Fraser, Chair, Climate Change Authority, 27 April 2014.

Engineers Australia supports the sentiments of Mr Fraser. We add by way of preface to our brief submission, the following points.

The transition of electricity generation from emission intensive fossil fuels to low or zero emission renewable technologies is one of the most crucial transformations the industrial world must make, if it is to avert potentially catastrophic global warming. Australia is particularly vulnerable to impacts of climate change. The effects have been documented extensively by the Climate Commission, now Climate Council, and most recently in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). The necessity for Australia to reduce emissions is pressing and urgent, as a contribution to the global effort to avoid dangerous warming of the climate. Suffice to say, the uptake of renewable energy should occur as rapidly as possible, consistent with realistic economic and engineering constraints.

This Review should, to echo Mr Fraser's sentiments, focus on the interests of Australian society in the medium to long term over and above those of some industry players.

We note that there was a review of the RET by the Climate Change Authority (CCA), completed less than eighteen months ago. That review recommended essentially continuing the Large-scale Renewable Energy Target (LRET) and Small-scale Renewable Energy Scheme (SRES) as they are at present, albeit with some recommendations to vary some details of the operation of the schemes. In early 2013, the (then) government accepted the majority of the CCA's recommendations. Incidentally, one recommendation accepted was that reviews of the RET schemes should occur at four-yearly intervals rather than two-yearly, in order to provide the renewable energy industry with a stable planning outlook with which to make investment to decisions. Engineers Australia has concerns that this review will, simply by having been established, discourage the renewable energy industry.

Engineers Australia does not have the capacity to investigate the RET performance and future prospects to the point where we could add anything useful to work already done by the CCA, the clean energy industry and their consultants. We will simply identify some points we feel are pertinent and offer comments, where relevant, from the perspective of the engineering profession.

Carbon Pricing

Emission of greenhouse gases comes at a price. Greenhouse gases leading to global warming will cause substantial environmental harm, as repeatedly outlined by mainstream and accepted climate science. As well as environmental effects, there will be human costs through forced migration as low lying areas and islands become subject to inundation. There is likely to be increased heat related illness and death and more injuries and deaths from increasingly intense severe weather such as floods, cyclones, tornadoes and the like.

How to quantify these costs in economic terms is challenging and imprecise. Various studies give highly variable results depending on assumptions made. The 2006 Stern review suggests global GDP could be reduced by 5 percent, or some $3.6 trillion, with business as usual emissions growth. Annual global emissions being around 37 gigatonnes of CO_2, yields a notional cost of $100 per tonne. The IPCC report[1] gives costs ranging from a few dollars to hundreds of dollars per tonne of CO_2 emitted.

Human societies reside within, and depend entirely on the natural world and the ecological services it provides. Economies are subsets of societies yet conventional economics struggles (and mostly fails) in valuing the services provided by nature. The result is that the costs of environmental harm are usually neglected.

The point to emphasis is that there are clear economic and social cost to carbon emissions. From the studies done, imprecise as they are, it is reasonable to postulate that the cost of carbon emissions is likely to exceed $40 per tonne. At an emissions intensity of 0.9 tonne/MWh, this would equate to an environmental cost of $36 per MWh. By not pricing these emissions, a subsidy is effectively conferred to economic activities that emit carbon. Carbon pricing currently in force in Australia goes some way to correcting this market distortion. But because the current price is below the true cost of the emissions, complementary measures such as the RET are necessary to bring about the transformation that environmental imperatives require.

Direct Action

The government's Direct Action scheme, as defined in the recently released White Paper is, we believe, highly unlikely to achieve its objective of reducing Australia's emissions by 5 percent relative to the year 2000 level. Reasons to have serious doubts about the scheme include:

- The implied abatement cost of six dollars per tonne of CO_2 appears unrealistically low. A study in 2013 by SKM for the Climate institute suggests the fund would have to be some four times larger to achieve the required abatement.
- The time scale for projects funded by the ERF to deliver abatement seems unrealistically short, especially for funding allocated in the first year or two of the scheme (beginning form July 2014).
- The scheme is vague about how emission baselines will be established.
- The scheme allows existing emitters to continue business as usual.
- The prospects of the legislation for the scheme passing the senate seem uncertain.

We therefore believe the RET Review should actively question the successful implementation of the Direct Action policy.

[1] AR5 WG2 Full Report, Chapter 10.

Performance of the RET to Date

Capacity Growth: The RET has clearly stimulated the development and deployment of renewable energy. Since 2001, renewable energy generation has exceeded the legislated year by year targets as shown in Figure 1.

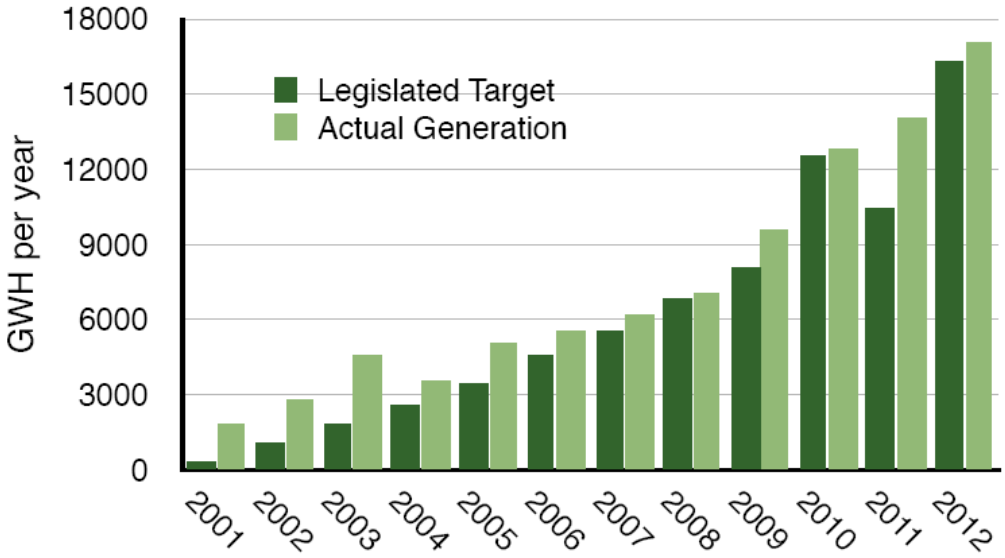

Figure 1: Performance of the RET

Source: CCA RET Review p. 8

There seems to be no basis, from a historical perspective, to doubt the ability of renewable energy to grow in line with the targets currently set, growing to 41,000 GWh energy by 2020 under the current LRET provisions.

Emissions Reductions: renewable energy has also acted to contain emissions growth from the electricity sector as illustrated in Figure 2.

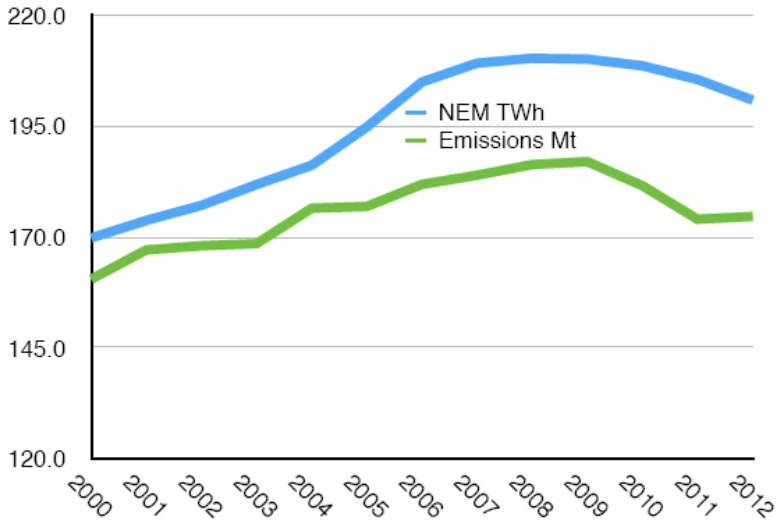

Figure 2: Generation and emissions in the NEM

Source: Aust. Energy Regulator and Department of the Environment

Energy demand in the National Electricity Market (NEM) has grown over the last decade reaching a peak in 2008 and declining somewhat since. Renewable energy has grown simultaneously such that it has increased its relative contribution to a current level of about 13 percent[2]. Some of this increase in recent years would be attributable to the rapid uptake of domestic solar photovoltaic. Had renewable energy not achieved this growth, the emissions intensity of the electricity sector would have increased. In fact, emissions declined at a greater rate than energy output until 2012; the reason for the relative increase in emissions in 2012 is not clear. Victoria, with its emissions intensive brown-coal-fired power generation, is the main contributor to the increase.

Wholesale Price Reduction: Experience has also shown that renewable energy exerts downward pressure on wholesale power prices. This results from the marginal cost of renewable power being low such that it is despatched ahead of coal and gas in periods of high demand. Solar is especially effective in hot weather when air conditioners drive power demand to peak levels. Some analyses[3] suggest that renewable energy has reduced average wholesale power costs by around $4 per MWh in some states.

Retail Price Impact: The national average impact on residential electricity prices in 2012-13 are estimated to be 0.57 cents per KWh for the LRET and 0.81 cents per KWh for the SRES[4]. These amount to, in total for both, 5 percent of electricity cost. The major factor by far is the regulated costs of monopoly transmission and distribution services which make up around 50 percent of the total. This component has been the main contributor to the cost increase of 56 percent in the four years to March 2012[5]. The RET has not been a major contributor to electricity price rises.

Jobs and investment: Investment in clean energy in Australia since 2001 is reportedly $18.5 billion with $11 billion in small-scale systems and $7.5 billion in large-scale systems. Jobs in the sector are reported to exceed 24,000, with the great majority being in the solar photovoltaic sector[6].

Future Outlook under Various RET Scenarios

Reducing or Abandoning the RET

The most recent research available[7] suggests that a 'no RET' scenario will result in slight price reductions to 2020 of between 0.6 percent and 1.3 percent with much greater price rises, of around 5 percent, thereafter. Renewable energy generators depress wholesale prices by the mechanism described earlier. The wholesale price reduction largely offsets the additional costs the RET scheme introduces. The impact of this is also to reduce the revenue of the coal and gas generators, therefore there are both financial winners and losers from the RET scheme.

Curtailment of the RET will largely stall clean energy investment for years ahead. The investment outlook for clean energy will not be encouraging. Eventually, as demand rises and/or older coal-fired generators are retired, new fossil fuelled generators will be built. The life of these generators will be four or more decades and this will crowd out the investment space for renewables. The result will be fossil fuel 'lock in'.

A further consequence will be reduced carbon abatement opportunities as renewable uptake is reduced or stopped all together. It is estimated[8] that additional cumulative emissions will amount

[2] Clean Energy Council Report 2012, p.9.

[3] SKM Report to Clean Energy Council 2012, p.28.

[4] AEMC 2013 Residential Electricity Price Trends.

[5] ABS Consumer Price Index, 6401.0.

[6] Clean Energy Council Report 2012, p.20.

[7] ROAM Consulting, Report to the Clean Energy Council, 29 April 2014.

[8] *Ibid*.

to 35 million tonnes by 2020. This will exacerbate the challenges Australia will face in reducing emissions, not only for the 2020 timeframe but for years and decades ahead. This could prove to be a massive policy mistake in the event that Australia commits to far more ambitions emissions reductions following the 2015 UNFCCC meeting where binding targets are expected to be agreed to by many countries, especially developed economies. It must be borne in mind that the electricity sector in Australia is the largest emissions contributor and probably the one where abatement is most readily available.

With a stalled renewables industry, investment of around $11 billion between now and 2020 will be foregone. Likewise, employment estimated at 12,000 jobs will be lost - a tragedy given the loss of industrial employment with recently announced closures of car manufacturing, petroleum refineries and aluminium smelting operations. Intellectual capital will be squandered as research and development incentives diminish and researchers head overseas. This basically amounts to a road block for the transition of Australian industry to serve high value markets based on innovation and a skilled workforce.

With the government's declared intention to repeal the carbon price, dilution or abandonment of the RET will leave virtually no avenues of emission reduction. Australia, already among the largest per capita emitters (among developed economies) will become even more of a recalcitrant in the global emissions reduction effort.

Maintaining or Extending the RET

It follows that maintaining the LRET at its present level and allowing the SRES to continue along current lines will avoid the negative effects outlined above. That is to say some $11 billion of investment and 12,000 jobs are likely to be generated.

The ability of industry to expand to meet the current LRET is supported by most industry representatives consulted by ROAM Consulting. Sufficient skilled labour and materials are considered to be available. Policy certainty is a key factor in assuring labour and material resources are available. It is even more important to maintain confidence for potential investors, given the substantial period required to provide investment returns.

Maintaining the LRET at 41,000 GWh will lead to the abatement of 35 million tonnes of CO_2-e emissions equating to about 8 percent of the amount required to fulfil the bipartisan 5 percent target by 2020.

We believe there could be some changes made to the SRES given that it is a more expensive scheme per unit of renewable energy delivered. The reductions in the multiplier used to compute the number of STCs is probably reasonable. However, this multiplier should not be reduced below unity in any future review. More importantly, we believe, is crediting small system owners (e.g. roof top solar) with a credit for exported energy closer to the charge for energy drawn from the grid. Locally generated energy causes little, if any, need for upgrading of distribution networks. Existing feed-in credits of 8 cents per KWh is unreasonably low, considering retailers charge close to 30 cents for power consumed, on top of which a service charge of ≥ $1 per day is added.

We do not believe the SRES and LRET schemes should be recombined, at least until any overhang RECs caused by high STC multiples and solar hot water has been absorbed. Even then, we see no benefit to recombining the schemes.

Other benefits of Renewable Energy

Renewable Energy has significant benefits apart from avoidance of carbon emissions, including:

- The avoidance of health hazards associated with the mining, transport and burning of coal. A study by the Australian Academy of Technological Sciences and Engineering[9] gives figures of $19, $42 and $52 per MWh for the combined health and environmental costs of gas, black coal and brown coal fired electricity, respectively.
- Not requiring water for cooling purposes. A 1000 MW coal-fired power station typically requires 17GL of water per year.
- Providing a valuable income source for farmers willing to provide land for wind farms.

Challenges for Renewable Energy

There are some significant technical issues involved with the use of renewable energy. These include:

- **Intermittency**. Wind and solar generators are weather dependent and solar photovoltaic is only operable during the day, although these limitations can be largely ameliorated by geographic distribution. Energy storage is also key to renewable energy becoming the major component of the power system. Storage technologies are inherent in solar thermal power stations. However, to utilise other technologies such as wind, solar photovoltaic, tide, wave (etc.) to their fullest extent, advances in storage are necessary. In some locations, pumped hydro is viable. Battery storage is rapidly advancing at both domestic and utility scale.
- **Grid integration**. Renewable energy dictates a new approach to power grid architecture. The historic model is one of small numbers of large power stations located remotely from the locations they serve. Connection is by way of long and costly transmission lines stepping up to and down from high voltage. Around seven or eight percent of power generated is lost in transmission. The architecture is relatively simple with control and protection systems evolved over many decades. Renewable energy inverts this architecture with large numbers of widely dispersed generators located close to or right at the load centre. However, this arrangement poses new challenges in maintaining grid stability, voltage and effective fault protection.

Engineers are in the forefront of designing and implementing these new technologies. Development work is progressing apace in many countries to overcome the issues that arise from major deployment of renewable energy. Electrical engineering literature is heavily devoted to concepts broadly known as 'smart grid' technologies: these apply modern computing, communications and monitoring technologies to electricity grid operation. We are confident that these challenges will not hold back the deployment of renewable energy.

Recommendations

1. With the stated intention of the current government to dismantle carbon pricing, and the possibility of limited effectiveness or failure of the Direct Action scheme, the RET should be retained to at least its present level (i.e. an LRET of 41,000 GWh per year by 2020 and an uncapped SRES).
2. The LRET and SRES schemes should not be recombined.
3. Future reviews should be limited because of the investment uncertainty they cause. Reviews should take place no more frequently than four-yearly.
4. Any modifications to the administrative arrangements for governing renewable energy should be such as to not impede in any way, the expansion of renewable energy and the long term transition of the energy sector away from combustion of fossil fuels, especially coal.

[9] ATSE: The Hidden Costs of Electricity, 2009.

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