Addendum

On the 23 April 2014, shortly after submissions to the RET Review modelling assumptions were due, the government held a workshop where more detail on the modelling assumptions was released.

The following summarises our main concerns that have arisen from that workshop. These are in addition to those discussed in our submission below.

- It seems the modelling may focus only on costs and benefits at the societal level, and so ignore how renewable energy affects the financial flows between different stakeholders.
- Examples of such financial flows include peak demand reduction and the provision of frequency and voltage control services (benefits to network operators), as well as the reduction in wholesale prices driven by all renewables (benefit to retailers, and if passed on, then a benefit to all consumers).
- The modelling team (ACILAllen) also stated that modelling such impacts was too hard within the short timeframe (despite the wealth of such assessments in the literature).
- Storage, used by either networks or end users, will not be included in the modelling, despite it being highly likely that storage will be widely used by both end-users and network operators – which will result in changes to demand peaks and the types of generation required to meet that demand, as well as increased uptake of distributed generation.
- It was assumed there would be no form of carbon pricing out to 2030.
- They will use a centralised planning model therefore the role of PPA and other market-based mechanisms will not be not considered.

RET Review 2014 –
APVI Submission on Modelling Assumptions

Details of person making the submission

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Position in Organisation	**Chief Executive Officer**
Type of Organisation	**Company – Other, Not-for-Profit**
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Confidentiality

	APVI agrees that this Submission may be published on the RET Review website.

Scope of this submission

Appendix B of the RET Review issues paper outlines the proposed approach to quantifying the key assumptions that will underpin electricity market modelling to be commissioned to support the current review of the Renewable Energy Target (RET) scheme and the Government's response.[1]

Modelling and analysis will be an important input to the Review. It will inform evaluation of the performance of the RET against its objectives; its economic impacts; and the costs and benefits of potential changes to the scheme. It will provide quantitative estimates of important variables, such as wholesale and retail electricity price impacts, associated with changing the RET scheme design. The approach to the key modelling assumptions is based on the most recent electricity sector modelling conducted for the Australian Government.[2]

A Request for Tender has been issued for detailed electricity market modelling and analysis. Feedback through this consultation will be an input to the finalisation of the key modelling assumptions to be used by the successful tenderer.

Views are sought from interested parties on these assumptions and on any other assumptions and/or approaches that should be considered.

APVI's responses to the proposed modelling assumptions

Introduction

The RET scheme is designed to ensure that 20 per cent of Australia's electricity generation will come from renewable energy sources by 2020.

APVI Response

This is not correct. According to the current legislation, the RET scheme is not defined as a percentage, but is actually designed to ensure that at least 41,000 GWh of Australia's electricity generation will come from renewable energy sources by 2020.

ACIL Allen modelling

The approach to the key modelling assumptions is based on the most recent electricity sector modelling conducted for the Australian Government

APVI Response

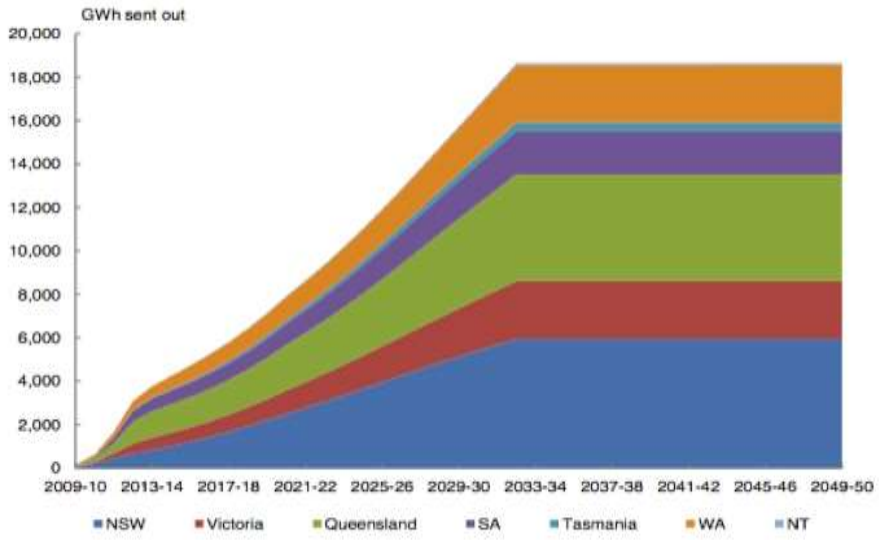
The following issues are noted with regard to the ACIL Allen Methodology referenced by the RET review issues paper appendix B:

[1] On 17 February 2014 the Government announced a review of the RET scheme, to be undertaken in 2014 by an independent panel of experts led by Dick Warburton AO LVO and reporting to the Government by mid-year

[2] ACIL Allen Consulting, *Electricity Sector Emissions: Modelling of the Australian Electricity Generation Sector*, Sep 2013

- 'Intermittent' generation traces are deducted from the demand profile. It is unclear how many years have been considered. The US National Renewable Energy Laboratory recommends at least 8 years of wind data are required to calculate capacity factor. ACIL Allen then reduces this to a 50 point profile (50 half hours). This may not be sufficient information to deal with the diversity in wind, PV and load correlations.
- ACIL Allen limits wind capacity factors to recent real outputs. Again, recent years may not be statistically representative of long term outputs.
- An aggregate solar capacity constraint (no more solar allowed) is applied when solar is equal to midday demand in each region (as estimated from the ratio of midday to average demand 2009-2011). This comes into effect around 2040 in the emissions modelling Acil Allen did previously. Storage would need to be modelled to provide realistic future penetration levels.
- Small scale solar was held constant from 2032-33, assuming that, if PV was not viable at the wholesale level at that point in time it would have reached an effective saturation point and would not be widely deployed at the small scale level either. This is an unrealistic assumption, as small-scale solar can be deployed from mW to MW levels in a wide range of locations, regardless of wholesale price parity.

Figure 7 **Small-scale solar generation output assumptions**



Source: AEMO; IMO

- With the exception of rooftop PV generation, all other embedded and behind the meter generation was assumed to hold constant with a static technology mix and emissions profile based on estimates of the current mix of this generation. This means that all additional generation was met either by rooftop solar generation or generation selected within the wholesale market modelling discussed above.
- Off grid technology stays constant as a percentage of demand. This is unlikely to be the case, given the large off-grid developments now underway, as well as the likely increase in mini-grids and individuals choosing to be off-grid.
- It is not clear how retirement/mothballing of fossil fuel plant will be modelled
- How is the distributed solar output modelled? Is variation in tilt and orientation of PV systems taken into account? Is spatial diversity taken into account?

Electricity demand

The growth rates will incorporate an 'autonomous energy efficiency improvement' parameter averaging 0.8 per cent per year to 2025 declining to 0.5 per cent per year.

APVI Response

Note that consumers are interested in overall energy services and the associated overall cost. Distributed energy, energy efficiency and demand management will increasingly provide these services, so that new options for energy service provision are now required. The RET modelling may need to reflect these alternative service provision options.

It is intended that the electricity sector modelling would make adjustments to the initial demand profile by simulating the market's response to any price impacts that may arise from changes to the RET.

APVI Response

The modelling should incorporate the wholesale price reductions caused by increased use of renewable energy technologies with zero or low marginal cost of operation. It should also incorporate reduced loss factors across all networks caused by distributed renewables, and reduced peak demand in some jurisdictions, as well as the impacts of overall demand reduction, caused in part by distributed renewable energy, which is now leading the Australian Energy Regulator to reduce the pass through costs proposed by networks[3]

The modelling exercise is also intended to estimate future seasonal and time-of-day variations in demand, based on market operator data and forecasts

APVI Response

Note that customers will change their demand patterns in response to PV feed-in tariff levels on offer and will increasingly install on-site storage, in order to optimise PV electricity use and minimise electricity bills. Hence any forecasts will need to examine scenarios with different tariff structures and different regulations concerning storage, such as whether or not stored electricity, from whichever source, is allowed to be exported.

Electricity generation technology costs

Costs will be based on the 2013 update to the Australian Energy Technology Assessment (AETA) published by BREE.[4]

APVI Response

It should be noted that the AETA costs for PV are for large-scale, ground mounted systems only. The largest PV market in Australia is for small-scale distributed systems, typically installed on rooftops. Australia has moved rapidly down the learning curve for deployment of rooftop systems over the past decade and costs are some of the lowest in the world. Uptake of rooftop PV has already had a large impact on the electricity market and is likely to continue to do so. It will be important that any RET modelling includes rooftop PV.

[3] http://www.aer.gov.au/node/24576;

[4] The BREE technology reports are available at http://www.bree.gov.au/publications/australian-energy-technology-assessments

Natural gas prices

It is proposed that forecast natural gas prices will be based on information held by the successful tenderer along with latest Treasury estimates which are based on industry output and energy demand growth rates.[5]

APVI Response

Renewable energy uptake has had a significant impact on gas demand, particularly as reduced market price volatility and displacement of daytime demand has dampened demand and cost-effectiveness of gas-fired generation. The impacts of any changes to the RET will need to model this effect carefully, in addition to scenarios of world parity gas prices vs allocations for local use, and energy efficiency impacts on gas used in buildings.

Coal prices

It is proposed that domestic coal prices will be based on information held by the successful tenderer about prices applicable in the four core coal generating regions: Queensland, New South Wales, Victoria and south Western Australia, along with Treasury's longer-term estimates, and finalised in consultation with the Treasury.

APVI Response

Note that coal demand will be impacted by emission reduction policies internationally, as well as in Australia.

Parameters relevant to the Government's energy-related climate policies

It is proposed that the impacts on the electricity sector of repealing the carbon tax will be incorporated into the modelling by adapting No Carbon Price scenario data from the Treasury to account for carbon tax impacts from 1 July 2012 to 30 June 2014.

APVI Response

Note that the Senate may not pass carbon price repeal legislation, and even if the carbon price is repealed, a future government may reinstate it, so scenarios including the carbon price will be essential. These should assume that post July 2015 the Australian carbon price will equilibrate with the European carbon price, and take into account the European Commission's recent proposal for a binding 2030 emissions reduction target of 40% relative to 1990. The EC's proposed renewable energy target of 27% by 2030 may also be relevant.

The modelling should also consider the possibility that retail prices remain unchanged, even if the carbon price is removed. Retailers have, in the past, collectively managed to avoid passing on NEM wholesale price decreases resulting from the merit order effect of wind and solar, so they may not to pass on any reduction in prices resulting from the carbon price repeal. The modelling should also take into account the possible return to more volatile, higher NEM prices as the carbon advantage of renewables is removed, which could see NEM prices increase.

[5] Key sources utilised by Treasury include BREE, ABARES, Wood McKenzie and the International Energy Agency World Energy Outlook (IEA WEO).

Attachment A: Background on the APVI

The APVI is an association of companies, government agencies, individuals, universities and research institutions with an interest in solar photovoltaic electricity. In addition to Australian activities, we provide the structure through which Australia participates in the International Energy Agency (IEA) PVPS (Photovoltaic Power Systems) and SHC (Solar Heating and Cooling) programmes, which in turn are made up of a number of activities concerning PV and solar system performance and implementation. Further information is available from www.apvi.org.au.

APVI Objective

The objective of the APVI is to support the increased development and use of PV via research, analysis and information.

APVI membership provides:

Information

- Australian PV data and information
- Standards impacting on PV applications
- Up to date information on new PV developments around the world (research, product development, policy, marketing strategies) as well as issues arising
- Access to PV sites and PV data from around the world
- International experiences with strategies, standards, technologies and policies

Networking

- Opportunity to participate in Australian and international projects, with associated shared knowledge and understanding
- Access to Australian and international PV networks (PV industry, government, researchers) which can be invaluable in business, research or policy development or information exchange generally
- Opportunity to meet regularly and discuss specific issues which are of local, as well as international interest. This provides opportunities for joint work, reduces duplication of effort and keeps everyone up to date on current issues.

Marketing Australian Products and Expertise

- Opportunities for Australian input (and hence influence on) PV guidelines and standards development. This ensures both that Australian products are not excluded from international markets and that Australian product developers are aware of likely international guidelines.
- Using the information and networks detailed above to promote Australian products and expertise.
- Working with international network partners to further develop products and services.
- Using the network to enter into new markets and open new business opportunities in Australia.

The International Energy Agency Programmes

PV Power Systems (IEA PVPS)

- **Mission:** *To enhance the international collaborative efforts which facilitate the role of photovoltaic solar energy as a cornerstone in the transition to sustainable energy systems*
- **Focus** (26 countries, 5 associates)
    - PV technology development
    - Competitive PV markets
    - Environmentally & economically sustainable PV industry
    - Policy recommendations and strategies
    - Neutral and unbiased information

Australia currently participates in:

PVPS Task 1: Information Dissemination

PVPS Task 13: PV System Performance

PVPS Task 14: High Penetration PV in Electricity Grids.

Solar Heating & Cooling (IEA SHC)

- **Mission:** *International collaboration to fulfil the vision of solar thermal energy meeting 50% of low temperature heating and cooling demand by 2050*
- **Focus** (21 countries, 2 associates)
    - Components
    - Systems
    - Integration into energy system
    - Design and planning tools
    - Training and capacity building

Current Australian participation:

- SHC Task 51 – PV in Urban Environments
- SHC Task 48 – Quality Assurance Support Measures for Solar Cooling Systems
- SHC Task 47 – Solar renovation of non-residential buildings
- SHC Task 46 - Solar Resource Assessment and Forecasting
- SHC Task 43 - Solar Rating & Certification Procedures
- SHC Task 42 - Compact Thermal Energy Storage
- SHC Task 40 - Net Zero Energy Solar Buildings

For further information on the Australian PV Association visit: **www.apvi.org.au**

For further information on the IEA PVPS Programmes visit **www.iea-pvps.org and www.iea-shc.org**