



AUSTRALIA

A RAPIDLY CHANGING POWER MARKET

INTRODUCTION

Australia is a fascinating case study in the global energy sector. Factors including Federal and State government incentives have driven rapid uptake of renewable generation and other emerging technologies, making Australia one of the world's leaders in rooftop solar installations, and wind generation capacity, per capita.

Despite state based government subsidies for feed in tariffs being scaled back significantly, interest in renewable generation investment remains high and state government renewable generation targets are ambitious.

This paper provides a brief overview of the current position of the power market in Australia and its future direction.

WHOLESALE MARKETS

Whilst coal remains the primary fuel source in Australia, over 4,000MW of coal fired capacity has been withdrawn in the last 5 years. Over the same period, a large number of smaller renewable technology generators have been constructed, taking advantage of government incentives (including grants) and renewable energy target (RET) legislation. The RET, passed with bipartisan support in June 2015, requires a reduction to 33,000 GWh of fossil fuel generation by 2020 to achieve a target of 23.5% of energy from renewable sources. Achieving that target will require roughly 6,000 MW of new renewable generation capacity by 2020. The RET legislation creates cost advantages for generators using renewable fuel sources by creating a market for renewable energy certificates, which they are deemed to create and can sell to retailers who purchase fossil fuel generation.

Meanwhile, State government targets are even more aggressive. The Australian Capital Territory (ACT) government is targeting 100% of energy generation from renewable sources by 2020 and has upcoming auctions for the installation of 36MW of storage as part of an overall package that will see auctions for renewable capacity of 650MW of renewable generation. The Victorian government, which is starting from a lower base, is targeting 25% renewable energy by 2020 and 40% by 2025.

At a national level, the government has for the first time created a portfolio combining energy and climate change, giving Minister Frydenberg an opportunity to instil greater recognition of climate change imperatives into energy policy. If anything, the combining of these two portfolios is likely to hasten the adoption of renewable generation, and other new energy technologies, in Australia.

Wind and solar are the leading forms of renewable generation in Australia. Specifically:

- Australia ranks 11th in the world for wind generation per capita with 3,800MW of installed capacity. However, it is South Australia, where 1,200MW of this capacity is located, that provides the most interesting case study. It is becoming ever more reliant on wind power and has limited redundancy because it sits at the end of the national grid connected to the other NEM regions by

only two transmission interconnectors. In 2014/15, wind powered generation accounted for almost 40% of power generation in South Australia.

- Australia ranks 6th in the world for solar capacity per capita (0.19kW per person). However, it is residential solar where Australia is a world leader. Over 1.4m Australian houses (15%) have solar panels. The percentages in South Australia and Queensland are even higher at 25% and 24% respectively. This was driven by a number of factors including favourable climatic conditions and generous government feed-in tariffs (which are currently being significantly scaled back). This decentralised power generation model creates an interesting contrast to other countries that have installed grid scale solar plants.



VOLATILITY

In particular regions, like South Australia, a large percentage of renewable generation combined with a lack of battery infrastructure and interconnector limits can create significant wholesale price volatility. Volatility can quickly push up the wholesale spot price, and the price of hedge contracts is impacted by both actual and potential volatility. The high price cap in Australia means that even a few hours of very high electricity prices can significantly increase the average price and forward price curve.

There have been a number of instances of high prices in South Australia this year, including in July 2016 when the government was forced to request Engie to turn on its mothballed Pelican Point gas fired plant in order to ensure supply in the face of high demand in the middle of winter, low winds and a reduced capacity (less than half the normal capacity) on the Heywood interconnector due to maintenance. In this period, prices spiked from a year-long average of \$60 per MWh to \$8898 per MWh for one trading interval. Indeed, the average wholesale electricity price in South Australia in 2016 is markedly above those in other regions.

POWER PURCHASE AGREEMENTS

An emerging trend in Australia, reflecting an established practice in North America and Europe, is the use by big business of power purchase agreements (PPAs) to buy renewable energy and hedge long-term energy costs. Read our report '[2016 The Year of PPAs and the Corporate Green Agenda](#)' to learn more about the global trend of PPA adoption.

In an Australian context, the 56 MW Moree Solar Farm in New South Wales is a good case study. It was commissioned in 2014 with assistance from \$100m grant from ARENA, the Australian Renewable Energy Agency, and debt from Clean Energy Finance Corporation. Completed in 2016, it sold 100% of its energy through a landmark 15-year PPA with Origin Energy Limited. The PPA not only allowed Origin to secure a reliable renewable energy supply, but also price certainty for 15 years, thus mitigating the risk of price spikes.

INERTIA ANCILLARY SERVICES MARKETS

One of the challenges for a grid with high levels of renewable generation is maintaining system security. The inertia of the large spinning turbines and alternators of traditional coal and gas fired generators provides stability by resisting fluctuations in frequency and voltage. Renewable generation technologies are typically not synchronised to the frequency of the system and have limited ability to dampen rapid changes in frequency.

Although a number of ancillary services markets are already in place, these are for longer response times of 5 minutes, 1 minute and 6 seconds. The inertia provided by traditional generators has not previously been recognised by any market. Against the background of the continuing withdrawal of coal and gas fired generators, the AEMC received rule change request in June 2016 for the creation of a new market for inertia ancillary services.

Related rule change requests followed in July 2016. In response, the AEMC has initiated a broader review into system security market frameworks which will result in a report being provided to the Council of Australian Governments Energy Council in December 2016. There is potential for a rule change proposal to follow in 2017.

By comparison, National Grid in the UK has already created a market for ancillary services with response time under 1 second. In August 2016, National Grid awarded four year contracts to seven firms to provide 200MW of enhanced frequency response. Many of the tender responses involved the use of battery technology to provide these services.



NETWORKS

The Australian electricity grid is one of the longest interconnected networks in the world, connecting states and territories from Tasmania to Queensland. Separate businesses in each region provide transmission services and distribution services respectively and are subject to economic regulation under the National Electricity Rules. The AER determines annual revenue requirements using a building block model which incorporates return on capital, depreciation, operating expenditure, cost of tax and various incentive mechanisms.

Network costs currently account for around 43% of electricity cost nationally. A large portion of these costs arise in order to meet high reliability requirements and high peak demand. One network calculated that 25% of the cost of the network is associated with assets that are used less than 1% of the time.

New rules have recently been put in place requiring networks to offer cost reflective tariffs. In consequence, customers with smart meters are likely in the future to pay costs based, to a much larger degree, on their maximum demand during peak times.

Changes to the metering requirements, which take effect in December 2017, will reduce the influence of networks on metering installations as retailers are given the power to appoint a metering co-ordinator for their customers. This may accelerate the take-up of smart meters in regions outside Victoria. Almost all Victorian consumers already have a smart meter following a government mandated rollout.

There are a number of other significant projects currently underway that will impact the ability of network businesses to provide services. For example, in November 2016, the AER will publish national ring-fencing guidelines that will set out the basis on which network businesses can offer competitive services. In addition, a review is underway of the limited merits review regime that applies to the decisions made by the AER each 5 years which set annual revenue requirements for those businesses.

THE RETAIL MARKET

Retail market prices have been deregulated in all regions except the ACT, Tasmania and Northern Queensland and reviews have generally found an adequate degree of competition in those deregulated markets.

An interesting feature of the retail markets in Australia is the degree of vertical integration between retail and generation. In particular, three large gentailers have the largest retail market share on a nationwide basis. The competition issues associated with vertical integration in the NEM were considered in the recent decision of the Australian Competition Tribunal regarding

the acquisition of the assets of Macquarie Generation by AGL Energy. Ultimately, that acquisition received authorisation to proceed.

THE FUTURE

Change is a constant and the Australian market will continue to change at a rapid pace. There are a number of interesting issues including:

- **The role of networks and grid scale generators.** Will distributed generation continue to grow in popularity, particularly if battery storage technology makes it easier to store electricity at a household scale? What impact will this have on grid scale generation and the use of existing networks? Will micro-grids grow in popularity and what impact will this have on existing network businesses? Will electric vehicles grow in popularity and, if so, what impact will this have on the use of networks, and the network infrastructure required?
- **The wholesale market.** Will the growing popularity of renewable generation leads to the creation of new markets, such as very fast response ancillary services? Will increasing renewable generation lead to greater spot price volatility, or will battery storage technology counter such impact? Will new technologies allow trading between consumers?

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