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4 December 2017

Ms Donna Hogan
Principal Council Officer
Legislative Council: Select Committee on Electricity Supply, Demand and Prices in NSW
Parliament House, Macquarie Street,
Sydney NSW 2000 AUSTRALIA

By email:
electricitysupply@parliament.nsw.gov.au

Dear Ms Hogan,

AEMO response to questions on notice

Thank you for the opportunity for Damien and I to appear before the Committee on 31 October. In providing our evidence there were several questions taken on notice and these related to:

a. Applications for new generators to connect to the grid in New South Wales
b. Installed generation and interconnector capacities in New South Wales
c. The AEMO-ARENA demand response program for this summer
d. Financial markets that underpin the NEM

The response to each of these issues is provided in the following.

1. Applications for new generators to connect to the grid in NSW

We advised the Committee that AEMO had a large number of active projects engaging with us and network service providers, seeking to connect to the grid. The proposed capacity of all those projects was around 22,000 MW. The Committee asked for further information on the volume of projects in New South Wales.

The numbers change as projects progress and new connection applications are received. The monthly report for October 2017 shows that there are approximately 14 GW of projects with current, formal applications for new connections across the NEM, just over 2 GW of which is in NSW.

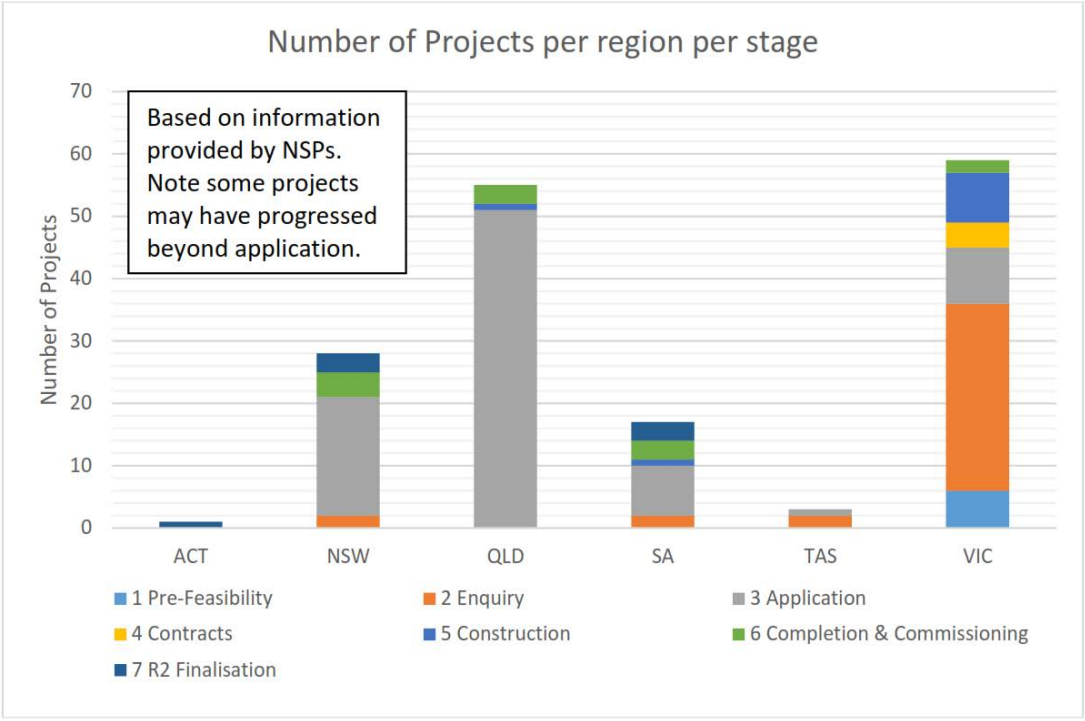
The majority of applications in New South Wales, by number and by capacity, are for Photovoltaic Solar generators. The remainder are for wind generators. There are currently no applications for connection in New South Wales for conventional generators.

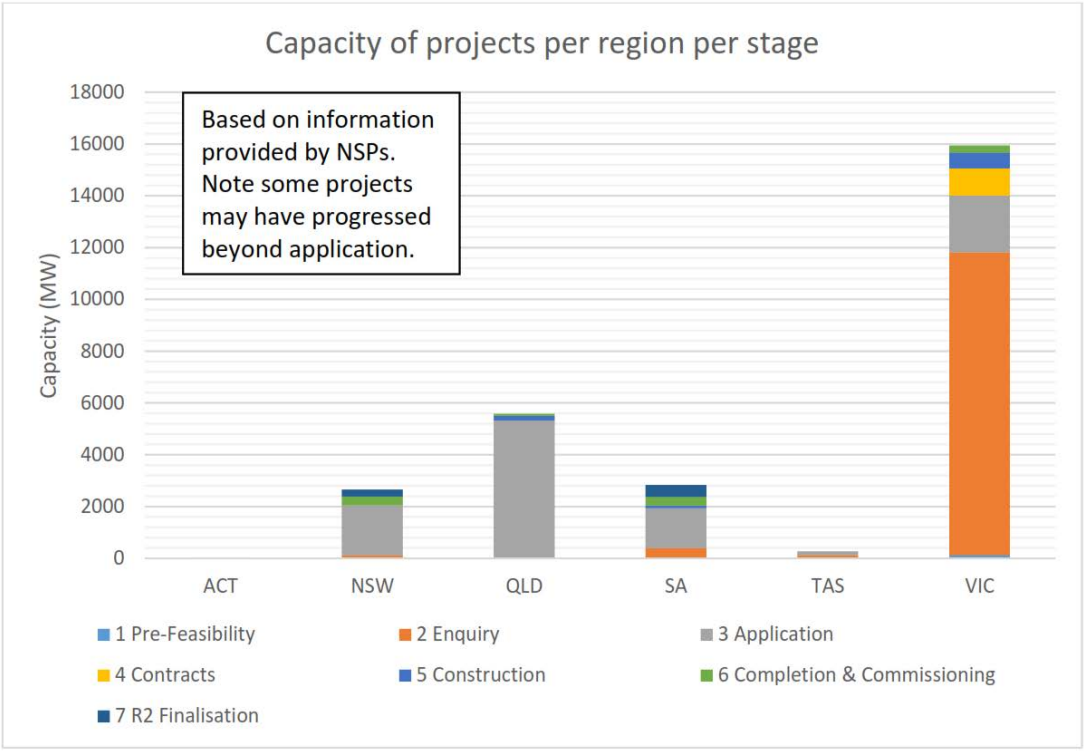
This does not include a large number of projects in earlier stages that may be

undertaking feasibility studies and making enquiries to network service providers or

AEMO. While we are aware that there are many of these, the actual numbers are difficult to ascertain exactly. It does also not include applications for connection for smaller projects that do not need to be registered with AEMO.

The number of applications by region are shown in the figure below and their capacity in the figure following.

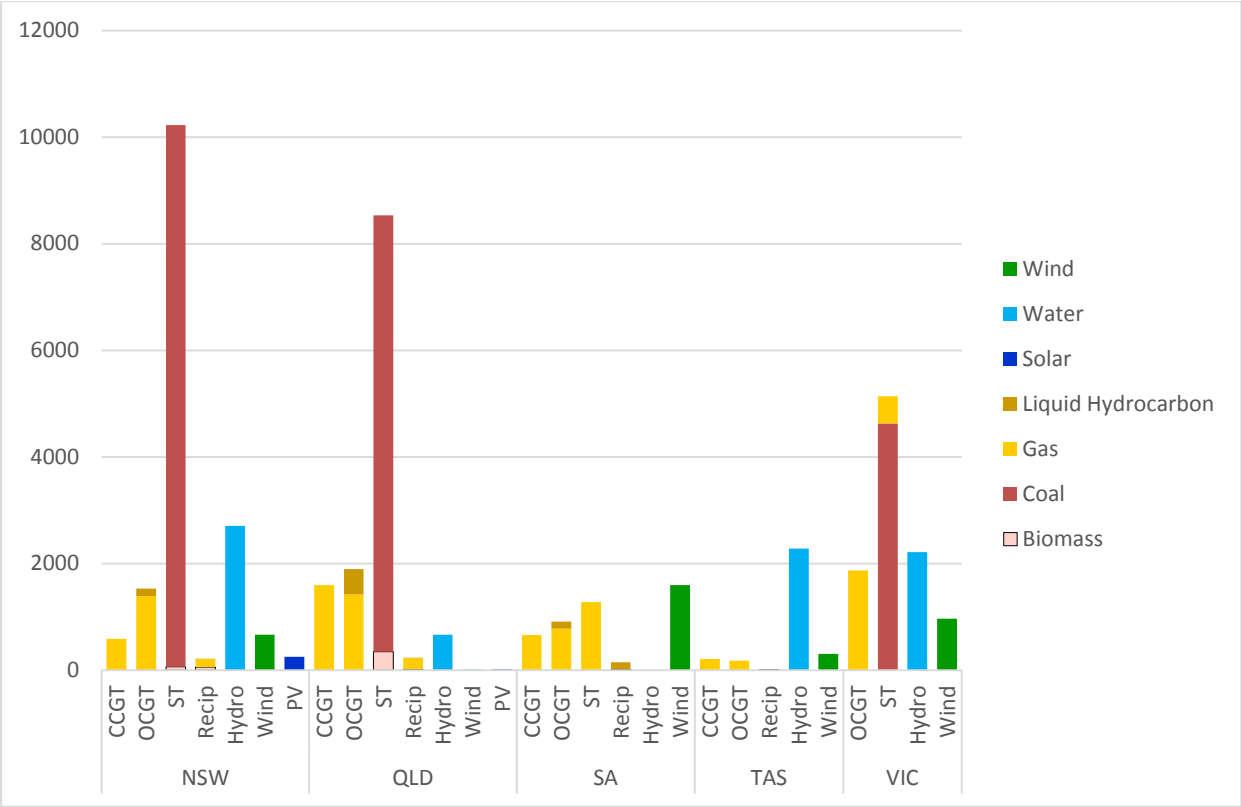




2. Installed generation and interconnector capacities in New South Wales

The installed generating capacity in New South Wales can be defined in a number of ways. The following table outlines the most current information for the installed capacity of plant in New South Wales by technology and fuel type. This covers only registered generators, dispatched by AEMO (scheduled or semi-scheduled). It excludes smaller generators including rooftop solar PV and non-scheduled generators.

	Fuel Type						
Technology	Biomass	Coal	Gas	Liquid	Solar	Water	Wind
CCGT			591				
OCGT			1388	142			
ST	68	10160					
Reciprocating	63		147	9			
Hydro						2706	
Wind							665
PV					254		
	131	10160	2126	151	254	2706	665



The total installed capacity in New South Wales as set out is 16,193 MW. The rated capacity of conventional thermal plant is generally lower under high temperature conditions than the nameplate capacity and the reliable output from intermittent wind and solar generation is statistically calculated based on past performance. The current summer rating of all generation in New South Wales is 15,330 MW.

The capacities set out above are for larger or registered generators. Importantly in New South Wales over 350,000 households in NSW have installed solar PV systems with a total capacity of over 1,100 MWs.

In addition to the installed generation capacity in New South Wales, customers have access to generation in the rest of the National Electricity Market through interconnectors to Queensland and Victoria. It is important to note that the actual secure transfer capacity across each interconnector are dynamically calculated by AEMO in each dispatch interval and vary significantly based on the pattern of demand and generation at the time. Flows between New South Wales and Victoria are particularly sensitive to generation in the Snowy area.

The following table provides the nominal ratings, which seek to represent the average capability during peak periods (7 AM to 10 PM on weekdays).

From	To	Summer peak (MW)	Summer off-peak (MW)	Winter peak (MW)	Winter off-peak (MW)
Queensland	NSW	1030	1030	1030	1030

Victoria	NSW	3200 minus Upper & Lower Tumut Generation	3000 minus Upper & Lower Tumut Generation	3200 minus Upper & Lower Tumut Generation	3000 minus Upper & Lower Tumut Generation
Queensland (Terranora)	NSW (Terranora)	224	224	224	224

3. The AEMO-ARENA demand response program for this summer

In the Energy Supply Outlook report published earlier this year, AEMO identified a heightened risk of supply disruptions for the coming summer in Victoria and South Australia if no further steps were taken. As a result, AEMO initiated its 2017/18 summer readiness action plan, focused on maximising the resources available to the system during periods of extreme electricity demand.

AEMO recently released a report outlining all actions taken to prepare the National Electricity Market to meet Australian energy consumer requirements. That report is available on AEMO's website here:

http://www.aemo.com.au/-/media/Files/Media_Centre/2017/AEMO_Summer-operations-2017-18-report_FINAL.pdf

The additional resources retained include the return to service of 833 MW of existing market generation capacity from gas-powered generators and over 1,000 MW of generation and demand response reserves AEMO has procured much of these via the Reliability and Emergency Reserve Trader (RERT) mechanism. The RERT is a mechanism AEMO uses to maintain power system reliability and system security by entering into reserve contracts. It is a program outside the wholesale electricity market where parties are contracted by AEMO to either use less energy or generate power from their own generators. The RERT mechanism has also been employed to facilitate 143 MW of demand response across Victoria, South Australia and New South Wales procured through the joint AEMO and ARENA demand response trial.

AEMO's actions were based on analysis highlighting a risk to power supply across Victoria and South Australia during extreme demand periods in the coming summer. However, AEMO's summer readiness plan sought to ensure all reasonable and necessary actions were pursued to prepare for the coming summer in all NEM regions. Of particular relevance for New South Wales:

- AEMO's comprehensive summer readiness plan also includes the implementation of a range of operational improvements, together with ensuring the availability of fuel for generators (coal, gas, water, and diesel) and the availability and capacity of the transmission network to carry power to where consumers need it.
- AEMO has been talking to a number of large industrial customers in New South Wales, seeking to have some demand side capacity available under the short term RERT

- The AEMO - ARENA demand response trial includes 61 MWs in New South Wales

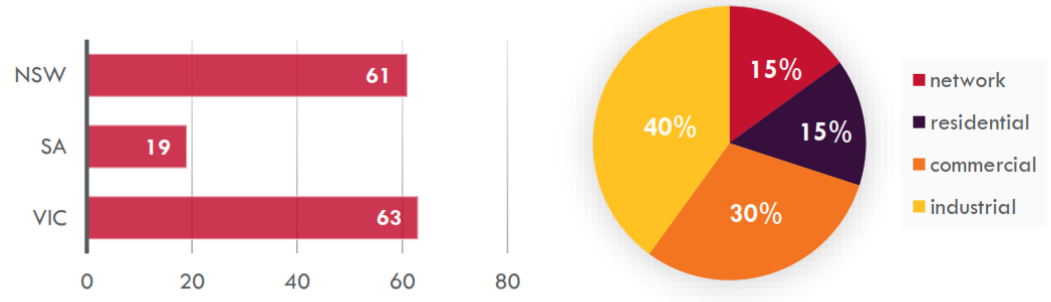
The joint AEMO/Australian Renewable Energy Agency (ARENA) demand response trial is a three-year initiative to pilot demand response projects with the dual aim to:

- Provide reserves for the upcoming summer as part of RERT; and
- To trial a strategic reserve model (referencing international market designs) for reliability or emergency demand response to inform future market design.

Under the trial, ARENA is providing, over a period of three years, up to $28.6 million of funding for projects, with the New South Wales Government providing $7 million, for energy users to become demand response enabled. The trial was run as a competitive funding round. The competitive round received 24 applications, of which 10 projects involving eight recipients were successful.

Participation ranges across network providers, retailers, aggregators, direct energy users, and technology providers such as smart thermostat developers. The pilot projects will involve commercial, industrial and residential consumers. During an extreme peak demand event, AEMO will be able to call on these pilot projects to dispatch their reserves if required, and will pay usage charges under the RERT agreements. The pilot projects will trial a range of different demand response models, technologies, and incentives. The projects are summarised by region and source in the following graph extracted from AEMO's report.

Figure 7 AEMO/ARENA demand response trial for this summer, by region and sector



Further information on the project is available on ARENA's website here: https://arena.gov.au/news/aemo-arena-demand-response/

As a result of AEMO's initiatives, the actions of governments and industry and the support of ARENA, AEMO is well prepared for the summer. While we know unexpected events can and do happen to power systems, we have pursued a thorough plan to address most foreseeable events, and undertaken contingency planning to prepare AEMO, governments, and the energy industry to address the unforeseeable quickly and effectively.

Although preparing the power system for the upcoming summer is an immediate priority, AEMO continues to focus on supporting the evolution of the power system.

Our focus is to ensure that the security and reliability of the power system is maintained as it transitions to a low emission future.

4. Financial markets that underpin the NEM

As outlined in the 'AEMC Reliability Frameworks Review', contract markets are an integral part of the National Electricity Market (NEM) market design and contribute to reliability by hedging uncertainty and assisting with risk management.[1]

Currently there are two main avenues for trading contracts to hedge against future electricity prices:

- ASX Energy; and
- Over-the-counter (OTC) bilateral contracts.

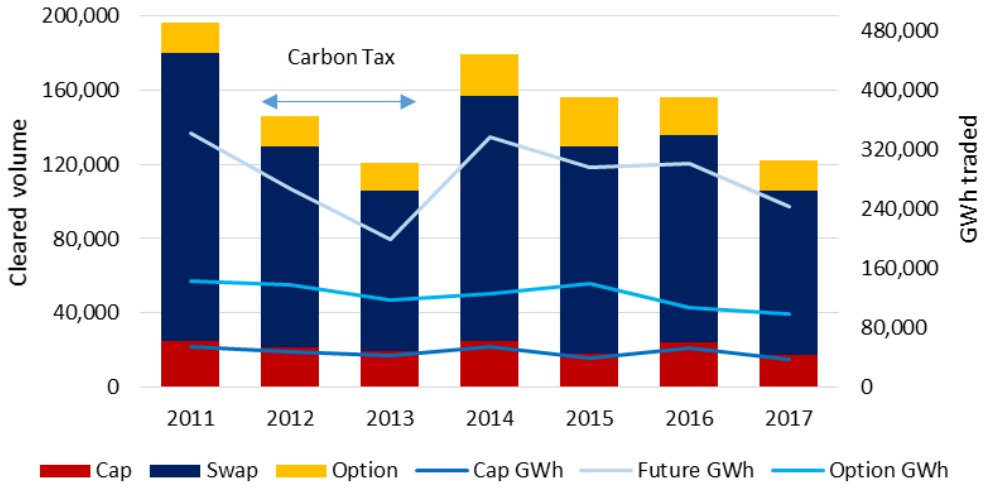
Additionally, participants can manage financial risks arising from uncertain future electricity prices by vertically integrating across generation and retail. This is now the prevalent mode in New South Wales.

The trading of hedging contracts in these markets is explored below.

Overview of ASX Energy contract volumes

The volume of hedging contracts traded through ASX Energy is substantial. According to the Australian Financial Markets Association (AFMA), "in FY16 traded volume (of electricity contracts on the ASX) was $16.5 billion in face value, or 388.9 TWh of traded energy, representing 125% of the underlying NEM system demand."[2] While these figures are large and indicate a liquid market covering the physical market, the traded volume of contracts has been decreasing since 2011.

Figure 1 ASX Energy – cleared volume by product

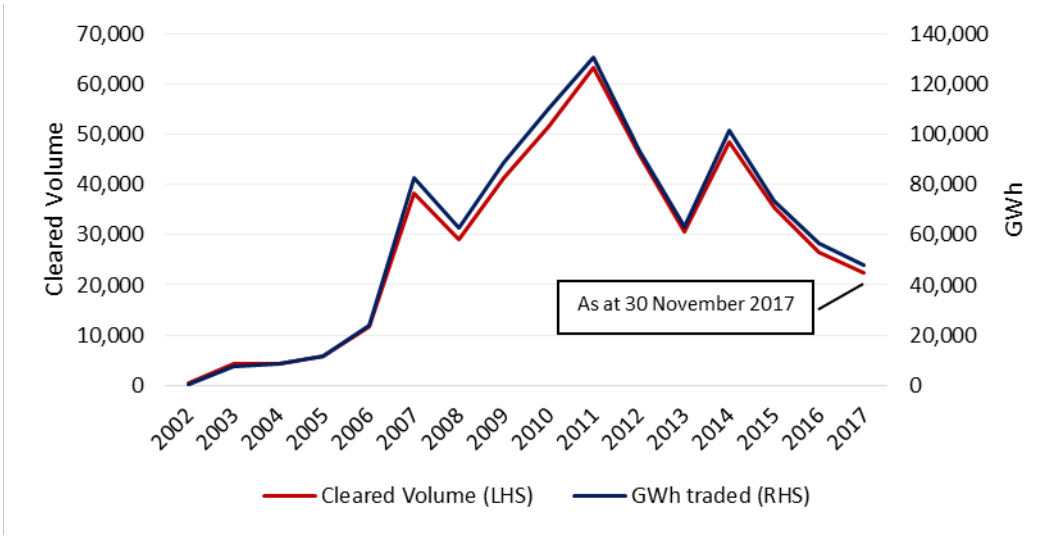


Source: ASX Energy

[1] AEMC. 2017. Reliability Frameworks Review. [ONLINE]. http://www.aemc.gov.au/getattachment/75368f62-e3aa-46c5-bf57-383b82767423/Issues-Paper.aspx Accessed 21 November 2017.
[2] AFMA. 2017. 2016 Australian Financial Markets Report. [ONLINE]. https://afma.com.au/data/afmr/2016%20AFMR.pdf Accessed 30 November 2017.

The following chart shows the New South Wales ASX Energy swap traded volumes over time. The volume of trading has fallen in New South Wales (down 55% since 2011) and in 2016 and 2017 fell below the underlying NEM system demand.

Figure 2 NSW swap volumes – 2002 to November 2017

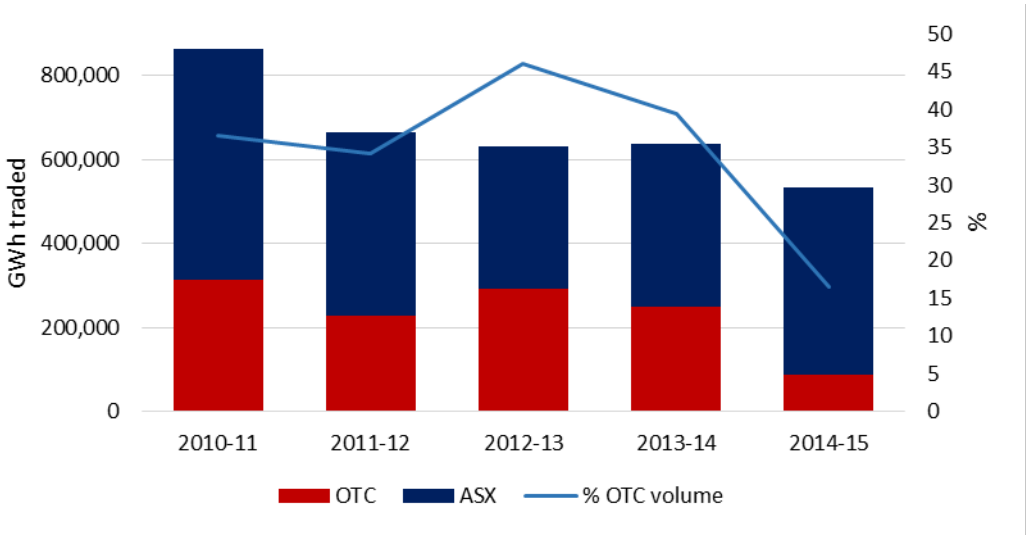


Overview of over-the-counter (OTC) volumes

Because OTC trades are negotiated bi-laterally there is little visibility of the volumes of trades actually occurring.

The most up-to-date information on the number of OTC electricity derivatives traded was provided by Australia Financial Markets Association (AFMA) in its 2015 Australian Financial Markets Report (AFMR)[3]. AFMA previously collected this data via a survey sent out to its members, but this ceased in 2015.

Figure 5 AFMA data on OTC and ASX GWh traded



Source: AFMA

[3] AFMA. Australian Financial Markets Report. [ONLINE] https://afma.com.au/data/afmr/2015%20AFMR.pdf. Accessed 16 November 2017

It is important to note that the AFMA survey relies on survey responses from members and so is not comprehensive. The AFMA data indicates, however, that the OTC bilateral trades in the market are small in comparison to the ASX trades.

I hope that this information responds adequately to the Committees questions on notice. We would be happy to provide any additional material the Committee might require in its important work.

Yours sincerely,

(not signed – forwarded by email)

David Swift

Advisor to the CEO