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Dora Oravec
Committee Manager,
NSW Legislative Assembly Committee on Environment and Planning
NSW Parliament House
SYDNEY NSW 2000

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

Dear Committee manager

AEMC submission to the Inquiry into Sustainability of energy supply and resources in NSW

The Australian Energy Market Commission (AEMC) welcomes the opportunity to make a submission to the sustainability of energy supply and resources in NSW. We note that the inquiry is looking at the capacity and economic opportunities of renewable energy. It will also cover trends in energy supply and exports, including investment and other financial arrangements, and effects on regional communities, water security, the environment and public health. The Committee will also consider options to support sustainable economic development in communities affected by changing energy and resource markets, including the role of government policies.

The AEMC's role is to make and amend the rules that underpin Australia's energy systems and markets. We also advise governments on how to develop flexible and resilient energy markets that benefit consumers over time. The rules we make and the advice we give set the foundations that drive industry to deliver what energy consumers value in a sustainable manner, over the long term.

Our decision making is guided by the national energy objectives, that is, we seek to promote efficient investment in and efficient use of energy services with respect to safety, security, reliability and price and in the long-term interest of energy consumers. Our submission addresses the inquiry's terms of reference with this objective in mind.

Summary of AEMC submission

To deliver sustainable energy supply and resources in NSW, the energy sector needs investment.

Investments in the energy sector are capital intensive, take many years to plan and build and operate over extended periods of time. Such investments require policy settings that are stable and predictable but able to adapt transparency the energy sector transitions. Governments, energy institutions, industry, interest groups and other stakeholders all have a role to play in supporting an investment environment that is predictable yet flexible.

Ad-hoc, short-term or interventionist policy approaches will hinder new private sector investment that is crucial to delivering sustainability of energy supply and resources in NSW.

In its submission the AEMC urges the Committee to consider the following four points when inquiring into and reporting on the sustainability of energy supply and resources in NSW:

1. The grid of the future will allow consumers buy and sell energy and demand response services in a more dynamic way – in response to prices and their own preferences. **Supporting market and regulatory frameworks that reward customers for their contributions to the power system will allow the grid to operate more efficiently.** This will lower prices for all consumers, not just those with distributed energy resources – see section 1.
2. The national energy market (NEM) is designed to provide financial incentives for the private sector to invest in generation capacity that is available when customers and the power system need it. **If supporting new investment in the sector, Governments should maintain strong financial incentives for investors to supply generation or demand response when it is needed.** Without these links, reliability concerns can arise over time – see section 2.
3. A market-based and technology neutral approach has served NSW well, delivering increasing levels of competition and allowing the NSW energy sector to innovate and change over time. **Continuing along a technology neutral path will deliver the lowest cost combination of electricity generation and demand response technologies for NSW and reduce the risks and costs borne by consumers** as the power system transitions – see section 3.
4. In a transitioning sector and market, generation plant with high capital costs and long lead times carry increased levels of investment risk. **Current and forecast demand patterns signal a need for dispatchable generation that is flexible and can respond quickly to changes in the supply and demand balance during the day.** This will complement growing investment in variable renewable energy – see section 4.

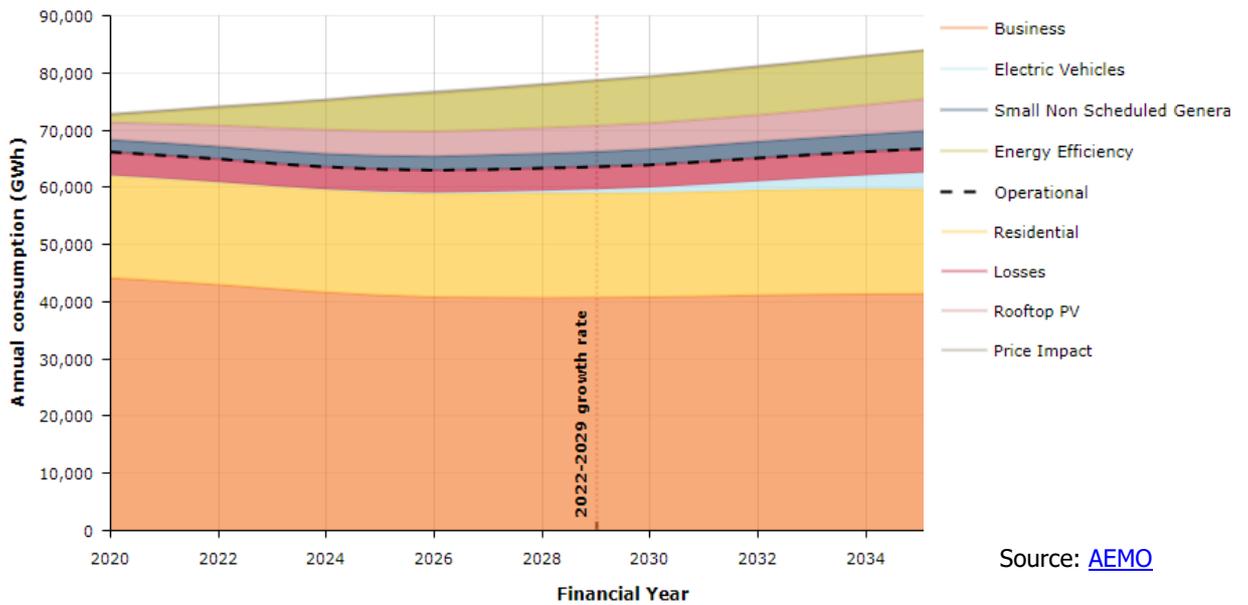
Before covering these points in more detail, I have included a snapshot of electricity supply and demand in NSW. Electricity *supply* must match consumer *demand* at all times for the power system to stay reliable and secure. Understanding the supply and demand balance can be useful when considering the sustainability of energy supply and resources in NSW.

Snapshot: electricity consumption in NSW

NSW customers are responsible for around 37 per cent of total electricity consumption in the NEM. The seasonal peak occurs in summer and was 12,878 megawatts (MW) in 2018. Maximum daily demand tends to occur between 15:00 and 18:30 however as rooftop PV uptake increases, maximum demand is forecast to shift later in the day to between 15:30 to 19:30.

The Australian Energy Markets Operator's (AEMO) [operational forecast for NSW](#) show that business consumption makes up around 67 per cent while residential consumption makes up around 27 per cent total electricity consumed in NSW (see figure 1 below). AEMO's [2019 Electricity statement of opportunities](#) forecast a slight downward trend in total operational consumption in New South Wales over the next decade from 68,000 gigawatt hours (GWh) in 2018-19 to around 64,000 GWh in 2028-29.

Figure 1: Annual operational consumption forecast for NSW

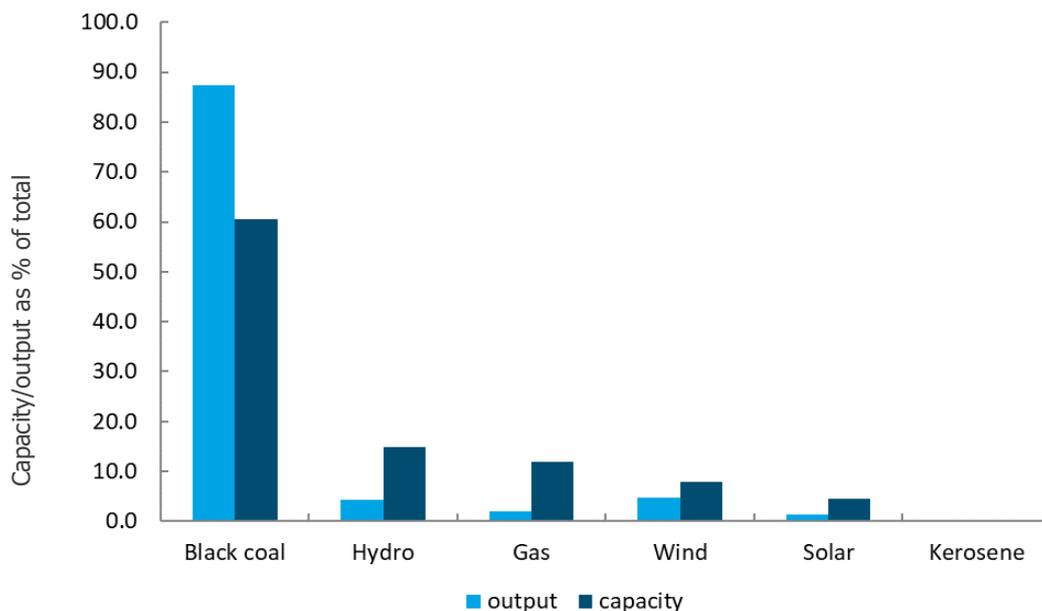


Snapshot: electricity supply in NSW

As of October 2019, the total installed electricity generation capacity installed in NSW is 16,929 MW or around 34 per cent of the total installed capacity in the NEM. This is made up of 60 per cent black coal, 15 per cent hydro, 12 per cent gas, and less than one per cent of each wind, solar and kerosene.

The total electricity generated in NSW in 2018 was 65,614 GWh which equates to 36 per cent of total electricity generated in the NEM. This was made up of 88 per cent black coal, 5 per cent wind, 4 per cent hydro, 2 per cent gas, 1 per cent other (other includes large-scale solar).

Figure 2: Generation installed capacity and output by fuel source in 2018



Source: AEMC analysis of AEMO data

Section 1: Rewarding customers for their contributions to the power system will allow the grid to operate more efficiently.

The electricity system is transforming into a market where consumers can buy and sell energy and demand response services in response to their own preferences and the prices in the market. Consumers can control how their solar panels, batteries, electric vehicles and other distributed energy resources are used with the option of selling the power from their solar panels or batteries if they don't need it.

To support this transformation, changes are needed in the way we regulate and operate the electricity system, and the way consumers access, pay for and are rewarded for the services they provide to the grid. The AEMC recently made ten recommendations in its [2019 Electricity networks economic regulatory frameworks \(ENERF\)](#) review that will take us from where we are now, to the grid of the future.

Moving to the grid of the future which efficiently integrates distributed energy resources requires collaboration. The [Distributed Energy Integration Program](#) is a collaboration of government agencies, market bodies, industry and consumer groups that aims to maximise the value of consumers distributed energy resources for all energy users. Recommendations from the AEMC's recently released report will be progressed through the Distributed Energy Integration Program.

Governments that support market and regulatory frameworks that reward customers for their contributions to the power system will make the most of the distributed energy resources already available and help the grid can operate more efficiently. This will benefit everyone connected to the grid, not just those consumers who have solar panels or other distributed energy resources.

Section 2: Market incentives will deliver what consumers and the power system need

The NEM is [designed to provide market incentives](#) that drive the private sector to invest in generation capacity and demand response capability that is available when and where customers and the power system need it. There are appropriate safety nets in place if the market fails to deliver reliable supply.

As a result, most of the investment risk is borne by market participants who have the information and capital to bear them, rather than being shouldered by energy consumers or taxpayers.

Examples of market incentives that drive private sector investment include:

- Spot market prices– that indicate when generators should turn on or ramp up their output to sell extra power to the market (when spot prices are high) or ramp down or turn off because they are not needed (when spot prices are low).
- Market contracts between generators and retailers – that give generators an incentive to supply electricity when it is needed by the power system or pay the retailer a financial penalty.
- Regular information about power system performance – for example AEMO's electricity statement of opportunities, is published annually to inform the market of any forecast breaches to the reliability standard and therefore indicate when would be a good time to invest in new generation or extend retirement decisions.

Market incentives don't work as well if factors outside the market are affecting investment decisions.

For example, if governments provide revenue to generators to reduce emissions, without also maintaining strong incentives for the generator to be available when consumers and the power system need electricity, reliability concerns can arise.

As the NEM undergoes a transition [more variable demand from customers, more variable supply from generators](#) and consequently more variable prices in the market makes forecasting a challenge and adds risk to operational and investment decisions. This, along with other factors like capital costs, construction lead time, technology risk and the level of certainty around future government decisions relating to energy or emissions reduction policies contribute to the level of investment risk the private sector is willing to take on.

In this environment, governments should focus on providing policy certainty. If governments seek to provide financial assistance for new generation investment, this should be focused on lowering their input costs such as capital costs, but then leave the generator to operate in the competitive market once built.

Section 3: Technology neutrality will deliver the lowest cost combination of energy

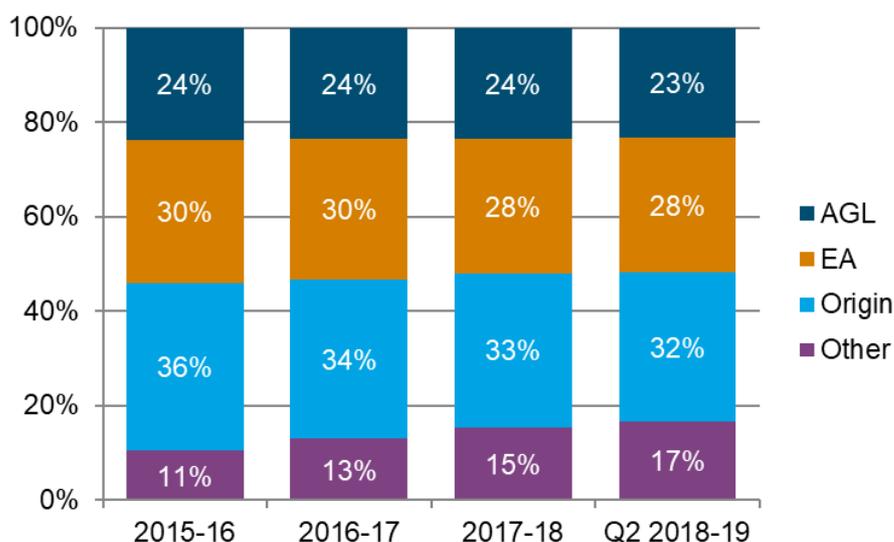
The AEMC has always advocated for a technology-neutral approach when it comes to facilitating investment in the energy sector. This is because uncertainty is a key feature of our energy system. It cannot be predicted how investment in new technologies or changes to consumer behaviour will impact the energy market and subsequently how the market will respond with further investment choices.

The AEMC believes that the efficiencies of the NEM are realised through healthy competition and market forces that promote investment and innovation in technologies that best serve the needs of the power system and consumers at least cost.

A market-based and technology neutral approach has served NSW well, delivering increasing levels of competition and allowing the NSW energy sector to innovate and change over time.

In our [2019 retail energy competition review](#) we noted that competition increased for both consumers with the retail market share of tier two retailers increasing year on year since retail contestability was introduced (see figure 1 below). In 2018, four new electricity retailers entered the NSW market – Sumo Power, ReAmped Energy, Powerclub and DC Power Co – bringing the total of retail brands in NSW to 32.

Figure 1: Retail market share in NSW



Source: AEMC analysis of AER data

Contestable retail markets now underpin a wide variety of retailers with different sizes, strategies and skills and facilitate innovation in energy products, services and business models. This in turn results in a range of offers available to meet consumers preferences.

Continuing along a technology neutral path that facilitates the private sector to invest in what customers and the power system need, rather than shifting the risks and costs of those investments onto consumers or taxpayers, will deliver the lowest cost combination of electricity generation and demand response technologies for NSW as the power system transitions

Section 4: Flexible and dispatchable electricity for a transitioning sector

As discussed earlier, the NEM is designed to send price signals for investment in capacity that has characteristics to meet demand. In a secure, reliable power system, the generation mix closely reflects the shape of consumer demand as it varies over time.

In the NEM, customer demand is met by the lowest cost combination of energy available at any one time. Currently, renewable technologies, such as wind and solar PV have very low operating costs, and as such, they displace generation from traditional thermal generators. Therefore, to determine how much “room” there is for a new “firm” or “dispatchable” generation, we must remove the amount of generation provided by “non-firm” technologies from the aggregate demand curve. The demand that is left over is termed *residual demand*.

Investment in the future power system will need to include generating technologies (or demand response capability) that can fill this residual demand gap. The size and shape of residual demand will be a key influencer of future investment in new generation and demand response capacity.

In recent years, the AEMC has observed three key trends that are changing the profile of residual electricity demand. These changes are:

1. flat demand growth in the NEM;
2. changes in the large-scale generation mix; and
3. the rapid up-take of behind-the-meter rooftop PV.

The combination of flat demand with increasing intermittent generation leads to significant changes in the size and profile of residual demand and has significant [implications for the optimal future generation mix](#).

The market and technological trends observed mean that future generation will need to be sufficiently flexible to meet the changing profile of residual demand. These changes in residual demand mean:

- traditional thermal technologies that are designed to operate at high capacity factors and have correspondingly low ramp rates and high start-up costs, are unlikely to be dispatched at the levels required for efficient operation.
- flexible technologies, such as peaking gas plants, pumped hydro and battery storage, are likely to be better suited to the changing profile of residual demand.

Put another way, the concept of “baseload” demand (the portion of residual demand that can always be assumed to exist regardless of the output of “non-firm” variable renewables) is becoming outdated as flexible or dispatchable plant becomes a natural complement to new higher penetrations of renewables that will continue to enter the NEM.

Current and forecast demand patterns indicate that “baseload” demand is decreasing, non-existent or negative at times across the NEM and signal a need for dispatchable generation that is dispatchable and flexible to complement growing investment in variable renewable energy.

Further information

I would be happy to provide more information on any matters that may assist the Committee in its deliberations. In the meantime, please do not hesitate to contact me directly on ph. [REDACTED]

[REDACTED] or [REDACTED]

Yours sincerely

A handwritten signature in blue ink, appearing to be 'JP', with a long horizontal flourish extending to the right.

John Pierce AO

Chairman

AEMC and the energy market bodies

The Commission is one of three energy market bodies that carry out the day to day operation, regulation and evolution of the energy sector.

- The **Australian Energy Market Commission** makes and amends the rules that underpin energy sector activity and provides advice to government on energy sector design.
- The **Australian Energy Market Operator** runs the physical systems balancing supply and demand for energy in real time, as well as running the financial market that supports this.
- The **Australian Energy Regulator** polices the system and oversees the economic regulation of the monopoly network sector.

Both individually, and collectively through the **Energy Security Board**, the market bodies are working collaboratively to create an energy sector that can meet consumer needs as they evolve over time.

AEMC priority areas of reform

The AEMC is focused on five key trends taking place in the market and is prioritising reforms in these areas so customers can access safe, secure reliable energy at the lowest possible costs as we transition.

- **Generator access and transmission pricing**
A shift from large geographically concentrated to small geographically dispersed generation. This requires us to rethink how we plan and develop markets so we get investment in the right kit, in the right place at the right time to deliver reliable supply to customers.
- **Power system security**
Power system services that were previously provided for free as a by-product of power generation are now not necessarily provided by new generation. This requires us to find new ways of procuring enough of the technical services to keep the power system secure.
- **Integrating distributed energy resources**
Customers are increasingly adopting small-scale solar and energy storage technologies. This requires us to re-think how network infrastructure is used so customers and the grid can get the most out of these technologies.
- **Digitalisation of energy supply**
The power system and market are increasingly underpinned by digital technologies that make it easier choose and control how, when and where power is delivered and used. We are increasingly focusing on embracing market frameworks so customers can reap the benefits of these technologies.
- **Aligning financial incentives with physical needs to deliver reliable supply**
More variable demand from customers and more variable supply from generators makes forecasting a challenge and adds risk to operational and investment decisions. We are focused on maintaining the link between financial incentives facing market participants and the physical needs of the system.

The AEMC is working with our stakeholders to take us from where we are today, to where consumers want to be in the future.