AGL Energy Limited
ABN: 74 115 061 375
Level 24, 200 George St
Sydney NSW 2000
Locked Bag 1837
St Leonards NSW 2065
t: 02 9921 2999
f: 02 9921 2552
agl.com.au

Standing Committee on the Environment and Energy
Submitted online at www.aph.gov.au/moderngrid

28 April 2017

Dear Committee,

Inquiry into modernising Australia's electricity grid

AGL Energy Limited (**AGL**) welcomes the opportunity to make a submission to the Standing Committee on the Environment and Energy (the **Committee**) inquiry into modernising Australia's electricity grid (the **Inquiry**).

AGL is one of Australia's largest integrated energy companies and the largest ASX listed owner, operator and developer of renewable generation. Our diverse power generation portfolio includes base, peaking and intermediate generation plants, spread across traditional thermal generation as well as renewable sources. AGL is also a significant retailer of energy, providing energy solutions to around 3.7 million customer accounts throughout eastern Australia. In 2015, AGL established a New Energy Services division, with a dedicated focus on distributed energy services and solutions.

As the Committee recognises, Australia's electricity system is undergoing a significant transformation. At the transmission level, variable renewable generation is increasingly replacing older thermal generation plant. At the distribution level, penetration of small-scale generation is proliferating as households and businesses across the country become 'prosumers' - that is, both consumers and producers of electricity. The once linear supply chain - where electricity generated by large power stations is transported across the high-voltage transmission network and through the low-voltage distribution network and into homes and businesses - is becoming increasingly decentralised and bi-directional. There are both opportunities and challenges associated with this inexorable transition.

Customer preferences and expectations are changing

Customers are seeking to exert more control over their energy supply arrangements than ever before. Australia leads the world with small-scale solar PV installations. Across the country, approximately 17% of households have a solar PV system installed. This number exceeds 25% in some jurisdictions. Installations are expected to continue to grow, and will increasingly be accompanied by the installation of a battery energy storage system. Although currently primarily the domain of so-called 'early adopters', expected cost declines and associated reductions in the length of pay-back periods for battery energy storage technology are anticipated to see an acceleration in take up. Bloomberg New Energy Finance predicts that by 2040, 24% of residential buildings will have a storage system installed.[i]

Smart appliances, smart inverters and intelligent control systems are also entering the market. In combination with solar PV and battery systems, these technologies enable the creation of small-scale electricity ecosystems 'behind-the-meter' - that is, on the customer side of the meter, with a single connection to the grid. These systems and their interaction with the electricity distribution network can be closely monitored and intelligently controlled. They can be dispatched individually or as a fleet to respond to changing network conditions or conditions in the wholesale market.

These developments mean that utilisation of the grid is changing dramatically. A customer with solar PV will draw less electricity from the grid than a customer without, and a customer with a solar PV plus battery energy system even less so. It also means that customers increasingly see the grid as much as a means to export, as import, electricity. Customers are also becoming interested in understanding how they can share energy locally (for example, through a peer-to-peer trading program) or participate in wholesale or network services markets. Thus the grid is increasingly becoming the gateway to a range of other markets and additional value streams for customers.

At the same time, these developments are presenting new challenges for the safe and reliable management of distribution networks. Distribution networks were originally designed for one-way flows and expenditure may be required to accommodate the increasingly bi-directional nature of energy flows. If not managed, reverse flows can cause voltage, protection and thermal network problems.

This consumer- and technology-led transformation has a number of implications for the modernisation of the electricity grid.

Connections

Customers expect to be able to easily connect new distributed technologies behind-the-meter. However, there are different application processes and technical criteria applying across different distribution zones. These cumbersome and lengthy application processes create a barrier to the easy connection of new distributed technologies. These challenges were recently highlighted in joint ClimateWorks and Seed Advisory report *'Plug & Play: Facilitating grid connection of low emissions technologies*'.[ii]

Further, in order to manage the technical challenges posed by increasing levels of distributed generation on networks, distribution businesses have resorted to export limitations on new connections and are increasingly requiring that inverters include specific demand response capabilities (i.e. AS4775) to allow networks direct control. The application of these limits and control schemes impacts the ability of customers to extract full value from the technologies they are installing. For example, customers increasingly size systems to match their own load with implications for the extent to which their distributed generation can be available to participate in programs which address broader system needs.

While the network impacts of increasingly levels of distributed generation need to be managed, greater guidance is required as to how technical requirements should be set to adequately balance network risks with customer choice and connection efficiency. Providing distribution businesses with discretion to strike the right balance between market efficiency and safety/security of network in the connection agreements may not promote the right outcomes for the market more broadly. The network's narrow focus on particular technology solutions and the move by some for direct control of behind-the-meter systems limits innovation and adds to the installed cost borne by customers. It would be preferable for distribution businesses to focus instead on performance outcomes and the value they place on particular demand response services and allow the market to innovate to provide these.

For example, there is a move to enforce AS4755 as a standard feature of new micro-embedded generation connections. AS4775 involves a fairly rudimentary form of demand response control and there are already more effective means of delivering remote demand response capability in the market. AGL's current SA Virtual Power Plant[iii] (comprising a distributed fleet of solar PV plus batteries energy storage systems) and earlier demand response trial hosted in the United Energy network[iv] (featuring solar, batteries, and cloud-interfaced air-con) are both demonstrating the capabilities of more nuanced and customer-centric demand response programs utilising advanced cloud-interfaced monitoring and control platforms.

Harnessing the capabilities of distributed technologies to support the network

Although increasing levels of distributed generation are creating new technical challenges for distribution businesses, the advanced control and communications capabilities built into many new distributed energy technologies means they can also be a key part of the solution. By modifying the overall volume and shape of demand, distributed energy technologies can be deployed to avoid or delay more expensive augmentations to the network. Further, smart inverters and local sensing devices enable the provision of voltage and frequency regulation services back to the distribution network.

AGL is supportive of ongoing reforms being managed by the Australian Energy Market Commission (**AEMC**) which seek to ensure that competitive demand response and other non-network solutions are considered for the widest practicable range of network investment decisions.

Distribution network as a platform for other markets

The distribution network will increasingly become the platform across which customers expect to be able to connect and transact. Competing energy service providers are beginning to trial and offer innovative products and services which leverage the grid to provide customers with access to other markets and value streams. These include 'peer-to-peer' energy trading, premium payments for exports to the grid at times of high wholesale price or reward for participation in programs to support

grid operation. Thus it is imperative that as far as possible access and connection to the grid proceed on neutral grounds and the distribution network be managed in such a way as to facilitate (rather than impede) access to and optimisation across these other markets and value streams.

AGL's SA Virtual Power Plant offers a useful example of a program which seeks to enable the 'stacking' of multiple values. Over a 3 year period, AGL plans to have one thousand smart, connected energy storage devices installed behind-the-meter at homes and small businesses across Metropolitan Adelaide. When aggregated, the batteries will act like a 5 MW solar peaking plant. The project will demonstrate at a commercial scale the value that distributed energy technologies (solar and batteries in particular) can provide three groups:

- Consumers can use the batteries to self-consume more of their solar power by storing energy produced during the day that might otherwise be exported to the grid;
- Networks can benefit from peak load shaving and voltage management services that potentially avoids further infrastructure expenditure; and
- Retailers can benefit from their reduced wholesale exposure during peak demand periods, and through the use of the battery to provide synthetic inertia and frequency balancing services.

Importantly, all grid users stand to benefit from such an arrangement through the reduced spending on network infrastructure and improved grid stability.

Appropriate delineation between monopoly and competitive elements

Networks operate monopoly infrastructure and are the monopsony purchasers of demand response and other non-network solutions. Therefore, it will be critical to maintain a clear focus on the role of distribution businesses through the grid modernisation process. In AGL's view, network businesses should be required to test the competitive market for the provision of demand response and other non-network solutions before developing their own programs or directly investing in distributed energy technologies and including such expenditure in the regulated asset base.

There is a natural requirement on firms operating in the competitive market to maintain a definite customer focus in the products and services they develop, and to innovate and extract efficiencies and additional values where possible, so that the product delivered to the end-customer addresses their needs and preferences while being price competitive. Without this competitive discipline and with a singular focus on network benefits, programs delivered directly by distribution businesses are unlikely to result in the most efficient deployment of distributed energy technologies.

However, the current regulatory framework does not require network businesses to draw on competitive markets to deliver network support and demand management solutions. Instead network monopolies can (and are sometimes encouraged to) directly invest in technologies installed behind-the-meter provided this is ostensibly to assist in the management of the network. This creates a barrier to the development of well-functioning markets in products and services enabled by distributed energy technologies, including demand management programs. Without effective competition in the delivery of such services, the efficiency of network spending, customer choice and innovation will all be negatively impacted.

AGL is supportive of an Australian Energy Council rule change which seeks to address this issue.[v]

Pricing access to the network

The effective modernisation of the electricity grid requires ongoing reform to network pricing and the continued transition to more cost-reflective network tariffs. Network pricing that reflects the variable costs placed on the network by different patterns of use will promote more efficient investment in and use of distributed energy technologies (and deter inefficient grid substitution), promote better network utilisation and lower network costs for all users. Care in the design of network cost-recovery and pricing frameworks is also key to mitigating potential equity issues that arise where those without the ability to adopt distributed generation technologies are left to bear a disproportionate share of remaining network costs.

However, the increasing instances of grid substitution (where some customers rely on the grid only as a back-up to their behind-the-meter installation which supplies their primary energy needs) also means there is a direct need to address the treatment of network assets that are becoming partially stranded. With overall declining grid utilisation and spare capacity in many networks, there is a question as to whether the policy intent behind the introduction of cost-reflective pricing can be achieved without a clear policy on the treatment of the existing regulated asset base. It is unlikely to be socially acceptable, or indeed sustainable, to expect customers to continue to fund these assets. It will be even less acceptable should those households without the ability to install grid substitutes be required to fund a disproportionate share of those stranded assets.

Renewal of the large-scale generation fleet

As the Committee notes, the large-scale generation mix across Australia is changing. The reasons for this change are not the subject of the current Inquiry, only the implications for supporting network infrastructure.

Mitigating risks of asset stranding

Transmission infrastructure - including regional interconnectors - is costly and long-dated. Given the ongoing structural shift, which is seeing greater volumes of electricity generated at the distribution level, decisions regarding the potential expansion of the existing transmission grid must take appropriate heed of the risk that those assets will be 'stranded' (that is, substantially underutilised) before the end of their economic life. Within the current regulatory framework, customers would continue to pay for such assets despite this situation eventuating.

Justification for the exploration of new interconnectors between regions has recently been based primarily on the need to enhance the security and reliability of different regions of the National Electricity Market (**NEM**). South Australia has been a particular focus of this discussion following the system black in September 2016. However alternative approaches may offer more efficient, flexible and robust solutions. For example, increasing the level and diversity of supply indigenous to a particular NEM region may prove more resilient to adverse system conditions then a new transmission line covering many hundreds of kilometres. More numerous generation plant mitigates the risk of concurrent outages or maintenance work, and a more diverse spread of generation technologies (solar, wind, storage, gas etc.) means that the fleet as a whole is less likely to be unduly affected by particular climatic or system conditions.

Expanding grid stabilisation markets

As the generation mix changes to incorporate a growing amount of variable renewable energy, demand for grid stabilisation services such as Frequency Control Ancillary Services (**FCAS**), reactive power and inertia will increase as the traditional suppliers of these services exit the market.

The introduction of new ancillary services markets will ensure that users appropriately value services, such as inertia, that had previously been available for free and in surplus. The ability to procure system security services, like inertia, will support system security and reliability. South Australia in particular is moving away from thermal fuel sources of generation capacity and has experienced significant increase in the proportion of its energy being supplied by renewable, intermittent, generation sources. Contracting services, such as inertia, in such an environment would significantly help to address concerns with regards to security and reliability of electricity supply as the sectoral transformation continues. In 2016, AGL authored a rule change formally proposing the introduction of an inertia market.[vi]

As well as new markets, AGL considers that there may be benefits associated with opening existing grid services markets to new providers to reflect the technological evolution and changes in the generation mix that are occurring. We are therefore supportive of the work being undertaken to review the technical specifications for participation in the existing FCAS markets.[vii] In AGL's view markets should be constructed as far as possible on open and technology neutral grounds, allowing competing providers to lead the form of entry and participation.

International experiences

We note that the Committee is also interested in lessons that can be learned from international experiences of electricity grid modernisation. While regulators and policy-makers in other jurisdictions are grappling with similar issues in the transformation and modernisation of their own electricity grids, it is important to recognise the differences in the structure and organisation of the electricity sector in those jurisdictions. For example, New York, which is often referred to as an example of an ambitious program to modernise the grid, operates under an integrated utility model with limited competition. This can be contrasted quite starkly with the NEM, which is characterised by a high-degree of competition in the generation, retail and emerging energy services sectors.

Elisabeth Brinton, the Executive General Manager of AGL's New Energy Division, recently noted that Australia's deregulated and highly competitive electricity market means that Australia has a distinct advantage in leveraging new technologies to innovate in the customer interest.[viii] This includes customer programs and new technologies that can be deployed to support a flexible and stable grid into the future. Accordingly, while international experiences can offer valuable learnings, it is important that solutions are developed that are fit for the Australian[ix] context.

Coordination and policy guidance

We note that there are a number of reform processes currently underway which seek to address several of the issues raised in this submission. These include:

- the introduction of more cost-reflective network tariffs;
- the implementation of more stringent electricity distribution network ring-fencing;
- modifications to the Regulatory Investment Test via the Australian Energy Regulator's replacement expenditure rule change proposal;
- the contestability of energy services rule change proposals launched by COAG Energy Council and the Australian Energy Council;
- the AEMC's Distribution Market Model project; and
- the AEMC's review of the economic regulatory framework as this applies to network businesses.

The coordination of these reform processes and the maintenance of a national focus for resolving issues relevant to the modernisation of the grid is imperative. AGL is keen to ensure that governance and regulatory frameworks evolve to deliver benefits to energy users into the future, within the context of rapidly advancing technology and community expectations. AGL believes that the COAG Energy Council has a primary role in driving energy policy in Australia, and should include this program of work addressing grid modernisation issues as a strategic focus.

Should you have any questions or concerns, please contact on or

Your sincerely,

Dr Tim Nelson

Chief Economist

[i] Bloomberg New Energy Finance, Annabel Wilton, *Australia Behind-the-Meter PV and Storage Forecast*, 22 February 2017

[ii] ClimateWorks and Seed Advisory, '*Plug & Play: Facilitating grid connection of low emissions technologies*', Consultation Summary Paper, February 2017, http://climateworks.com.au/sites/default/files/documents/publications/climateworks_seed_plugplay_consultation_report_final_20170228.pdf

[iii] https://www.agl.com.au/about-agl/media-centre/article-list/2017/march/agl-virtual-power-plant-goes-live

[iv] https://www.agl.com.au/about-agl/media-centre/article-list/2016/march/agl-trials-impacts-of-emerging-technologies-on-the-grid-and-energy-bills

[v] Australian Energy Council, Contestability of energy services – demand response and network support, Rule change proposal, December 2016, http://www.aemc.gov.au/Rule-Changes/Contestability-of-energy-services-demand-response

[vi] AGL Energy, NEM Wide Inertia Ancillary Service, Rule change proposal, September 2016, http://www.aemc.gov.au/Rule-Changes/Inertia-Ancillary-Service-Market

[vii] Australian Energy Market Operator, Amendment of the Market Ancillary Services Specification, http://www.aemo.com.au/Stakeholder-Consultation/Consultations/Amendment-Of-The-Market-Ancillary-Service-Specification

[viii] Australian Financial Review, *AGL Energy's tech high-flyer to redefine energy for customers*, 21 April 2017, http://www.afr.com/business/energy/electricity/agl-energys-tech-highflyer-to-redefine-energy-for-customers-20170405-gvecp6

[ix] http://onlinelibrary.wiley.com/doi/10.1111/1759-3441.12170/full