S&C ELECTRIC COMPANY
Excellence Through Innovation

12-14 Claremont Street
South Yarra VIC 3141
Australia

Matthew Armitage
Australian Energy Market Operator
530 Collins Street
Melbourne
Victoria 3000

Our Ref: JC 2018-086

20 December 2018

Dear Mr. Armitage,

S&C Electric Company submission to the Consultation Paper on the NEM Virtual Power Plant Demonstration Program

S&C Electric Company welcomes the opportunity to provide a response to the Consultation Paper on the proposed trials of Virtual Power Plants to provide support to the NEM.

S&C Electric Company has been supporting the operation of electricity utilities in Australia for over 60 years, while S&C Electric Company in the USA has been supporting the delivery of secure electricity systems for over 100 years. S&C Electric Company not only supports the "wires and poles" activities of the networks, but has delivered over 8 GW wind, over 1 GW of solar and over 45 MW of electricity storage globally, including batteries in Australia and New Zealand. We have also deployed over 30 microgrids combining renewable generation, storage and conventional generation to deliver improved reliability to customers.

S&C Electric are particularly interested in facilitating the development of markets and standards that deliver secure, low carbon and low-cost networks and would be very happy to provide further support to the Australian Energy Market Operator on the treatment and potential of emerging technologies and approaches.

Yours Sincerely

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General Comments

Exploring the potential of Virtual Power Plants (VPPs) to provide system support services is certainly a worthwhile exercise. Experience from other locations indicate that orchestration and aggregation is not straightforward and it will be important to understand how these challenges play out locally. However, we have a number of concerns related to the scope and timing of the project.

ENA-AEMO Open Energy Networks

The joint ENA-AEMO Open Energy Networks project is not due to be finalised until August of 2019. This project explores how Distributed Energy resources (DERs) will be managed and facilitated in the future. There is a continuum of options for which entities in the electricity system will do what, described in the paper as Options 1-3.

- Option 1 envisages an AEMO central platform
- Option 2 proposes a two-tiered platform, driven by aggregators
- Option 3 suggests a new independent DSO role

It would appear that with the publication of this VPP Demonstration Consultation Paper that AEMO is pre-empting the outcome of the joint work and has already decided on Option 1, with AEMO having a central role and rapidly moving forward to develop the "AEMO Market Platform".

The need to explore the role of VPPs is not so pressing that AEMO needed to expropriate the outcome of the Open Energy Network project and the current approach AEMO is proposing for VPPs may lead to unnecessary duplication and unnecessary duplication will end up costing consumers more.

Visibility

Given the range of options proposed in the Open Energy Network project it is not clear why AEMO needs to have full visibility of the bottom of the system, not only in front of the meter, but behind the meter. There are other approaches, such as Distribution System Operators (Option 3 or similar) having that visibility, that would mean that AEMO need not penetrate into the distribution network. If the DNSPs (or other distributed entity) is actively managing and balancing the distribution system, there is no need for AEMO to have that role.

"Visibility" appears to be being used as the justification for AEMO to expand into operating the distribution system.

Use of System Charges

One option to manage the issues caused by DERs on the distribution network is for AEMO to take control and manage the distribution system, leaving the DNSPs to look solely after the infrastructure and assets. This seems to be the approach AEMO is advocating. Another equally valid way to manage DERs is through tariffs or use of system charges and this approach is being used in other locations (e.g. Hawaii and the time based tariff in Victoria). If use of system charges or tariffs made it unfavourable to export at midday (for example), then the risk of negative wholesale prices could be avoided through customers self-consuming at peak generation or charging their behind-the-meter battery. There would then be no need for AEMO to have direct control.

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Certainly it is useful for AEMO to explore the services that can be delivered from DERs via VPPs, but AEMO does not have to control these services or even understand the assets that deliver the services, since the providers can have that function and there are many potential new business models that could be realised (see comments below on "Centralised versus Decentralised"). AEMO can specify the technical requirements of any service and then purely purchase the services. All AEMO needs to be able to do is signal that a given service needs to be delivered. This is the model in GB. National Grid purchases an ancillary service from a range of providers. It does not need to know the specifics of what or who is delivering the service, only that the service is delivered as per contract and technical specification.

Development of APIs

AEMO is already developing an Application Programming Interface (API) that pre-empts the work of the DNSPs, particularly the considerable work of South Australia Power Networks (SAPN), and other new entrants in the electricity system. We would encourage AEMO to suspend their own API work and explore how the efforts in South Australia, through SAPN can support the VPP project, rather than duplicating work that is already being undertaken.

There is a very real risk that we will end up with multiple APIs, with different technical needs, which will complicate the role for VPPs nationally.

Appropriate international standards need to be adopted to ensure interoperability, otherwise the market will be complex and large established entities will have the potential to squeeze out newer, smaller and potentially more innovative businesses.

Centralised versus Decentralised System

It should be remembered that AEMO is a large centralised player in our previously centralised electricity system and like many centralised players, such as Retailers, Generators and Gentailers, AEMO is seeking to reinvent itself for the new decentralised system. This means that AEMO is directly competing with many of the other entities in the electricity system, including the DNSPs, who may have a system operator role in the future (as outlined in the Open Energy Networks project) and AEMO cannot be assumed to be totally impartial in its suggestions for future system architecture and operation.

In GB, the tension between the System Operator and the DNSPs (DNOs) and the perceived impartiality of National Grid as that System Operator has resulted in the separation of the System Operator role from wider National Grid businesses. The model in GB may result in the DNSPs acting as System Operators over the distribution network (having a balancing role), leaving the major System Operator to have the function of the "residual balancer", which would be a significant reduction in its role.

Given that many of the issues seen on the NEM are located on the distribution network, that is, the bottom of the system, where AEMO has little control or visibility, it would seem most efficient to give the secure operation distribution networks to the entity best placed to manage the network at the scale required. That entity is the DNSP who already has visibility (although not perfect and this needs to improve) and the local and geographic knowledge of their systems. They understand the everyday technical limitations of their networks in a way that AEMO will never achieve, even with visibility of distributed connectees.

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Once AEMO establishes its API it will be nearly impossible for any other party to use anything else, since AEMO is a monopsony. Therefore, great care is needed to ensure that decisions made now, by the most significant single actor in our electricity system, will result in the best outcomes for customers.

Other Issues to be Explored

The ability of a distribution connected VPP to deliver a system support service to the NEM is highly dependent on the technical operation of the distribution network to deliver that service. There are situations that can be envisaged where the orchestration of DERs for a system service (e.g. fast frequency response) may itself cause technical issues and constraints on the distribution infrastructure. It is therefore concerning that the DNSPs are not genuine partners in the VPP Demonstration Project and this should be resolved as soon as possible.

Speed and reliability of communications

Where DERs have been used to provide system support elsewhere the speed and reliability of the communications between the System Operator and the service provider/s has been a significant challenge. This is outside the very real cyber-security issues of using DERs. There is a useful report on a smart inverter trial in the USA (California) that explores many of the issues with using DERs for system support and focuses in particular on interoperability and communication issues:

https://www.pge.com/pge_global/common/pdfs/about-pge/environment/what-we-are-doing/electric-program-investment-charge/PGE-EPIC-Project-2.03a.pdf

https://www.pge.com/pge_global/common/pdfs/about-pge/environment/what-we-are-doing/electric-program-investment-charge/Joint-IOU-SI-White-Paper.pdf

Impact of Network Outages

It will be interesting to understand how network reliability will impact on the secure delivery of VPP services to AEMO. As mentioned above, the response of a VPP to a signal to deliver a service may create problems on the distribution network, that may result in an outage.

Additionally, an outage, even momentary, will prevent a service from being delivered when needed since the network will not be available. Some DERs will connect to the network via inverters, such as batteries, which are required to disconnect when there is an outage, including momentary outages. This will mean that even if the outage is very brief, there will be a delay between the start of the outage, the disconnection and the reconnection of the DER. That is, a momentary outage will result in a more prolonged absence of DERs, then the actual length of the outage, curtailing the ability of DERs/VPPs to deliver a contracted service.

An assessment of network reliability and its role in the successful provision of services from VPPs should be included as part of the demonstration project.