Schneider Electric Australia's Response to Open Energy Networks Consultation Paper, 2018

(AEMO and Energy Networks Australia 2018, Open Energy Networks Consultation Paper.)

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Dear Sir/Madam,

Thank you for the opportunity to review the Open Energy Networks Consultation Paper and provide our feedback. We have provided the response below, however, we would welcome the opportunity to meet to continue the discussion in the future and to engage on the more detailed design of the scheme in the coming months.

About Schneider Electric

Schneider Electric is a global business operating in over 100 countries, with more than 140,000 employees and is a global leader in energy management and automation. Revenues in 2017 were over €24.5 billion and over 5% were devoted to research and development.

Schneider Electric recognizes that globally, and particularly in Australia, we are experiencing four major disruptive megatrends: E and 3D – the world is becoming more Electric, more Digitised, more Decarbonised and more Decentralised. Schneider's technologies are at the core of these disruptive trends.

Schneider Electric's technologies (including equipment, software & technicians) are found throughout Australia's electric utilities and electro-intensive industries (mining and oil and gas); data centres, critical and commercial buildings, and through Clipsal by Schneider Electric, in over 80% of homes.

In Australia, our business includes over 3000 employees, has operations in all states, including manufacturing operations in Benalla, Victoria and at Gepps Cross, South Australia.

Schneider Electric is a leader in the Australian energy market and at the forefront of the distributed energy future:

- **Automated Distribution Management System (ADMS)** Schneider Electric's ADMS is installed and managing the network operations of SAPN and ActewAGL, and is currently in deployment with Endeavour Energy's network);
- **Distributed Energy Resource Management System (DERMS).** Our DERMS (integrating into the ADMS) is being installed in a trial of Distributed Energy Resources (DERs) in South Australia, to give visibility of behind the meter DERs to the network operating system for SAPN.
- **Energy Automation. Schneider Electric's** substation and feeder automation systems are within all major distribution networks and most large energy generation assets, businesses, commercial and industrial premises across the country as well as in sensitive and critical power installations; and
- **Microgrids**. Schneider Electric is in the process of delivering a number of microgrids, for example, a meat processing facility in Victoria, at the South Australian Produce Market and for a large Solar and microgrid installation, behind the meter at a distribution centre in South Australia, in a project funded by the South Australian Government.

Agreement with the principles of the Consultation Paper

SE have reviewed the consultation paper and are supportive of the need to shift to a more decentralised energy system, capable of managing both supply and demand and integrating the DERs within the system to provide a reliable future energy system at lower cost to consumers. The framework should be simple, transparent, minimise duplication, promote competition in the provision and aggregation of DER, technology neutrality and reducing barriers to entry across the NEM and WEM, promoting information transparency and price signals that encourage efficient investment and operational decisions.

Requirements for a transition from centralised to decentralised energy system

As we shift from centralised to decentralised energy systems, the traditional methods for managing the electrical distribution system (using voltage and protection devices at predetermined locations within the electrical distribution system to manage voltage and fault currents will no longer be adequate. Distribution protection, control, and metering were

handled by electromechanical devices, and almost no automation existed at the traditional distribution systems level. Consequently, Distribution Network Operators (DNOs) at that time were fully able to manage their corresponding grids manually, applying traditional paper-driven processes.

High penetration of distributed energy Resources (DERs) and development of distribution systems with volatile and uncertain characteristics create many new challenges for todays' distribution system operators (DSOs). To cope with these changes, DSOs need to take an active role in managing their systems and adapt to volatile conditions in real time and near future. A comprehensive set of specialized integrated software tools into one solution is required to handle these challenges and ensure a smooth transition from traditional, paper-driven processes, to an active and adaptive way of managing grid in real time. These capabilities are entirely provided through an Advanced Distribution Management System (ADMS) which includes module Distributed Energy Resources Management System (DERMS). Further description of these is included below as an understanding of the complexity of these systems is required to understand the challenge of integrating the modelling, management and optimisation of DERs into a DNSPs operating system and the risks in duplicating this or moving elements of it into a third party system (AEMO or iDSO).

What is ADMS – Intelligent platform for optimal management

ADMS is a comprehensive set tools that integrates operations across the numerous systems (modules). These modules include, but are not limited to:

- Supervisory Control and Data Acquisition (SCADA) software for remote control and monitoring of field devices.
- Outage Management System (OMS) – module for managing planned and un-planned outages in a distribution grid.
- Energy Management System (EMS) – module for management of (sub)transmission system.
- Distribution Management System (DMS) – module with a broad collection of advanced power applications for the optimal planning, visualization, monitoring, control, and overall management of the distribution system.
- Distributed Energy Resource Management System (DERMS) – module for monitoring and control of DERs.

Managing Distributed Energy Resources

DERMS is system that monitors and controls DERs while optimizes grid operation, improves power quality and reliability, and provides demand management and ancillary services. It is focused to distribution grid services that are highly dependent on the specific location of each DER (voltage management, grid constraint management, locational load relief, etc.).

Generally, DERMS should provide:

- DERs visibility from individual unit to aggregated unit per aggregators, power plants, region, etc. getting insight into installed DER and hidden (phantom) load
- Monitoring of current DER output, observability of non-monitored DER
- Load and generation forecast
- Manual DER individual and group control, including validation of planned operations regarding DERs and grid operation limits
- Control and simulation of operation of inverter-based DERs
- Determination of DER capabilities per circuit and per aggregated DER groups
- Determination of demand flexibility on large-scale and system level
- Utilization of DER as resources with „Watt“ and „VAR“ capability for grid operation optimization, grid constraint management, and demand management
- Interaction with 3rd party aggregators (VPPs) and microgrids
- Validation of proposed behavior (schedules) of VPPs and microgrids
- Communicate operational limits for individual DER, VPPs and microgrids
- Simple process of DER integration and analysis of feasibility and capacity of the network to accommodate new DER connections
- Simulation of load and generation production in order to analyze DER behavior and their impact on the network operation state
- History of DERMS control actions.

The above systems are discussed in greater detail in the attached whitepaper - *Why ADMS with DERMS Functionalities Forms the Backbone of the Digital DSO*. These systems are currently being deployed within distribution networks. As these systems at the distribution network level become more complicated and integrated, the ability to separate out control to other parties (i.e. AEMO or a third party independent DSO), becomes difficult.

Review of Consultation Paper

Overall, the consultant paper provides a comprehensive review of the issues and proposes sensible models for consideration and further development. This is welcomed by Schneider Electric. There are a number of key issues that the proposed models should solve including: streamlined process for bidding and dispatch of DERS; price discovery of the value of DERs and transparency for all parties and ideally, overcome the disaggregation of the value stack, where revenue streams (value from wholesale markets, FCAS markets, network support and demand response) are held by different parties and not all are accessible to customers. This disaggregation reduces the viability of active DER projects (i.e. those without automation and dispatch control systems) and encourages development of passive DER projects, which not only perpetuates the challenges of managing these within the grid, but once developed, is a lost opportunity for future management of these DERs.

Responses to specific questions:

"What new capabilities, functions and roles will be required to coordinate and optimise the value of customers' DER investments whilst maintaining security and reliability across the NEM and WEM?"

The roles and functions have been captured by the three proposed models. It is considered that further detail is required on the capabilities required for the dynamic modelling and management of constraints in the context of DER management and would be happy to discuss this with AEMO and ENA in the future.

Section 2 Consultation Questions:

1. Are these sources of value comprehensive and do they represent a suitable set of key use-cases to test potential value release mechanisms?

2. Are stakeholders willing to share work they have undertaken, and may not yet be in the public domain, which would help to quantify and prioritise these value streams now and into the future?

1. Yes, these sources of value are comprehensive and represent the key use-cases for the release of value. Greater visibility and transparency of the network constraints is required and access to receive revenue for network support is required.
2. Schneider Electric have many projects, locally and internationally, that have been undertaken that cover areas or ADMS and DERMS as well as projects involving microgrids. We would be happy to discuss the details of these projects and the value streams associated with them. Development of wheeling charges process to support peer to peer (or within portfolio trading.

Section 4 Consultation Questions:

4. What are the challenges in managing the new and emerging markets for DER?

5. At what point is coordination of the Wholesale, FCAS and new markets for DER required?

4. Schneider Electric considers that there is a need for discussion around prioritisation of dispatch of DERs, whether they are for customer value, network stability or market support. This will become increasingly important with coordination of DERs in VPPs. In a machine to machine environment, as will be the case as the automation of the DER market develops, the optimization

algorithms will be increasingly important in driving bidding behaviours and have the potential to impact upon network stability or at least a divergence between objectives of the various participants.

5. Schneider Electric considers that coordination of these is required soon as the disaggregation of the value stack is currently influencing the development of microgrids. There is a lack of coordination between those participants that control access to the various value streams (retailers and DNSPs), which is affecting the ability of microgrids to deliver the full value to the network by supporting constraints and the loss of the benefit of learning and increasing capability and maturity of all the participants. Currently, customers who are Market Participants are at an advantage as they can better access the various pools of value, however, most participants are too small to do this (become a Market Participant) and therefore, miss out on this value.

Section 5 Consultation Questions:

1. **How do aggregators best see themselves interfacing with the market?**
2. **Have the advantages and disadvantages of each model been appropriately described?**
3. **Are there other reasons why any of these (or alternative) models should be preferred?**

1. No Comments
2. Yes, the advantages and disadvantages have been adequately described.
3. No alternative models are proposed.
   The three models are referred to below as Model 1 (single integrated model - AEMO centralized platform); Model 2 (Two Step Tiered Platform; DNSPs optimising distribution level dispatch) and Model 3 (iDSO optimises distribution level dispatch).
   Of the options proposed, Schneider Electric considers that each has their advantages and disadvantages, however, Models 1 and 2 are considered more likely to be successful than Model 3, which requires the creation of several new iDSO entities with roles and capabilities that would be difficult to separate from the existing DNSPs due to the technical complexity of managing network conditions and constraints in real time.
   Models 1 and 2 are both options that require further development, however, at this stage, Schneider Electric's view is that the complexity of operating and optimising a distribution system with integrated DERs is best undertaken by the DNSP, where the detailed understanding of the constraints exists (under Model 2). It is considered that once the detail of DERs is overlaid with dynamic constraints with each network, managing this in a centralised system will become unwieldy (in Model 1).
   There is also a need for further discussion around prioritisation of dispatch of

DERs, whether they are for customer value, network stability or market support. This will become increasingly important with coordination of DERs in VPPs and the prioritisation and optimisation and their impact of bidding on network stability.

Conclusions

Schneider Electric is supportive of the efforts to implement a framework and new models to bring coordination of DERs the NEM and WEM. This will be required in the future as we transition to a decentralised energy model and will bring benefits to the grid, to the market and ultimately, to customers.

Schneider Electric has worked extensively with commercial and industrial customer on investments in energy management and control. To support the investment in active DER, rather than passive DER, customers need to be able to understand the business case for the investment. To overcome the disaggregation of the value stack for a microgrid project (and associated DER controls), customers require access to all value streams (wholesale and FCAS markets, network support and demand response). This requires transparency and discoverability of pricing for each of these as well as a streamlined process to contract and access them to enable scaling of transactions and increase viability of investments.

Of the options proposed, Schneider Electric considers that each has their advantages and disadvantages, however, Models 1 and 2 are considered more likely to be successful than Model 3, which requires the creation of a number of new iDSO entities with roles and capabilities that would be difficult to separate from DNSPs due to the technical complexity of managing network conditions and constraints in real time. Models 1 and 2 are both options that require further development, however, at this stage, Schneider Electric's view is that the complexity of operating and optimising a distribution system with integrated DERs is best undertaken by the DNSP, where the detailed understanding of the constraints exists (under Model 2). It is considered that once the detail of DERs is overlaid with dynamic constraints with each network, managing this in a centralised system will become unwieldy.

We would welcome the opportunity to engage with you on the development of this framework and models in the coming months.

Simon Mouat
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Schneider Electric

Enclosure
Schneider Electric Whitepaper – *Why ADMS with DERMS Functionalities Forms the Backbone of the Digital DSO.*