10 August 2018

Stuart Johnston
General Manager Network Transformation
Energy Networks Australia
Unit 5, Level 12, 385 Bourke Street
Melbourne VIC 3000

Dear Dr Johnston,

RE: ENA/AEMO Consultation Paper – *Open Energy Networks*

Endeavour Energy appreciates the opportunity to provide feedback on the Open Energy Networks consultation paper. The paper represents a positive step towards addressing the growing challenges of managing the distribution network as the prevalence of distributed energy resources (DER) increases.

We consider maintaining a largely passive approach to DER connection and control is not sustainable and changes will need to occur to deliver the best outcomes for customers. From a network perspective, improved coordination of DER would provide confidence that the transition towards more complex two-way energy flows can be accommodated by system infrastructure without an adverse impact on technical and safety requirements. It would increase the opportunities to utilise small scale DER in aggregate as cost effective alternatives to traditional network investment as well as avoid the need to impose DER restrictions and excessive export limits in constrained locations.

The key aspects of this consultation are the design of a DER optimisation framework and determining which party to assign Distribution System Operator (DSO) responsibilities. In our opinion, DNSPs can most readily identify and respond to network limitations and therefore are best placed to fulfil the role of DSO and manage DER optimisation. Under this arrangement, DNSPs would engage directly with DER customers to coordinate dispatch. Furthermore, assigning DSO responsibilities to another party will result in duplication of costly advanced monitoring and control systems.

On the basis it offers the most effective and efficient way to optimise DER to manage network constraints, we support the proposed Two Step Tiered Platform Model. However, we recognise new capabilities to support this approach will need to be developed. For instance, DNSPs will need to build platforms capable of communicating with an increasing number of DER for dispatch of both real and reactive power. DNSPs will also need to understand the behaviour of DER in a range of circumstances and the subsequent impact on power flows across the network such that local network constraints can be sufficiently anticipated ahead of time. Improved monitoring data will facilitate this and help develop new functions such as DER voltage control capabilities.

More broadly, the industry will need to establish an agreed set of rules and principles for managing dispatch and avoid possible dispatch request conflicts. Importantly, AEMO will need to provide detailed guidance for DNSPs on the effective use of the National Electricity Market Dispatch Engine (NEMDE) within the DER optimisation framework. The dispatch process and interfacing between platforms will need to be robust to ensure DER can be effectively used to manage network constraints and that all customers are able to benefit from improved integration of DER.

Our detailed responses to the questions in the consultation paper are included in Attachment 1. If you have any queries or wish to discuss our submission further please contact Frank Bucca, Network Demand Manager on (02) 9853 6566 or via email at frank.bucca@endeavourenergy.com.au.

Yours sincerely

Ty Christopher
General Manager
Asset Management

ATTACHMENT 1 – RESPONSES TO THE CONSULTATION PAPER QUESTIONS

Path-ways for DER to provide value

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

We consider the paper identifies the key sources of value for passive and active DER. We also agree that active DER provides significantly more opportunities for customers as a potential source of value, however the degree to which this value can realised will be highly dependent on developing accessible markets for trading and enhanced capabilities for remote and active management of DER.

We suggest that as DER penetration increases and the level of excess energy approaches hosting capacity limits, there may be an opportunity to use the energy for other types of storage such as hot water (flexible load).

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?

We would be willing to share any useful information that is not made publically available on the results and insights gained from our work with DER including trials in progress and not commercial in confidence.

Maximising passive DER potential

1. Are there additional key challenges presented by passive DER beyond those identified here?

The paper identifies the key challenges faced by networks in managing passive DER. An obstacle we currently encounter is the limited visibility of DER which makes it difficult to model the impact of DER behaviour on the LV network. Improving visibility will be fundamental to preserving system security as the number of DER installations increases. We expect the AEMC's final rule decision for the proposed DER register expected in September 2018 will allow NSPs and AEMO to obtain this much needed visibility.

The paper mentions restricting further applications for passive DERs as a possible response to overcome network hosting capacity constraints. We believe prohibitions on DER connection would curtail DER investment and be inconsistent with the current, widely accepted view of a future decentralised energy system with a diversified generation mix. Prohibitions on DER would be as undesirable as excessive network investment to cater for increased DER power flows.

In the near term before DSO capabilities are established, network constraints may be mitigated by limiting DER exports. We suggest that exports be self moderated/limited by the AS4777 requirement for Volt-Watt and protection trip limits at times when network voltage is too high. In addition, the AS4777 Volt-VAR function can be required to be implemented in inverters, however enforcing implementation may be challenging.

2. Is this an appropriate list of new capabilities and actions required to maximise network hosting potential for passive DER?

This list of new capabilities and actions is considered appropriate. Widespread voltage monitoring such as gaining access to non-market smart metering data is considered highly important to further optimising distribution transformer tap settings for passive DER. The paper discusses using flexible loads to assist soaking up excessive DER generation but it may be difficult to identify target locations. It would require real-time monitoring of the LV network for modelling and knowledge of DER locations, capabilities and penetrations levels as well as a method of dispatching the load. This would be an additional source of value to the customer, including customers without active DER systems.

3. What other actions might need to be taken to maximise passive DER potential?

We suggest the following actions:

- Networks need to be encouraged to fast track operational initiatives for 230V nominal migration, recognising that the lower limit of the voltage range has moved from 225V to 216V. In other words, better utilisation at the lower end of the range can build in headroom for DER exports.
- Mandating power quality response modes such as Volt-VAR in passive DER through standards or connection guidelines. Whilst we have requested all connecting DER have Volt-VAR mode enabled by default, anecdotally only a fraction of installers are doing this. Some installers/OEMs refuse to make changes that are different to AS4777 default settings which in some cases are unnecessarily restrictive which results in export curtailment or trips. The national DER connections guidelines currently under development may be of assistance in this regard.
- There is a trend for installers oversizing PV panels compared to inverter ratings (often 20-30%). This eliminates the natural headroom available for the Volt-VAR PQ response mode in AS4777. It also eliminates the ability for smart control of reactive power in a DSO arrangement under peak generation output (without sacrificing real power generation). This issue needs to be addressed through DER standards and connections guidelines.

Maximising active DER potential

1. Are these the key challenges presented by active DER?

Endeavour Energy agrees that the rapid and unpredictable response of active DER, particularly in aggregate, provide significant challenges.

We believe higher penetration of active DERs have the potential to reduce the swings in demand created by passive DERs under normal operating conditions. However, we acknowledge the dramatic demand swings caused by active DER responding to a price signal or other event in unison can have an adverse impact on the hosting capacity of the network as network limits are quickly approached. Forecasting these conditions will become an increasingly important aspect of managing network demand and voltage volatility.

This will require an understanding of the existing DER penetration levels and network hosting quantities. The creation of a DER register is a critical input into the forecasting process and the establishment of an appropriate DER optimisation platform is also critical to the management of DER resources at a local level and at higher levels.

2. Would resolution of the key impediments listed be sufficient to release the additional value available from active DER?

Overcoming the impediments nominated in the paper would be essential to facilitate fast and efficient optimisation of DER. It would be important however to maintain system security and safety as a priority when seeking ways to unlock value from active DER.

Other issues that may need to be resolved as part of this work program includes:

- Improving the ability to forecast voltage and demand volatility;
- Establishing a platform that allows aggregators and participants to interact through a market mechanism;
- Establishing “rules for dispatch” capable of simultaneously maximising DER value and providing network stability; and
- Ability to access DER information in order to determine the level of demand reduction that can be relied on for demand management purposes.

3. What other actions might need to be taken to maximise active DER potential?

Cost reflective network tariffs have an important role to play in maximising active DER potential. As networks continue to develop new tariffs reflecting a customer’s contribution to network costs, customers

will respond efficiently by adjusting their consumption/usage profile. This may also incentivise greater take-up of active DER. If take-up increases more rapidly than expected, a DER optimisation platform will be required sooner.

We also expect, as the benefits offered from active DER becomes more apparent, customers of passive DER will choose to upgrade their systems to take advantage of the higher value placed on the services offered by active DER.

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

As the numbers of DER connections continues to increase, there will be a growing appetite from DER owners/customers to unlock potential value streams from their investment. This appetite should inturn serve as a signal to aggregators, retailers, networks and system operators of the potential for new markets capable of unlocking this value.

Developing the necessary systems and platforms to enable these new markets to prosper will take time. However, it is important that a clear framework be established outlining the roles and responsibilities of each market participants and how trades and transactions are to occur. This would provide the confidence that is required to encourage participation in DER service markets and ultimately contribute to the effective integration of DER to the system.

As previously stated, it is important that DER markets develop without adversely impacting on system security and safety. Also, for the efficient DER optimisation, we suggest:

- providing DNSPs ability to influence the operation of the DER to avoid network security issues and have priority on dispatch. To achieve this, NSPs will need to establish systems and tools to perform ongoing network analysis to ensure the security of the network; and
- requiring aggregators to register in the DER Optimisation Platform in their nominated region or agent.

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

We do not offer a response except to suggest it would be important that DER be optimised on a whole-of-system basis. For this to occur, DER owners will need to be able to participate in the wholesale, FCAS and other markets. Access to these markets will be likely provided by aggregators or retailers. However, given the central role of the distribution network as key enabler of all potential DER services, we suspect DER services would be most highly valued as a network support service.

Frameworks for DER optimisation within distribution network limits

The constraints experienced within the distribution system are generally localised and timely in nature. The response to these localised constraints will need co-ordination from all resources in a specific part of the low voltage network to ensure that local constraints are managed. If responses to constraints are not managed in relationship to the part of the network the DER's are connected to the outcomes could be counterproductive, either through DER's not being able to respond as network conditions are outside hard limits or through network limits being breached and equipment damage occurring.

The ongoing management of the location where the DER's are connected to would need to be highly integrated with the DSO function such that the DSO will need a full live network model of the DNSP's network and the energy flows across this network.

Endeavour currently enacts load curtailment agreements via bilateral contracts. It is not clear if a DER optimisation platform will avoid the need for such agreements and all DERs will be registered either directly or through an aggregator to the platform. Depending on the final platform design, the DNSP may need to rely on AEMO dispatch and the resolution of any conflict between the parties requirements as mentioned above. DNSPs will need to manage two types of network capacity limitations - those created by consumer demand and DER charging and discharging.

The DER charging and discharging network constraints may be driven by both normal conditions such as local voltage or asset ratings as well as uncommon conditions either by weather or network outages. The latter is largely out of DNSP control and ability to forecast. The management of DER dispatch under these conditions would need to be automated and apply limits on the quantity of DER that can be dispatched at any point in time. They may also be driven by normal operation when penetration reaches excessive levels.

It may be most effective for DNSPs to have the ability to manage local consumer demand and network constraints which the DNSP can forecast and plan DER dispatch typically up to 24 hours ahead. The platform will need to accommodate these requirements as well as TNSP, retailer, AEMO and consumer requirements.

The consultation paper suggests that, when DER penetrations reaches very high levels, the system framework will be required to optimise DER dispatch to ensure demand remains within distribution network technical limits. This would occur when there is a lack of diversity of DER charging and discharging such as under VPP action. The distribution network is constructed based on standard after diversity maximum demand (ADMD) figures per dwelling. The after diversity maximum generation (ADMG) amount is unknown at this point in time and may be double the ADMD figure under coordinated dispatch.

The consultation paper offers three potential models for optimising DER dispatch. In each model, optimisation responsibilities fall on different parties. Our thoughts on each are provided below.

Model 1: Single Integrated Platform (SIP)

The key aspects of this model are:

- AEMO provides a central platform that interfaces with aggregators for the provision of DER services therefore providing direct access to the market.
- Aggregators provide bids and offers directly to AEMO via this platform.
- Each distribution network business is connected to the central platform.
- AEMO would optimise the resources taking into account local network constraints provided by the distribution network business.
- This is performed in real time with aggregators providing bids to AEMO representing their dispatch preferences.
- AEMO would optimise the dispatch of DER based upon those bids, taking into account local network limits and transmission network limits.
- AEMO would provide dispatch schedules to aggregators, who would then activate their customer's DER.
- Settlements would remain between AEMO and market participants.
- The distribution network business could also use the central platform to seek network support services from aggregators.

For this model to be effective in resolving network constraints, a DNSP's request for DER activation needs to carry priority status and be actioned as per the request. It is important other parties cannot interfere with this outcome possibly resulting in DER dispatch moments prior to the DNSP's request, resulting in insufficient DER capability to avoid the network constraint event. The model does not clearly indicate how the DNSP requests dispatch events or communicates with the DER owner or aggregator.

Under a SIP, the DNSP only provides a stop/go review of DER bids against network constraints. It does not have the ability to influence the value to the DNSP of certain locational bids upstream. This reduces the value of the DER and DSO where a small change to the DER bid stack may provide an optimal outcome

Option 2: Two-Step Tiered Platform

The key aspects of this model are:

- DNSPs taking responsibility for optimisation of DER dispatch within their own networks.
- Aggregators provide bids to the DNSP, representing their dispatch preferences.
- DNSP aggregate these bids, taking into account any distribution network constraints that may prevent DER operation.
- DNSP stack and dispatch DER based on bid price.
- DNSPs aggregate bids from all active DER in their networks, and provide to AEMO and associated transmission connection point.
- AEMO include these aggregated bids in the NEMDE dispatch optimisation.
- AEMO calculate dispatch targets at each transmission connection point, and communicate to the DNSP.
- DNSP disaggregate dispatch targets to each aggregator, based upon their respective bids (with the lowest priced offers having the most access to network capacity).
- Aggregators activate their customer's DER to meet the required dispatch targets.
- Settlements remain between AEMO and the retailer, as per the present system.

This model allows DNSPs to better manage DER in their networks. Responsibility is on the DNSP to optimise DER against local network constraints to provide network security. DNSPs will be responsible for ensuring all market participants have access to revenue sources and expose a financial litigation risk if not managed properly.

We consider DNSPs are best placed to understand their network constraints. DNSP also need to collect LV and HV demand information in real time to analyse the network status and identify emerging network constraints. The DNSP must perform this function regardless of which option is selected. DNSPs perform this analysis as part of their normal planning process to ensure the security of the network. We believe it makes most sense for the DNSP to fulfil the DSO role and manage the control platform to avoid duplication of work and the added challenge of two parties managing a complex network with competing aims.

Option 3: Independent DSO or AEMO Platform

The key aspects of this model are:

- An independent distribution system operators (iDSOs) takes on the responsibility of optimising DER dispatch within distribution network technical limits.
- A separate iDSO for each distribution network, or a single iDSO for the NEM and WEM is established.
- Independent DSO model operates similarly to the DNSP optimisation process but with aggregators providing bids to the iDSO.
- iDSO aggregates the bids to each transmission connection point, taking into account distribution network limits.
- iDSO passes the aggregated bids to AEMO to include in the NEMDE central dispatch process.

In our opinion, providing full visibility of all DNSPs network data and constraints to a single independent DSO would be highly onerous and represent a huge volume of data flow and exchange. A large amount of duplication of analysis is expected under this approach, with significant amount of additional resources required to enact this option.

1. How do aggregators best see themselves interfacing with the market?

Currently, aggregators liaise with retailers and DNSPs that offer bilateral agreements for demand reduction. We believe aggregators should be encouraged to liaise with any party, including the platform operator to gain access to market and sources of revenue.

2. Have the advantages and disadvantages of each model been appropriately described?

The additional risk for DNSPs to take on the role of the DSO has not been discussed in detail. However, given that no party is currently performing DSO functions, this risk exists for any party that takes on the DSO role.

3. Are there other reasons why any of these (or alternative) models should be preferred?

The two-step tiered platform provides DNSPs the greatest level confidence that requests for DER support will be properly enacted and contribute to maintaining network safety and security. The two step tiered platform is also likely to be the most efficient option as it avoids duplication of analysis that would be required by an independent DSO and avoids the transfer of large quantities of data.

Immediate actions to improve DER coordination

1. Are these the right actions for the AEMO and Energy Networks Australia to consider to improve the coordination of DER?

We agree with the listed actions.

2. Are there other immediate actions that could be undertaken to aid the coordination of DER?

Improved visibility of existing and new DER would be critical to the success of the framework. We recognise the AEMC expect to make a final decision regarding the establishment of a national DER register in September 2018. We expect the AEMO guideline outlining the DER information gathering, reporting and sharing to be developed cognisant of the objectives of the ENA/AEMO's OpEN work program.