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23/10/18

Energy Networks Australia
Unit 5, Level 12, 385 Bourke St
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VIC 3000

Att: Stuart Johnson

By email: info@energynetworks.com.au

Dear Stuart,

Open Energy Networks Consultation on how best to transition to a two-way grid that allows better integration of Distributed Energy Resources for the benefit of all customers

LO3 Energy welcomes the opportunity to make a submission in response to the Energy Networks Australia (ENA) and Australian Energy Market Operator (AEMO) joint consultation paper on future frameworks for optimising Distributed Energy Resources (DERs).

We are a fast-growing company, headquartered in New York, with deep roots in energy, finance and technology. We are building a blockchain based platform to enable decentralised markets and innovative business models to support new energy products and services.

Bloomberg Energy Finance predicts that by 2050 some 40 percent of all generation capacity will be located behind the meter, making the National Electricity Market (NEM) one of the two most decentralised energy markets in the world.[1] We agree with the central proposition in the consultation paper that to manage the extraordinary transition to a high DER penetration power system will require significant changes to market frameworks.

The consultation paper proposes three potential future models for managing this transition. At the heart of each model lies a new DER optimisation function to be performed by either AEMO, the distribution businesses or an Independent Distribution System Operator (iDSO).

We consider the DER optimisation function is best performed by AEMO, working closely with the distribution businesses to ensure local constraints are efficiently integrated into the dispatch process. AEMO has the experience, expertise and independence to optimise DERs efficiently and in a non-discriminatory fashion.

[1] Bloomberg New Energy Finance, New Energy Outlook 2018

We set out our detailed views below.

1. DER optimisation models

The consultation sets out three potential high-level governance models for optimising DER:

- *AEMO provides a single integrated platform* - AEMO would perform a system wide optimised dispatch, which includes aggregated DER and takes into consideration both local network limits and transmission network limits. The role of AEMO would be expanded significantly under this model while the role of the distribution businesses would largely stay the same;
- *Distribution businesses optimise the dispatch of DER using their own platforms* - Distribution businesses would be responsible for reviewing the dispatch preferences of DER aggregators, taking into account distribution level network limits, and provide a feasible dispatch schedule to AEMO. This would essentially look like a virtual power plant or scheduled load at each transmission connection point. AEMO would then integrate the DER dispatch into its dispatch algorithm and communicate dispatch targets at each transmission connection to the distribution businesses. Aggregators would then activate their DER based on communication signals received by the distribution business (with the lowest priced offers being dispatched first).
- *An independent Distribution System Operator (DSO) optimises dispatch of DER* - the third option requires an independent third party, referred to as a DSO, to take on the responsibility of optimising DER dispatch within distribution network technical limits. This model would separate system operation from distribution investment and planning. This may involve establishing a separate DSO for each distribution network, or a single DSO for the National Electricity Market (NEM).

The preferred model should be the one judged as most likely to promote a competitive market for a diverse range of DER services, while at the same capable of managing the complexity of a very high penetration of DER in the power system.

2. Preferred DER optimisation model

As noted in the consultation paper, there are some important advantages to AEMO taking on responsibility for optimising aggregated DERs using a single integrated platform. AEMO is an independent entity and has considerable experience with dispatching generation and formulating complex constraint equations for managing the network.

The single integrated platform model would however add an additional layer of complexity to AEMO's operations in requiring visibility and management of distribution level constraints. This will require AEMO and the distribution businesses to work together closely to coordinate operations effectively and integrate local constraints into the central dispatch process. We expect only aggregations of DERs would need to be managed in a centralised fashion - DERs that do not participate in aggregations would be expected to self-optimise in response

to price signals. As we discuss in the next section, ideally this would require the implementation of highly granular dynamic price signals at the distribution level. Allowing some degree of self-optimisation in response to given price signals will be necessary in order to keep the power system optimisation task manageable for AEMO.

The two alternative models presented in the consultation paper are unlikely to be feasible. First, the establishment of multiple iDSOs appears unwarranted in terms of cost of setting up such entities (and supporting regulatory frameworks) given Australia's relatively small size of the NEM. Second, the AEMC[2] and KPMG [3] have previously raised a range of competition related concerns with a model where distribution businesses control the operation and dispatch of DERs. This is because they would have a financial interest in specific outcomes that favour the network. In particular, a distribution business could have an incentive to hinder the access of DER providers to non-network related revenue streams in order to maximise the value DERs can deliver for the distribution business (e.g. by requiring customers to commit to long term contracts and/or requiring the ability to directly control a customer's DER assets).[4] As KPMG has noted, even the perception of such a conflict of interest could deter development of DER markets.

Consequently, we consider the single integrated platform model, which takes advance of the existing AEMO governance architecture, represents the best model for optimising a power system with a high penetration of DERs.

3. Broadening the concept of optimisation

The concept of optimisation as described in the consultation paper appears largely focused on the value such optimisation will bring to reducing the impacts of DER on networks. DERs are capable however of delivering a range of potential value streams for DER customers, including revenues from wholesale and ancillary services markets and also potentially from innovative new business models, such as peer to peer trading.

As we move forward into more detailed market design considerations, it is important that optimisation is defined in a comprehensive manner. It should include all potential revenue streams available to DER providers at a particular point in time, not just those that allow distribution businesses to manage the network more efficiently. DER providers should have the opportunity to choose the DER service that will deliver them the most value at a particular point in time.

DER optimisation should reflect the outcomes of an efficient 'two sided' transactive market at the distribution level. Such a market would be two sided in the sense that buyers of DER services, such as distribution businesses, AEMO and retailers, would compete with one another to buy DER services, while providers of DER owners compete with one another to supply services at lowest possible cost.

A transactive market uses price signals to allocate DER services to their highest value uses, as previously described by the AEMC in its discussion paper on Distribution Market Models:[5]

> "A transactive market platform - a distribution level market - provides a mechanism through which the various services that can be provided by distributed energy resources can be bought and sold in a more dynamic way, in response to price signals and consumer preferences. This means that if consumers want to use the electricity from their solar panels or batteries, they can, and if they do not need it - or value the

[2] AEMC, Distribution Market Model, Final Report, August 2017

[3] KPMG Distribution Market Models Preliminary Assessment of Supporting Frameworks, Report for the Australian Energy Council, June 2017

[4] AEMC, Distribution Market Model, Final Report, August 2017, p 31 and 32

[5] AEMC, Distribution Market Model, Final Report, August 2017, P 26

> income from selling it more than their own use - they can sell it to whoever values it the most at a particular point in time e.g. the local network or the wholesale market"

LO3 Energy's ultimate vision for transactive market is one which is highly dynamic with energy prices varying by time and location reflecting both losses and constraints in the network at the local level. In its purest form this type of pricing, often referred to as locational marginal pricing (LMP), would reflect the marginal value of production and the cost of transportation at each customer connection point.[6] Such granular pricing would be necessary to identify where and when DER providers can deliver the most value to the power system, taking into account network, wholesale and ancillary market considerations.

LMP has been employed for over a decade now at the transmission level in many North American markets and in New Zealand.[7] It has not been applied at the distribution level anywhere in the world, most likely because the costs of doing so to date have not been worth the benefits. This is now changing. The growth of DERs in power systems around the world has strengthened the case for introducing more efficient price signals in the distribution network. In addition, the evolution of digital and communication technologies means customers and devices can now respond to such price signals.[8]

4. Role of distribution network service providers

The ability of a transactive marketplace to deliver value to its users and the power system more generally will depend in part on the state of the distribution network at any given point time and other factors, such as the quality and timeliness of connection processes and the ability of DER providers to seek their desired levels of export capability (e.g. the quality of access to the network). These factors are controlled by the distribution business.

We consider that implementing a single integrated platform for DER optimisation will require supporting changes to network regulation to ensure incentives between AEMO and distribution businesses are appropriately aligned. A key required reform will be the need to remove the bias between capital expenditure and operational expenditure that exists under building block regulation. A transactive market for DER services could be undermined if the distribution business continues to earn greater profits from investing in capital rather than operational expenditures.

The AEMC has acknowledged that the existing framework for approving separate capital and operating allowances is not likely to be suitable in an environment with a high penetration of DER and where planning arrangements require non-network alternatives to be considered. It has commenced consultation on changes required to the expenditure assessment and remuneration systems to enable the network regulatory framework to continue to support the electricity sector transformation.[9]

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[6] For example, in locations or at times when network capacity is scarce high prices would signal the value of turning off appliances or dispatch batteries to balance supply in a constrained area.

[7] MIT, Utility of the future, "an MIT Energy initiative response to an industry in transition", 2016, p 91

[8] Ibid p 92

[9] AEMC Economic Regulatory Framework Review, Promoting Efficient Investment in the Grid of the Future, p ix

That consultation process will provide an important opportunity to consider different types of network regulatory incentive arrangements, such as the total expenditure approach, which would replace the current assessment and establishment of separate allowances for capital and operating expenditure with a single regulatory allowance. This type of approach might better support a transactive market for DERs.

We consider that changes to how expenditure is assessed and remunerated will also need to accompanied by a shift to performance-based regulation (PBR). By rewarding outcomes instead of inputs, PBR would better align the behaviour and financial interests of distribution businesses with DER outcomes. For example, a proportion of the regulated revenues the distribution business collects could be made contingent on it achieving key performance metrics, such DER connection time frames, the level of DER hosting capacity in the network, or customer satisfaction surveys etc. This type of approach has recently been legislated by State of Hawaii for implementation for its distribution businesses.[10]

If you have any questions please do not hesitate to give me a call on +61 439399943

Thank You,

ConVanKemenade

Con Van Kemenade
Director Public Policy
LO3 Energy

[10] S.B. NO. 2039 - requiring the public utilities commission to establish performance incentives and penalty mechanisms that directly tie an electric utility revenues to that utility's achievement of performance metrics, such as the level of integration of renewable energy resources into the grid; timely interconnection processes; customers engagement and satisfaction and provision of data