Power Ledger

Response to the NEM Virtual Power Plant Demonstrations Program consultation paper

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In Brief

Power Ledger welcomes the opportunity to respond to the Australian Energy Market Operator's (**AEMO**) consultation paper on the NEM Virtual Power Plant (VPP) Demonstrations Program (**Consultation Paper**).

It is Power Ledger's view that VPPs will play an integral role in both the transition and the future of the distributed energy system. As identified in the Consultation Paper, Australian consumers have now invested in more than 7.6 GW of rooftop solar capacity. This places Australia in a unique position to take advantage of this consumer driven momentum and develop models for VPPs which will help optimise the value of distributed energy resources (DER) and ensure security and reliability of supply.

About Power Ledger

Power Ledger is a Western Australian company, formed in May 2016, that uses blockchain technology to provide an alternate model for the reconciliation and settlement of energy transactions. Our platform allows consumers with embedded renewable energy generating technology to sell excess energy to their neighbours. Our ecosystem of applications also extends to offer Virtual Power Plant (VPP) and distributed market optimisation mechanisms, aimed at empowering consumers and encouraging access to more reliable, renewable energy. The technology and business model were devised to support the transition of mature energy systems into dynamic, consumer-centric and renewable distributed energy markets.

Opportunities of the VPP Demonstrations

The Virtual Power Plant trial presents an opportunity to demonstrate orchestrated operation of DERs and as such, shouldn't lose sight of the potential for providing a broad and dynamic range of valuable services at a *distribution* level. Aggregating the capacity of DERs and treating them as a traditional transmission connected asset is a missed opportunity.

Orchestrating the operation of DERs, bought and installed by consumers, provides an opportunity to improve the cost, quality and resilience of consumer energy supplies. DERs can provide important Network Control and discreet load-shaping services that can

improve network utilisation and performance and reduce the need for investments in network capacity, the value of which can be returned to consumers.

The increased penetration of uncoordinated DERs can present a risk to the system but if orchestrated, can lead to the creation and control of distribution load areas that, as a characteristic of their behaviour, provide the system security that the market is looking for without the need to engage as a single entity with the market.

1. Introduction - Primary Purpose

Question 1.1: The primary focus of these trials is to demonstrate VPP aggregating battery storage systems. Do intending participants envisage incorporating demand response resources into your aggregated portfolios, and should this be incorporated into the VPP Demonstrations?

It is Power Ledger's view that incorporating demand response into participants 'aggregated portfolios' will be necessary to maximise the value and potential outcomes from the Demonstrations. One of the objectives of the Demonstrations is to allow VPPs to demonstrate their capability to deliver the full value stack, and demand response will be a crucial component of this value stack.

As referenced in the Consultation Paper value stacking is in the early stages, which means the VPPs in the Demonstrations will be perfectly positioned to trial innovative new methods of delivering traditional network and market services. The result will be to develop a framework for potential VPP models moving forward, that will also serve to highlight the full range of relevant regulatory changes that may be required along the way.

Beyond demand response, the aggregated capacity of a VPP can be used for load shaping; allowing consumers with storage to participate as an active generator. This type of VPP model would be especially valuable for markets with a high penetration of solar, including those in Queensland, South Australia and Western Australia.

The Consultation Paper identifies the potential of VPPs to deliver multiple services and increase the potential 'value stack' delivered to consumers, including participation in markets as well as entering into network support agreements. Power Ledger's view of the potential value stack of a VPP in a scenario distributed market optimisation is even broader, and includes the following potential layers:

	Fault Management (Self-healing Networks)	Network
	Network Control Services	Network
	Frequency Control Services	Market

Prosumer	Power Quality Management	Network
	Demand-side Management (Load shaping)	Network / Market / Retailer
	Peer to peer Trading	Consumer

To achieve any form of active load management, or rest of the value stack outlined above, there needs to be a platform capable of incentivising consumers and providing the right price signals to increase or decrease load. For this to be possible, consumers with distributed storage will need the value associated with these services to be transacted as quickly as possible. Blockchain is the only technology we have found that is capable of managing this multiplicity of agreements, to facilitate the low cost, fast and accurate reconciliation and settlement of energy transactions.

Within this type of optimised VPP model, the Power Ledger platform can act as the transactive layer between the various functions of the VPP, providing for settlement between generators, distribution network operators, retailers, the wholesale market (if required) and consumers. These multi-party agreements will normally cease to persist after a service is provided, or a trade is completed. Smart Contracts allow for the trustless, instantaneous settlement of these agreements. Participation in energy and FCAS markets can be therefore be facilitated using the same transactive platform for instantaneous, autonomous financial settlement, creating the most value for all participants and maximising utilisation of network assets.

2. Objectives and Approach

Question 2.1: Are these objectives logical and achievable? Should any other objectives be considered for these VPP Demonstrations?

The objectives that have been listed are logical and achievable with respect to the ability of VPPs to provide market services in the NEM, relating to both energy and FCAS. However it is Power Ledger's strong view that network control needs to be considered as part of any VPP solution explored for the NEM. This is because early stage VPPs are most likely to be at a smaller scale than the capacity required to provide FCAS.

Furthermore, it is not our view that the Demonstrations, which will involve smaller scale VPPs (under 5-10 MW), should be approached with the assumption that they will eventually scale up to transmission scale aggregated capacity. As we progress towards a distributed energy future, we should be approaching the transition and innovative new VPP models in a distributed way.

Question 2.2: How can projects involved in the VPP Demonstrations better capture consumer insights and improve customer experience and outcomes?

It is Power Ledger's view that consumers will be at the heart of the new distributed energy system, and as such access to detailed consumer insights should be a key component of the various models which will be involved in AEMO's VPP Demonstrations process. Each of the projects in the VPP Demonstrations should take advantage of existing and proven technologies which are capable of both facilitating a greater level of consumer engagement, and creating positive outcomes for all types of customers.

Power Ledger's participation in the Demonstrations would be as part of a consortium of service providers, including a Financially Responsible Market Participant (FRMP). A key benefit to our potential involvement is the control our platform can provide consumers with respect to their energy choices. Our platform provides clear incentives and price signals for consumers with distributed storage, and gives them access to an interactive and real-time view of all energy transactions.

Using our platform, and the benefits of blockchain, consumers with distributed storage will have the opportunity to gain insight as well as experience the following benefits and outcomes:

- Once a transaction is written to the blockchain it can never be changed;
- A complete view of all energy transactions and sources of value;
- Improved level of trust and transparency;
- A layer of auditability;
- Granularity of data and access to analytics; and
- Clear incentives and price signals.

Within a VPP trial, Power Ledger would not be responsible for providing the aggregation or control aspects. However, our involvement will facilitate consumers and stakeholders to become more actively involved in each energy transaction, with a real-time view of the

VPP environment and potential value stack. This element of consumer engagement will be integral in a successful transition towards more distributed networks and markets.

Question 2.3: Is AEMO's high-level approach to the VPP Demonstrations appropriate? What other arrangements could be tested under the VPP Demonstrations framework?

AEMO's high-level approach VPP Demonstrations is generally appropriate given the framework outlined. In these early stages of VPP testing, the likely scale of VPPs will be small, and this means that there needs to be effective methods of communication developed at the distribution and market level, so that AEMO can begin including distributed VPPs as part of system planning. Currently the system is still lacking visibility of DER at the distribution level, and it is Power Ledger's view that these smaller-scale VPPs should be contemplated as part of an optimised distributed market moving forward.

It is also our view that potential models for VPPs participating in the Demonstrations should focus on providing incentives and creating price signals to encourage active consumer participation. This will help retain the focus on maximising value to consumers, while also supporting system security and reliability of supply. We should not lose sight of the fundamental objective of giving consumers more control over their energy choices, while providing them with access to cheaper, cleaner, more resilient energy.

3. Trial Participation

Power Ledger's intended participation in the VPP Demonstrations will be as part of a consortium of providers, inclusive of a Financially Responsible Market Participant (FRMP), battery provider and other relevant technology providers. This would be achieved through an iteration of the first model, with a retailer and a separate VPP operator (who may not be registered participant) where the retailer is the FRMP. It is our strong view that a diverse range of participants and trial types should be considered for the Demonstrations, to promote innovation and help deliver the best outcomes for the future distributed energy system. We look forward to the outcomes of the Consultation Paper and the resulting terms and conditions which will define the information required for registration.

4. Data Requirements and Sharing Arrangements

Question 4.1: AEMO would like the aggregated VPP dataset to be refreshed every five minutes to align with its operational forecasting function. Are VPP operators able to provide this data on a 5-minute refresh basis?

Yes, it is Power Ledger's view that all VPP operators should be able to provide data on a five-minute interval basis. Our Platform is capable of providing energy transaction data at intervals as short as one minute if required.

Question 4.2: Should the values be reported as an average value across the 5-minute interval, or an instantaneous value at the end of the 5-minute interval, or both?

It is Power Ledger's view that the values should normally be reported as an instantaneous value a the end of a 5-minute interval.

Question 4.4: Are there any regulatory or other obstacles to participants facilitating the data sharing arrangements contemplated in this section?

We acknowledge and support the commitment of AEMO, the AEMC and the AER in sharing insights from the VPP demonstrations to lift the collective industry learning in this new realm. In addition, we would like to see the results of the trials highlight relevant regulatory barriers for third party technology providers, and help shape arrangements for data sharing and access for third party service providers.

Conclusion

As we rapidly move towards a distributed future, it is Power Ledger's fundamental objective to optimise the value of distributed energy resources in a way which benefits all types of consumers, while maintaining the relevance and value of the existing network. We look forward to the outcomes of the Consultation Paper and the resulting terms and conditions that will shape participation in AEMO's Demonstrations. The VPP Demonstrations have the potential to highlight and develop innovative new models, which could help position Australia as a world leader in optimising consumer-scale DER.