

**NEM Virtual Power Plant (VPP) Demonstrations Program – Section A1 – Summary of Questions – November 2018 - Responses**

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?*

Discussions during the AEMO hosted webinars supported a much wider application to VPP trials than “battery storage systems”. We agree with that fundamental position.

At a simplistic level a battery provides “generation” (discharge) or “load” (charge) – all mooted applications of Demand Management essentially provide the same functionality.

One might argue that a battery (if ‘fully’ charged) represents a live/dynamic generation asset whereas a DM solution would have to load that could be shed (which might not always be the case) – the other side of coin though .... A fully charged battery could not provide load. The issues facing the grid – from a security perspective – require equal if greater weight to the provision of both load and generation.

Further, it is not unreasonable to say that the primary, if not exclusive, consideration of an individual residential, (or small business), battery owner will be self interest in respect to the impact on their own energy costs and not a “greater good”. Battery manufacturers will, rightly, focus on that service delivery in the design and marketing of their products. This same hurdle is faced by Demand Management solutions (though perhaps at a lower cost). A consequence of this is that there is little focus on data distribution and aggregation.

In the current energy market place – where batteries are barely economically viable even when paired with local renewable (PV) generation. It is illogical to create a greater divide amongst those who must share the burden of paying for the network and those that think they shouldn’t. VPP sites should provide some services in contra for their network service.

A “VPP” (for energy and/or FCAS) should be any orchestration of any DER assets that can generate energy (or lower load) or, conversely increase load (lower generation output) with a measurable effect on energy supply (positive or negative).

Therefore in our opinion the “VPP” trials should be completely agnostic to technology (i.e. not biased towards batteries) but look at all technical solutions that deliver load & generation management but also, crucially, inform AEMO (et al) with dynamic data as to the state of distributed grid in detail.

AEMO should actively encourage all orchestration systems (a VPP) and where possible during the trial, through data sharing, stimulate separate participants to work together where a symbiotic relationship is possible.

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

The objectives set out by AEMO are:

*(a) Allow participants to demonstrate basic control and coordination capability for VPPs providing market services in the NEM relating to both energy and FCAS*

This objective is logical and achievable.

*(b) Develop basic systems and capability to provide AEMO with operational visibility of VPPs to understand their impact on power system security and how they interact with the market.*

This objective is logical and achievable – however see comment below with respect to expansion of data collection and information services.

*(c) Assess current regulatory arrangements affecting participation of VPPs in energy and FCAS markets, and inform new or amended arrangements where appropriate.*

This objective is the most challenging facing AEMO (and AEMC & AER) – and requires real flexibility to be able to interact with DNSPs and Consumers to explore multiple approaches.

Of particular concern are three broad headline issues: -

- 5-minute settlement
- flexible DSNP tariffs
- discretionary participation in load shedding

In respect to settlement – the current gaming of the 5-minute bids v 30-minute settlement places undue risk on participants in the trial. In our opinion the trial should operate cognisant of the long-term reality – 5-minute settlement. If so, both the participants and AEMO (along with AEMC & AER) will be able develop & test systems on solid foundations.

In respect to tariffs – there are two crucial considerations –

### **Community Battery Systems**

There are strong (technical and commercial) arguments for embedding larger Community Battery Systems in the Distribution Network over smaller batteries. In our opinion DNSPs should be able to enter into arrangements for the trial (and beyond) that allow for a range of options (from a fixed annual “connection fee” to a “variable energy fee” (kWhr) tariffs).

The biggest issues with DER – on all fronts but especially security – is in the low voltage networks. It is our opinion that DNSPs should be afforded greater flexibility in dealing with consumer endpoints (or “specialist” retailers who orchestrate those endpoints) than is currently the case.

### Load (or Generation) Time Shifting

If there is one area of DM and VPP thinking that has the potential for dramatic utility and impact it is the time shifting of load – especially residential air-conditioning load!

It is fair to say that current real time energy pricing (the NEM) and fixed (esp. ToU) tariffs are juxtaposed to deliver efficient outcomes – we see, due to high availability of renewables, low energy pricing at the same time as peak ToU tariffs come in.

Load shifting also allows consumers who do not have their own renewable generation (a presumptive of having a battery) to participate in DM/VPP trials and long term operation.

In NSW, a Government program funds replacement and new air-conditioning systems.<sup>1</sup> While ostensibly this has the laudable objective to replacing inefficient systems with new models it also provides for, in fact encourages, new installations.

A combination of social and government policies has exacerbated the afternoon peak demand due to ‘delayed’ start and continuous running of residential air-conditioning systems through the later peak before commercial and industrial load drops.

In the same way that historically there was, and still is, off-peak tariffs for hot water (time shifted energy transfer to heat) we should actively investigate load shifting for air-conditioning (both heating and cooling) along with subsequent guaranteed controlled load (blocking start) of the air-conditioners.

You don’t need to be a Behavioural Economist or a marketing guru to believe that it’d be possible to sell the benefits of arriving home to a pre-cooled/warmed house if it could be delivered at the same, or lower cost, than current “on-demand” air-conditioning.

The simple fact is that there is ample, if not excessive, amounts of capacity in the residential distribution networks during the early afternoon (when wholesale energy is generally cheaper) and that all of the NEM, DNSPs and consumers would benefit from flattening the load by eating into the otherwise later peak. The stumbling block is flexible tariffing and/or the introduction of dynamic controlled and pre-emptible loads (as against static controlled loads like hot water heating).

### Discretionary Load Shedding

We do not believe that there have been any significant trials of discretionary residential participation in controlled “load shedding” but it has the potential to make a significant impact on the market – both from a consumer perspective (in lower prices) and from an overall NEM security perspective. In one DER VPP model we propose consumers would have separation of their power supply into essential and non-essential sub-boards with the later temporarily disconnected during designated LOR2 or LOR3 or high energy price events.

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<sup>1</sup> <https://energysaver.nsw.gov.au/households/rebates-and-discounts/discounted-energy-efficient-air-conditioners-households>

2.2 *How can the VPP Demonstrations projects better capture consumer insights and improve customer experience and outcomes?*

The Paper outlines 7 parties having roles and responsibilities in the Demonstration Trials.

Albeit with significant self-interest we'd recommend a boarder and more detailed data and information gathering opportunity presents itself by utilising the Curb system by all trial participants as an adjunct to whatever proprietary (own system centric) information/data systems (which may not provide sufficient information).

The Curb system <https://energycurb.com/> provides real time (1 second resolution update) data on generation and consumption across at least 18 circuits (or six 3-phase circuits or combination of single and three phase circuits). Information for each circuit includes: -

- frequency (Hz)
- voltage (V)
- current (A)
- real power (W/kW)
- power factor [and Total/Apparent Power VA/kVA, Reactive Power (VAr/kVAr)]

The Curb system could provide all 7 interested parties with a wealth of data and, crucially, information and insights into both consumption and, where applicable<sup>2</sup>, generation.

The Curb system, aside from its comprehensive real time data and historical data User Interface also has both APIs and download facilities to provide for the use of collected data in other systems.

Curb is committed to product enhancement path to meet settlement metering standards.

Curb Australia is committed to developing a core system over and above that currently deployed in the USA (where it is primarily used as an energy consumer information tool with some fleet management function) to provide a real time aggregated data system that is usable by AEMO & DNSPs and VPPs to have real time visibility of system critical data – including “behind the meter” consumption AND generation.

We will, with appropriate design and configuration, be able to provide real time aggregated data from total generation and consumption, to actual consumption by (controlled or uncontrolled) air-conditioners, pool pumps, ovens, lighting etc. [with sub-aggregation by DNSP [and sub-station or zone-substation] and/or retailer etc. if required/desired].

With some modifications/enhancements we'd also be able provide data with respect “percentage utilisation” (so we could show raise/lower capacity from DER).

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<sup>2</sup> as mention above we believe having PV/renewable generation, or a battery, is a prerequisite to participate in these VPP Demonstration Trials

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

### **Openness to DNSP Commercial arrangements that “out live” the Demonstration Trial**

As raised above we believe other ‘low level’ elements should be considered, and facilitated, by the VPP Demonstration Trials – least they become “Distortion Trials” by operating under some preconceived bias. There is little doubt that regulatory lag is impinging on innovation in the energy sector – that coupled with incumbents (esp. “gentailers”) who have an overwhelming vested interest to block any changes to rules etc. that could harm their own commercial model/s.

While we don't propose a laissez faire approach we do believe that for these trials to have some foundation in reality – for the consumer/s and participant/s – that the participant consortiums (or specifically its retailer partner) should be able to enter into a regulator (AEMO, AEMC & AER) sanctioned (enduring) commercial arrangements with DNSPs outside of normal tariff arrangements.

There'd be a requirement for proper safeguards etc. but reasonably we'd expect (especially for something like a Community Battery Storage) to be able to advance and trial a business model that made sense to the “invested” parties – the consumers, the DNSP, and the aggregator/facilitator – over an expected system lifetime (not just a trial period).

There is, in our opinion, a strong argument to allow for some relaxation of the demarcation between DNSPs and Generators on one end and Retailer's on the other. The rise of the Gentailer as the dominate force in the [consumer] market has not only ‘squeezed’ the DNSPs but stifled innovation and competition.

By very definition DER (Distributed Energy Resources) are embedded in the [Low Voltage] Distribution Network – because of the risk DER pose to the security of network (locally and the NEM) DNSPs should have more flexibility to respond in a changing environment.

### **Right of connection, monitoring and (annual) compliance.**

In our opinion right of connection, monitoring and (annual) compliance is a critical issue.

A major problem with the rollout of small system renewable energy generation (Solar) – specifically residential – and the developing rollout of other DER – is the lack of any (apparent) licensing, (ongoing) accreditation, or safety scheme. It seems that everything is a one-time “set and forget” approach (aside from warranties and other obligations by the suppliers or installers which may never be called on because there is no independent validation).

## Ready.Energy submission to NEM Virtual Power Plant (VPP) Demonstrations Program Consultation

We believe that any VPP/DR scheme should logically have some annual inspection and/or monitoring fee attached to the right to connect to the Network.

We draw your attention to the requirement of water utility providers for a consumer to have an annual inspection of their Backflow Protection<sup>3</sup> valve – a mandatory requirement where the consumer has any third-party water system<sup>4</sup> connected to their mains water supply (within their property). This inspection must be carried out annually by a licensed (and authorised) plumber and lodged electronically with the Water Utility.

It seems somewhat bizarre that a water utility is requiring an annual inspection for safety reasons alone but no such scheme exists for electrical systems – which are potentially much more life threatening.

If we take a further example from Sydney Water<sup>5</sup> – where developers are constructing a property over three floors it is mandatory to install not only a Backflow Prevention valve but also Automated Metering.

We believe that this trial is an appropriate, indeed opportune, time to visit the question of grid security licensing of significant or aggregated DER devices (including Solar Panels and Inverters).

The majority of connected DER (especially renewable energy generation and batteries) economic value is predicated on disintermediation of generators and DNSPs but the site crucially still depends on the DNSP for fundamental services (frequency, stability, reliability etc.) therefore seems reasonable that a fee is payable to provide for monitoring of those systems and those DER assets perhaps could or should provide some services in “contra” for received services.

Further we believe that this trial, and the data and insights arising from it, provides an opportunity to get, for both the consumer and the NEM access to crucial “behind the meter” consumption data that has been lost because of the unfortunate decision to connect PV/Inverters (and now potentially batteries) behind the meter so that only “net” data is seen in meter billing data by AEMO & DNSP (and perhaps even the consumer).

Arguably “enforcing” a monitoring system on consumers (end-users) that delivers significant insights to them (with all the attendant benefits of Behavioural or “Nudge” Economics) while providing information and data centrally to DNSPs & AEMO that provides for energy system security and informed decision making is a big win-win.

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[http://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mdcy/~edisp/dd\\_072193.pdf](http://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mdcy/~edisp/dd_072193.pdf)

<sup>4</sup> e.g. hydronic heating, rain water, grey water etc.

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[http://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/m dc0/~edisp/dd\\_074401.pdf](http://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/m dc0/~edisp/dd_074401.pdf)

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. For all our own proposed DM/DER elements, with our consortium partners in the VPP Demonstration Trial, we intend to deploy the Curb system at each site giving us 1 second update data – then aggregated (in real time) over 1 minute, then 5 minute intervals, then 1 hourly interval.

As mentioned above we are prepared to work with AEMO and/or VPP Trial Participants to deploy Curb at sites other than our consortium sites.

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?*

Obviously, the higher frequency data is of more value. We will, for our sites, provide real time (1 second) current/instantaneous data (this will be the kW used in that second) as and where possible; we will be able to provide 1 minute summation data (i.e. that minute); and 5 minute (i.e. that 5-minute interval). We would not – unless required – provide a “fudged” data (i.e. an “average” of used energy interval-to-date and forecast to/a end-of-interval).

4.3 *What is the appropriate frequency for VPP operators to submit the device level dataset to AEMO? Is there a material difference in resources required to upload the data on a daily, weekly, or monthly basis?*

The Curb hubs upload the metered data (collected over a second) at the end of each second – if there are no connectivity issues that data is immediately available for a site; that includes addition/aggregate site data for 1 minute, 5 minute and 1 hour intervals; for each and every circuit (and “virtual circuits”). That data can be accessed by an API immediately, or displayed on the UIs (web User Interface and mobile app User Interface), or downloaded as a csv file from the web interface).

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

The primary concern with respect to the Curb data is the high level of detail and potential breaches of privacy and or security risks around that circuit data being available unobfuscated to third parties. We believe all these issues can be dealt with in terms and conditions and by obfuscating the user identification (NMI, name, address etc.) data when provided to third parties (who themselves would have abide by terms and conditions for access to the data).