



14 September 2023

Australian Energy Market Commission

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Dear Sir/Madam,

Response to Integrating Price Responsive Resources into the NEM – consultation paper

Origin Energy Limited (Origin) welcomes the opportunity to provide comments on the Integrating Price Responsive Resources into the NEM consultation paper, which is also known as 'Scheduled Lite'.

Origin is a large Australian integrated energy company with activities in energy retailing, power generation, natural gas production and LNG export. Origin also has recent experience in exploring new product offerings and has focused on areas such as solar and storage, connected homes, electric vehicles (EVs) and future fuels including hydrogen.

We have developed a proprietary Virtual Power Plant (VPP) platform to connect and use artificial intelligence to orchestrate distributed assets. Assets connected to the VPP have grown to over 800 MW, including an increasing variety of distributed energy and Internet of Things (IoT) devices. These devices include hot water systems, solar, batteries, EVs and various industrial assets, which are aggregated, controlled, and dispatched in response to market and portfolio positions, creating value for both Origin and customers through a lower cost of energy. Origin views the integration of these devices as a key long-term reform.

VPPs are growing across the market and we understand why AEMO is seeking better information on the various distributed assets that may be connected and orchestrated as part of this. We are supportive of providing increased information to help AEMO manage the market more efficiently. This should be undertaken in a way which continues to allow the emerging market for VPPs in Australia to develop. Importantly, it should allow the new products and services that customers want to evolve, without significant additional costs or restrictions. These new products and services are in many cases reducing costs for the market and customers, and it would be counterintuitive to regulate them in a costly manner which may stifle future development. Further, many of these products have additional benefits such as shifting demand to benefit the management of the electricity grid or reducing emissions.

We do not support the proposed rule change in its current form. We believe it is not required and will impose additional costs on the market which greatly outweigh any perceived benefits. We suggest that an alternative be developed which more efficiently targets the information required by AEMO.

Our key points include:

- **VPPs include a broad range of assets** – our VPP currently covers a range of both residential and commercial and industrial assets. For residential customers this includes controlled load hot water, solar PV systems, batteries, electric vehicles and our behavioural demand response program. For commercial and industrial customers this includes various load reduction activities as well as using on-site generation. Some of these assets are more price-responsive than others.

- **Customer requirements and firmness** - in most cases, the assets connected to our VPP deliver amenity for customers and their use can only be altered to a limited extent. Further, the customer often retains the ability to opt-out. This can reduce the perceived 'firmness' of the demand response or shifting, compared to a unit at a traditional generator. This makes the assets less appropriate to be included in a normal dispatch process.
- **Information gathering process** - we assume that part of the problem is that AEMO does not know what information it may be missing and will not know until further investigation is made. This uncertainty suggests that the next step should be the discovery of further information about price responsive VPP assets, rather than proceeding to a complex rule change which imposes a significant cost on the market.
- **Alternatives** - we suggest that an alternative be developed which more efficiently targets the information required by AEMO. We would be willing to explore what information we could provide in the near future which may improve AEMO's management of the NEM. For example, we could potentially provide, on a commercial-in-confidence basis, aggregated dispatchable load by NEM state for our VPP assets, as a starting point.
- **Cost-benefit analysis** - we support a rigorous cost-benefit analysis of the proposed rule change, as well as any alternatives. Ideally, this should take place as part of an 'options paper' stage of the consultation process. We support a technical working group being established to assist this process.

We also provide responses to specific consultation paper questions in **Attachment A**.

VPPs can include a broad range of assets

Our VPP, also known as a 'Loop', includes a wide variety of assets for both residential and commercial and industrial customers. For residential customers this includes controlled load hot water, solar PV systems, batteries, electric vehicles and our behavioural demand response program. For commercial and industrial customers this includes various load reduction activities as well as using on-site generation.

We have summarised a number of the most significant assets in **Attachment B**.

These products have been developed with customer interests at the forefront of consideration. In many cases, the assets connected deliver amenity for customers and their use can only be altered to a limited extent. Further, the customer often retains the ability to opt-out at any time. This can reduce the perceived 'firmness' of the demand response or shifting, compared to a unit at a traditional generator. This makes the assets less appropriate to be included in a normal dispatch process.

Customer requirements and firmness

As illustrated by these different asset classes, these products are ultimately for the benefit of customers who have various requirements - whether this is to have a car that they can drive the next morning or to run a data centre securely. The customer centric nature of DER resources has a number of relevant features:

- Customer requirements are built into the terms and conditions of the contracts we offer and have flow on effects to how we manage the various VPP assets. Whilst the proposed rule

change is very much focused on the role of aggregators (rather than customers) the impact on customer amenity must be considered.

- Further, the customer often retains the ability to opt-out at any time. This can reduce the perceived 'firmness' of the demand response or shifting, compared to a unit at a traditional generator. Whilst this firmness can be improved by aggregation it remains a source of uncertainty.
- Finally, the VPP asset classes at the residential level involve the orchestration of tens of thousands of individual loads or generators spread across tens of thousands of sites. This greatly increases the potential complexity of trying to fit such resources into the existing NEM dispatch process.

Information gathering process

The concept of Scheduled Lite has been around for many years. Whilst it has evolved over time, including through the Energy Security Boards' Post 2025 Electricity Market Design process, we have concerns that this rule change is based on a model which has not clearly articulated its purpose.

At a high level, we understand the problem is that AEMO does not have sufficient information about various VPPs and the way the underlying assets may respond to price signals. However, beyond this it is unclear exactly what AEMO considers it is missing. We assume that part of the problem is that AEMO does not know what information it may be missing and will not know until further investigation is made. However, this uncertainty suggests that the next step should be the discovery of further information, rather than proceeding to a rule change which imposes a significant change (and cost) to the market but may or may not improve its efficiency.

We acknowledge that the AEMC has described five potential types of impacts that this lack of visibility of VPP assets may have on the efficiency of the NEM (see p 12 of the consultation paper). This includes potential impacts on energy prices and reliability. We suggest that these impacts are unlikely to be significant at this point in time, but may grow. Further, we suggest that some of the impacts, such as reduced energy prices and the ability to shift demand out of peak periods, would be regarded as benefits by many stakeholders. We agree that having visibility of this will be beneficial for AEMO. We have provided further comment on these in Attachment A.

Alternatives

We suggest that an alternative be developed which more efficiently targets the information required by AEMO. This should focus on information provision, which is similar to the aim of the proposed 'visibility mode'.

We would be willing to explore what information we could provide in the near future which may improve AEMO's management of the NEM. For example, we could potentially provide, on a commercial-in-confidence basis, aggregated dispatchable load by NEM state for our VPP assets.

Once greater understanding of the information is achieved, a more informed decision on how best to plan for the potential growth of VPP assets can be made.

We are aware of an alternative proposal that has been put to the AEMC that involves retailers forecasting their own demand and providing this to AEMO. We do not support such an alternative. It also sounds potentially complex and costly to implement and we believe that ultimately AEMO is best placed to manage overall demand forecasting for the market.

Costs and benefits

As the AEMC acknowledges, the deployment of VPPs will rely on scale. Various retailers and aggregators have been investing significantly in VPPs as the trend towards a decentralised energy grid of the future evolves. As stated above, we suggest it would be counterintuitive to regulate these new products and services in a costly manner which may stifle future development. The NERA report for this consultation paper notes that various international schemes have tended to promote the development of price responsive resources first, before focusing on issues of integration. We would support such an approach in the NEM.

We support a rigorous cost-benefit analysis of the proposed rule change, as well as any alternatives, being undertaken. Ideally, this should take place as part of an 'options paper' stage of the consultation process. A key input for this analysis will be further understanding how various VPP assets are being orchestrated by aggregators and how costly it will be to implement the proposed 'visibility' and 'dispatch' mode for each asset class. We would be willing to be involved in this process at the appropriate time. We would also support a process for establishing a technical working group to assist with information discovery and cost estimation.

If you wish to discuss any aspect of this submission further, please contact Matthew Kaspura at matthew.kaspura@originenergy.com.au.

Yours sincerely



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Attachment A: Responses to specific consultation paper questions



| No | Question | Origin comment |
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| 1 | Do you agree that price-responsive resources need to be integrated into the NEM? | <ul style="list-style-type: none"> • Yes, generally, better integration of consumer energy resources (CER) is desirable over time. However, this must be achieved in an efficient way that continues to allow for the new products and services based on CER to develop. • Regarding the five types of issues identified by the AEMC, it is important that this rule change process delves into what information is required now and in into the future, before committing to implement a potentially costly change to the functioning of the market. • Regarding each issue identified in the consultation paper: <ul style="list-style-type: none"> ○ Dispatch costs – the volumes currently provided by VPPs per NEM state in each particular 5-minute interval are unlikely to be material enough that they alter the marginal generator. We expect that any impact on dispatch cost should be low. However, we acknowledge that these market-wide impacts are uncertain and that VPPs are growing. Therefore, further investigation and information gathering of the market wide impacts of such distributed assets would be a useful first step. ○ Energy prices – overall wholesale prices required by aggregators may be slightly lower when VPP assets are utilised. This benefit is shared with customers. ○ Reliability – further information provided to AEMO may be useful to efficiently manage the market. We note that many of the VPP assets can help to better manage the grid by shifting demand away from peak periods. ○ Security – some VPP products such as batteries may be able to provide additional services such as FCAS. Visibility of this may be beneficial for AEMO. ○ Operation of distribution and transmission networks – various separate consultations have been investigating issues related to network issues. There is already a DER register which covers new solar PV installations and residential batteries and a separate ESB consultation was conducted on how to add information on EV charging infrastructure in the future. |
| 2 | Representing price-responsive resources in scheduling processes | <ul style="list-style-type: none"> • We do not view the separation of CER behind the connection point as a relevant topic. As noted in our recent submission to the <i>Unlocking CER benefits through flexible trading</i> rule change process, we believe that consumers can currently access the desired products and services without introducing new and potentially costly changes to connections and metering. Further, the proposed changes to connections and metering would reduce the benefit immediately available to customers by reducing the ability to self-consume. • We acknowledge that defining exactly what should be covered as a ‘price responsive resource’ may not be easy. We suggest that this review should focus on gathering |

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| | | <p>information about the types of CER that are most relevant, including which are most price responsive and their estimated capacity and annual 'generation' (or load shifting).</p> <ul style="list-style-type: none"> • In Attachment B we have summarised some of the assets that we currently orchestrate through our VPP. <ul style="list-style-type: none"> ○ For residential customers this includes controlled load hot water, solar PV systems, batteries, electric vehicles (EVs) and behavioural demand response. ○ For commercial and industrial customers this includes various demand-shifting such as lowering the output of loads as well as using on-site generation. As noted, some of the C&I assets participate in the RERT so AEMO already has visibility of these. |
| 3 | Visibility mode – encouragement to participate | <ul style="list-style-type: none"> • Incentive mechanisms – we do not view any of the proposed incentive mechanisms as particularly attractive. Of these, some form of financial incentive is most obvious. However, if this was recovered through participant fees then it may not provide any net value to VPP aggregators. • Costs - an alternative way to consider incentives is to minimise costs of any new arrangements. We would suggest that an alternative which is tailored to providing the information most required by AEMO could help to achieve a low-cost solution. • Mandatory participation – we support participation in the initial 'visibility mode', or similar alternative, to be voluntary to start with. We acknowledge that participation may need to become mandatory at a later time, as the impact of CER increases. However, at this early stage of VPP development, greater visibility to AEMO is likely to be sufficient to effectively manage the market and may result in more specific and low cost solutions evolving. |
| 4 | Assessment of visibility mode | <ul style="list-style-type: none"> • We suggest that the AEMC should focus on gathering information on how VPP assets are being managed first. • We are not convinced that a visibility mode is necessarily required. There may be a more tailored solution that could provide AEMO with what is required to manage the market more efficiently. |
| 5 | Dispatch mode – incentives to participate | <ul style="list-style-type: none"> • As noted above, we do not believe the AEMC should be considering a formal dispatch mode for CER yet. Rather, the focus should be on understanding what information AEMO is missing and how to most effectively and efficiently address this. • We are concerned that implementing formal visibility and then dispatch modes may impose significant costs on retailers and aggregators of CER services. Such costs will need to be recouped and may erode the margin of evolving products and services. At worst, the additional costs may make new CER products and services financially unviable. |
| 6 | Assessment of dispatch mode | <ul style="list-style-type: none"> • As discussed above, we believe it is premature to be assessing a particular solution before the required information has been discovered. |

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| 7 | Other issues raised in relation to the scheduled lite mechanism | <ul style="list-style-type: none"> • We believe it is too early to be considering these implementation issues. |
| 8 | Are there preferable alternative arrangements? | <ul style="list-style-type: none"> • We suggest that an alternative be developed which more efficiently targets the information required by AEMO. This should focus on information provision, which is similar to the aim of the proposed 'visibility mode'. • We would be willing to explore what information we could provide in the near future which may improve AEMO's management of the NEM. For example, we could potentially provide, on a commercial-in-confidence basis, aggregated dispatchable load by NEM state for our VPP assets. This could be provided in advance to generally align with the NEMDE timetable. • The long-term interests of consumers will benefit from allowing a competitive market for CER products and services to develop, without being stifled by excessive regulation and costs. |
| 9 | Assessment framework | <ul style="list-style-type: none"> • Generally, we agree with the criteria listed on pages 37-38 of the consultation paper which includes the usual factors that the AEMC considers in a rule change proposal. • In particular, we would highlight the potential costs of the rule change, particularly on VPP aggregators and their consumers, as well as AEMO who will need to manage and implement the new system. As noted above, the long-term interests of consumers will benefit from allowing a competitive market for CER products and services to develop, without being stifled by excessive regulation and costs. These new products and services are in many cases reducing costs for the market and customers, and it would be counterintuitive to regulate them in a costly manner which may hinder future development. Further, many of these products have additional benefits such as shifting demand to benefit the management of the electricity grid or reducing emissions. |

Attachment B: Examples of assets connected to our VPP

| Assets type | Description | Benefits | Constraints |
|----------------------------------|---|---|--|
| <i>Residential</i> | | | |
| Controlled load hot water | <ul style="list-style-type: none"> Shifting of hot water load, generally from overnight to middle of day. Partly automated to respond to changes at 30-min intervals. | <ul style="list-style-type: none"> Reduced wholesale costs. Better management of distribution network. Potentially reduced emissions. | <ul style="list-style-type: none"> Customers require minimum level of hot water at all times. |
| Solar | <ul style="list-style-type: none"> Potential management of solar exports. Not actively managed at the moment. | <ul style="list-style-type: none"> Potential to reduce wholesale costs. Better management of distribution network. | <ul style="list-style-type: none"> Limits on how much solar export can be controlled. |
| Batteries | <ul style="list-style-type: none"> Can optimise output of residential batteries. Community battery trials starting soon. | <ul style="list-style-type: none"> Potential to reduce wholesale costs. Better management of distribution network. Exploring options to participate in FCAS. | <ul style="list-style-type: none"> Customers require minimum level of storage at all times. Annual export limits. Customer options to switch between 'modes' |
| Electric vehicles | <ul style="list-style-type: none"> Shifting charging to lower demand periods of the day. Small but growing volume. | <ul style="list-style-type: none"> Potential to reduce wholesale costs. Better management of distribution network. | <ul style="list-style-type: none"> Customers require a minimum level of charge over a given time period. |
| Spike | <ul style="list-style-type: none"> Behavioural demand response product which provides incentives to reduce demand during peak events nominated by retailer. | <ul style="list-style-type: none"> Reduced wholesale costs. Customer engagement. | <ul style="list-style-type: none"> At discretion of customer whether to participate. Requires a baseline for comparison. |
| <i>Commercial and industrial</i> | | | |
| Demand response | <ul style="list-style-type: none"> Various C&I loads can be turned down for incentive payments. Examples include cement, meat processing and paper goods. | <ul style="list-style-type: none"> Reduced wholesale costs. Customers receive capacity and activation payments. Better management of peak events. | <ul style="list-style-type: none"> Customers can opt not to participate in specific events. Can take time to respond. |
| Back-up generation | <ul style="list-style-type: none"> Some customers have on-site generators which can run in periods of high price. Examples include data centres and water utilities. | <ul style="list-style-type: none"> Reduced wholesale costs. Customers receive capacity and activation payments. Better management of peak events. | <ul style="list-style-type: none"> Customers can opt not to participate in specific events. Can take time to respond. Bespoke customer requirements include security and public health. |
| RERT | <ul style="list-style-type: none"> Various demand response. Not relevant – AEMO already have information. | | |

Our VPP, also known as 'Loop', includes a wide variety of assets for both residential and commercial and industrial customers. We have summarised a number of the most significant assets in the table above.

These have been developed with customer interests at the forefront of consideration. In many cases, the assets connected deliver amenity for customers and their use can only be altered to a limited extent. Further, the customer often retains the ability to opt-out at any time. This can reduce the perceived 'firmness' of the demand response or shifting, compared to a unit at a traditional generator. This makes the assets less appropriate to be included a normal dispatch process.

For residential customers this includes:

- *Controlled load hot water* – this involves the shifting of hot water load, generally from overnight periods to the middle of the day. This is a partly automated process which is designed to reduce energy cost for the Origin portfolio and customers. It also has benefits for the management of the electricity grid as demand is shifted to lower price periods which are often in the middle of the day when excess solar generation can occur. Most of these assets are in South Australia (which has a 'solar sponge' network tariff) and New South Wales.
- *Solar PV systems* – we currently have various solar systems which are enrolled in the VPP. Generally, these are not being actively managed yet but we are investigating ways that orchestration could occur in the future, especially as dynamic operating envelopes are introduced by various distribution networks.
- *Batteries* – we have a small but growing amount of residential scale batteries which are enrolled in the VPP. We attempt to optimise the output of these batteries given the requirements of customers. This includes requirements for a minimum level of storage at all times and annual export limits. Further, customers can also choose to switch between 'normal' and 'holiday' modes which change the level of control available. We are also progressing a number of community scale battery trials which will look at the potential to reduce wholesale costs as well as provide Frequency Control and Ancillary Services (FCAS).
- *Electric vehicles* – like batteries, we have a small but growing amount of electric vehicle charging capability in the VPP. This will generally be optimised to shift charging to lower demand parts of the day whilst ensuring minimum levels of charge over a given period. This control generally occurs through a smart charger at the customer's premises but we are also exploring options to communicate to the vehicle directly.
- *Behavioural demand response* – our 'Spike' product provides incentives for customers to reduce and/or shift demand during peak events nominated by Origin. This involves comparing the customers usage against a given baseline for similar periods of time. This can include reducing or shifting demand from a wide variety of residential assets including household devices.

For commercial and industrial customers this includes:

- *Demand response* – various C&I loads can be turned down for incentive payments. This includes a diverse range of businesses such as cement, meat processing and paper goods. This response is not automated at this stage but requires direct communication with

customers who are also managing a range of other factors at a given site which may take precedence over reduced energy costs. Customers are generally provided an incentive to have capacity available and a further incentive to participate in peak events. However, customers can choose to opt-out of peak events, for reduced incentives.

- *Back-up generation* – some customers have on-site generation which is economic to run at periods of high wholesale market prices. This includes customers such as data centres and water utilities. Again, these customers are provided incentive payments but may choose to opt-out of given events. These customers have bespoke requirements. For example, data centres have various security requirements whilst water utilities are critical infrastructure with public health requirements.
- *Reliability and Emergency Reserve Trader (RERT)* - a number of our C&I customers involved in the VPP also participate in the RERT. AEMO already has visibility of this information.