Rachel Thomas

Australian Energy Market Commission

Submission made online at www.aemc.gov.au

12 September 2024

Dear Ms Thomas,

Subject: ERC0352 Draft Rule Determination– Integrating price-responsive resources into the NEM Rule

SA Power Networks welcomes the opportunity to provide feedback on the AEMC's Draft Determination on the *Integrating price-responsive resources into the NEM* rule change (the Rule Change).

We support the introduction of the Rule Change as outlined in the Draft Determination, noting that implementing a voluntary mechanism for currently unscheduled generators to participate in scheduling and dispatch will likely benefit the wider energy system by lowering costs for all customers and enhancing system security.

However, we note that the Rule Change also introduces additional capability requirements for several parties in order to best integrate Voluntary Scheduled Resources (VSRs) into the wider energy system, with the potential for major system uplifts required for the Australian Energy Market Operator (AEMO), Distribution Network Service Providers (DNSPs) and Voluntary Scheduled Resource Providers (VSRPs) not currently recognised in the Draft Determination.

Our key points of feedback are as follows, and are expanded throughout the submission:

1. We support the consideration of distribution network limits within VSR bids and note that this will contribute to the goal of the Rule Change in aiding AEMO to produce efficient operational demand forecasts. However, consideration must be given to the additional technical requirements for VSRPs to account for distribution network limits in their bids, including:

    a. The timing of DNSPs providing DOE forecasts to VSRPs;

    b. The communications mechanisms through which this is done; and

    c. The future role of the distribution system operator (DSO) and AEMO in optimising generator bids within distribution network constraints.

    There are potential material system uplifts required for AEMO, VSRPs and DNSPs to efficiently communicate and apply these limits. Several models are currently being explored, and we encourage the AEMC and AEMO to engage closely with DNSPs in understanding the current state of DOE implementation and the uplifts required to best integrate VSRs into the distribution network.

2. We strongly support the AEMC's expectation that AEMO's VSR participation guideline include requirements for data to be provided to DNSPs. Data provided should include:

a. The MW portion of VSR bids for each trading interval, allowing for network capacity to be efficiently allocated under a DOE provided to these resources; and

b. Standing data relating to the enrolment of both primary NMIs and secondary settlement points (SSPs) in a VSR, allowing for DNSPs to best understand what individual connection point response is included in the pre-dispatch allocation for a given VSR.

3. We recommend that further progression on data sharing between AEMO, DNSPs and scheduled resources be explored, including the provision of forecasts from all scheduled resources connected to the distribution network. This will allow for more optimal allocation of capacity to all distribution connected generators under a dynamic operating envelope (DOE), regardless of their capacity.

4. We note the benefits of AEMO's parallel SCADA Lite reform in providing a cost-effective means for VSRPs without an existing NSP SCADA connection to receive dispatch instructions from AEMO. However, VSRs with an existing DNSP SCADA connection will require additional investment in TNSP SCADA systems to receive dispatch controls in some jurisdictions. We encourage the AEMC and AEMO to explore optimal arrangements with DNSPs for DNSP SCADA connected VSR receipt of dispatch controls.

5. We recognise that the interaction between this Rule Change and the *Unlocking CER benefits through flexible trading* rule change provides benefits to VSRPs by removing the need to forecast inflexible portions of a given connection point's load. However, additional complexities are introduced when considering the inclusion of SSPs within a VSR, including:

    a. DNSPs being provided with VSRP bid data representing response at a SSP will require DNSPs to forecast the inflexible portion of the site's load to generate a site-level DOE. We see this as a transfer of responsibility for potential forecast error, and the resultant impact of inefficient market pricing from a VSRP to a DNSP, with the DNSP unlikely to have the same insights into the potential behaviour of the inflexible load as the VSRP.

    b. Uncertainty in the available site capacity allocated to a given SSP, when the VSRP does not maintain ownership over the site-level control system receiving a DOE, leading to the potential of bid non-conformance.

We look forward to continuing to engage constructively with the AEMC, AEMO and other stakeholders to deliver the lowest cost whole-of-system approach to enabling the energy transition. Should you have questions on any aspect of our submission, please contact Liam Mallamo, Future Networks Engineer, at liam.mallamo@sapowernetworks.com.au.

Jessica Morris

Chief Customer & Strategy Officer

1. Provision of distribution network limits to VSRPs

We support the AEMC's decision that VSR bids would be subject to distribution network limits imposed by DNSPs. We would expect that the majority of distribution-connected VSRs, whether singular or aggregated would be likely to operate under a flexible connection, receiving dynamic import and export limits as part of a DOE.

Whilst we support this decision, we note that additional complexities are introduced which must be considered, namely:

- Uplifts required to DNSP forecasting & DOE generation systems to provide a 24 hour ahead DOE forecast, in line with VSRP timeframes for providing market bids;
- The introduction of new communications mechanisms, or expansion of existing mechanisms between DNSPs and VSRPs to allow for these 24-hour DOE schedules to be provided; and
- The future role of a DSO in managing distribution connected scheduled resources and the intersection with the future role of AEMO.

1.1. Provision of DOE forecasts to VSRPs

In order to best integrate VSRs into both the distribution network and the wider energy system, the time-horizon over which DOEs are provided to a VSRP must align with their VSR bids. This will ensure that all VSR bids provided to AEMO are as accurate as possible, and that efficient pre-dispatch targets and forecast spot prices are generated by AEMO as a result.

An optimal model would align DNSPs forecasting timeframe for DOEs with that of VSRPs, namely for day-ahead bids, ensuring that all data provided to AEMO is accurate and reflective of actual network conditions. We also note that *"VSRPs would be subject to the same ST PASA requirements for VSRs as other scheduled resources,"* and encourage the AEMC and AEMO to consider whether VSR PASA data provision would also need to account for distribution network limits via a DOE.

The majority of DNSPs however, including SA Power Networks, do not currently produce a 24-hour DOE forecast. Depending on the size of the generator and the communications mechanism via which a DOE is received, distribution connected generators in South Australia receive either a 1-hour DOE forecast or a single 15-minute value.

To produce 24-hour DOE forecasts, uplifts will be required to DNSP demand forecasting and DOE generation and dispatch systems. We note that these system uplifts will ultimately be required regardless of the implementation of the Rule Change, in order to best integrate larger traditionally scheduled resources into the network via a flexible connection. The parallel *Improving consideration of demand-side factors in the ISP* rule change could potentially result in additional large scheduled resources connecting to the distribution network, hence mirroring requirements for uplifting DNSPs DOE forecasting systems. The introduction of the Rule Change will however *accelerate* the need for these uplifts to be performed by DNSPs, with VSRPs being the first scheduled resources that are *expected* to have their bids reflective of distribution network constraints.

In aligning with AEMO's operational forecasting timeframes, consideration should also be given to the need for alignment on the operational forecasting methodology implemented by AEMO and DNSPs. Input data and assumptions used by DNSPs to calculate DOEs should align with those used by AEMO for operational forecasting of demand and unscheduled generation. Key inputs to these forecasting

processes include weather data such as temperature and solar irradiance, as well as assumptions on the conversion of solar irradiance to PV system generation. Alignment on these inputs and assumptions will allow for accurate and consistent operational forecasting between DNSPs and AEMO, in turn allowing for more optimal capacity allocation and dispatch.

Whilst SA Power Networks' implementation of these systems is currently developed in-house, we will be progressively transitioning to a vendor based Distributed Energy Resource Management System (DERMS) in coming years. The implementation of 24-hour DOE forecasts and the associated alignment on input data and forecasting methodology could thus be requirements ultimately placed upon providers of DERMS software and similar platforms, the internal calculation methodologies of which may be largely opaque to DNSPs and may vary significantly between vendors.

We recommend that AEMO engage closely with DNSPs, and potentially system vendors in providing guidance or requirements to achieve alignment in input datasets, assumptions and methodology between DNSPs and AEMOs respective operational forecasting processes.

1.2. Communications mechanisms between DNSPs and VSRs

Currently, all generators connected to SA Power Networks' distribution network with an export capacity of less than 200kVA need to be capable of receiving DOEs via the CSIP-AUS protocol, whilst generators exporting above 200kVA receive DOEs via a SCADA connection. In future, we expect that CSIP-AUS requirements may extend to larger generators.

The current CSIP-AUS implementation deployed by SA Power Networks and several other DNSPs does not allow for a 24-hour control schedule to be provided to a connected generator. Additionally, HV connected generators receiving controls via SCADA currently receive only a single control, with most SCADA systems currently unable to send or receive timeseries control schedules.

To support the provision of 24-hour DOE forecasts, DNSPs will need to invest in uplifts of their CSIP-AUS and/or SCADA systems. Noting that CSIP-AUS is better suited for delivering timeseries control schedules than SCADA, an efficient model may involve an extension of DNSP requirements to require all distribution connected generators to maintain a CSIP-AUS connection to receive a DOE forecast, regardless of what level of the network they connect at. Operational DOEs could then be received via that same CSIP-AUS connection or via SCADA, depending on whether the generator is connected to the LV or HV network respectively.

Alignment between DNSPs on the communication of DOEs to VSRs will aid in delivering more efficient connection processes nationally. We recommend that the AEMC and AEMO engage closely with DNSPs to understand current progress on national alignment between DNSPs regarding the implementation of DOEs and consider where further alignment and uplifts may be required to support the requirement of providing 24-hour DOE forecasts to VSRs.

1.3. AEMO and DSO roles and responsibilities

The Draft Determination notes that as AEMO's NEM Dispatch Engine (NEM-DE) does not currently consider distribution network limits, VSRPs would need to be responsible for incorporating these limits into their bids prior to ingestion into NEM-DE. This process would be managed outside of AEMO's systems, between DNSPs and VSRPs directly. As previously outlined, we support this model, noting that there are inherent complexities that must be considered during implementation.

The Draft Determination further notes that in future *"AEMO and DNSPs can investigate incorporating FELs [distribution network limits] into dispatch instructions to VSRs"*, presumably implemented via NEM-DE, mirroring the model currently deployed for transmission connected generators. We would caution

the AEMC and AEMO against presuming this model as a future state, particularly as many VSRs are likely to consist of LV connected resources, such as distributed behind-the-meter batteries operating as part of a VPP, each of which would be receiving a unique site-level DOE from the DNSP. This represents a significant increase in the volume and complexity of constraints to be considered, with approximately 77,000 LV networks, and hence individual constraints that need to be managed on the SA distribution network alone. Integrating these limits into NEM-DE would likely require a very significant uplift to the capabilities of the tool, as well as significant increases to the running costs and computational time involved with generating dispatch results.

We would propose that a more efficient long-term model would retain the current position proposed by the AEMC, with distribution network limits being accounted for directly between DNSPs and VSRPs and only the aggregated, post-constrained VSR bids being provided to AEMO and ingested into NEM-DE.

We encourage the AEMC to consider future models for dispatch of all distribution connected generators in their DSO roles and responsibilities review via the parallel *Electricity pricing for a consumer driven future* market review and the delivery of the National CER Roadmap, noting that multiple models may be required when considering the future broad spectrum of scheduled resources.

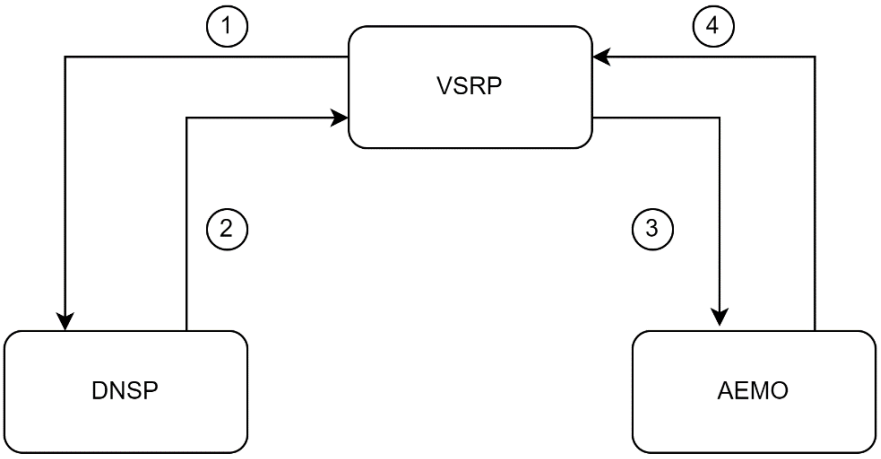
2. Provision of data from VSRPs to DNSPs

We note the AEMC's expectation that AEMO's VSR Guideline would "*set out any data sharing arrangements between AEMO and DNSPs*," and that "*this would allow for VSR information to assist in setting appropriate limits*." We have previously advocated for these arrangements in our submission to the Directions Paper and welcome the AEMC's expectation that these requirements will be included within AEMO's VSR Guideline.

2.1. Data sharing and transactional models between VSRPs, DNSPs and AEMO

Data sharing arrangements between VSRPs, DNSPs and AEMO will support the efficient integration of VSRs into the distribution network. However, there are no current systems in place to faciltiate these transactions and ensure a more optimal implementation of the Rule Change.

The below figure provides a summary of our proposed transactional model for the communication of DOEs and VSR bids between VSRPs, DNSPs and AEMO. Further discussion on each element of this model is outlined throughout this section.



1. VSRP provides DNSP with unconstrained VSR forecasts for each individual resource within the VSR;

2. DNSP:
    a. Ingests VSR forecasts;
    b. Generates DOEs at the connection point level;
    c. Provides DOEs to VSRP.

3. VSRP provides aggregated, post-constraint bid to AEMO for the VSR;

4. AEMO:
    a. Generates VSR pre-dispatch targets via NEM-DE;
    b. Provides VSR pre-dispatch to VSRP;

5 (1). VSRP:

    a. Disaggregates VSR pre-dispatch to the individual resource level;
    b. Provides a revised VSR forecast to the DNSP for each individual resource within the VSR

This process can repeat until the final pre-dispatch interval, noting that each time the process repeats, the DOEs provided to the VSR, and hence the pre-dispatch and resultant spot prices generated by AEMO become more efficient.

Whilst this model is only one of several potential options, we see it as the most efficient model, with each party receiving & handling data at a granularity best suited to their market role and systems capability. In particular, this model does not place any requirements on AEMO to handle the complexity of disaggregated, site-level data, nor for DNSPs to disaggregate VSR bids to a NMI-level, where that bid represents the aggregate response from distributed resources.

We encourage AEMO to engage closely with DNSPs and VSRPs during the development of the VSR Guideline, exploring options for efficient communication of DOEs and VSR bids between DNSPs, VSRPs and AEMO, and again for the AEMC to consider these arrangements in their parallel review of future DSO roles and responsibilities.

2.2. Provision of VSR bid data to DNSPs

We strongly recommend that AEMO's VSR Guideline require the provision of VSR bid data to DNSPs. This should cover only the MW portion of the bid, with no need for DNSPs to receive any pricing data. Receiving this data will allow DNSPs to better understand, model and forecast the behaviour of unpredictable price responsive resources such as VPPs, large batteries and large flexible loads, and hence provide more efficient allocation of network capacity under a DOE to these resources. In the absence of this data provision, DNSPs must make assumptions regarding the behaviour of price-responsive resources, with these assumptions typically being conservative and resulting in sub-optimal allocation of network capacity to these resources.

Provision of aggregate bid data to DNSPs for a VSR consisting of many distributed resources will significantly limit the usefulness of this data in generating site-level DOEs for these resources, potentially resulting in an inefficient allocation of network capacity and hence a reduction in the market

benefits the Rule Change seeks to deliver. As many VSRs are likely to consist of aggregated distributed resources, we recommend that VSR bid data be provided to DNSPs *at an individual resource level,* i.e. at the NMI or SSP level. We note that providing bid data to DNSPs at this resolution would differ from the data provided by the VSRP to AEMO, and hence would require the establishment of a new communications interface between VSRPs and DNSPs.

2.3. Provision of bid data from traditional scheduled generators to DNSPs

The implementation of the Rule Change will bring forth an immediate need to efficiently integrate VSRs into the distribution network under a flexible connection. We note that we note that this need is not limited only to VSRs however, and already exists today for traditionally scheduled resources.

Offering flexible connections for distribution connected scheduled resources provides a cost-effective and faster connection option, as well as best utilising existing network capacity. However, DNSPs currently lack the operational data to accurately forecast the behaviour of these resources, such as large scheduled batteries greater than 5MW.

We propose that the AEMC and AEMO consider expanding the requirements of scheduled resource data provision to DNSPs beyond just VSRs, but to *all* distribution-connected scheduled resources. The optimal models for data provision may differ between resource types, and we encourage AEMO to explore the suitability of each model for both VSRs and other scheduled resource types with DNSPs.

2.4. Provision of VSR enrolment standing data to DNSPs

In addition to the provision of VSR bid data to DNSPs, we recommend that AEMO's VSR Guideline include requirements for the provision of VSR enrolment standing data to DNSPs. This will allow DNSPs to best understand the local network impact of a given VSR's bids, by having a complete mapping of the aggregated VSR down to each individual resource, and hence generate more efficient DOEs for these resources. This standing data should include:

- The individual resource identifier, i.e. the connection point NMI;
    - For individual resources that are operated under a SSP, both the SSP and the primary NMI of the site connection point should be provided;
- The installed export capacity of the individual resource;
- The FRMP operating the VSR;
- The markets that the VSR is registered in;

This standing data may partially be housed in existing systems such as the DER Register today, although we expect that some resources aggregated into a VSR will fall outside of the current data collection scope of the DER Register. We encourage the AEMC and AEMO to consider where existing systems can be leveraged to provide this data to DNSPs in the most efficient manner.

3. Provision of dispatch controls from AEMO to VSRPs

The Draft Determination outlines the requirements for VSRPs to participate in dispatch and hence access additional markets, including regulation FCAS, noting that "*the introduction of SCADA Lite will facilitate this [the communication of dispatch controls from AEMO to VSRPs.]"*

AEMO's implementation of SCADA Lite will provide a solution for resources that do not currently have a NSP SCADA connection to receive dispatch controls from AEMO, including AGC and regulation FCAS setpoints. In South Australia, this will offer a cost-effective solution for resources with an individual export capacity of 200kW or less, such as behind-the-meter batteries participating in a VPP. However, we note that a SCADA Lite solution will not apply to sites with a current DNSP SCADA connection, including large distribution connected batteries.

There are few scheduled resources currently connected to the distribution network, with the majority of these resources instead connected to the transmission network. We expect that increasing numbers of scheduled generators will connect to the distribution network in future however, placing higher importance on implementing a cost-effective solution for DNSP SCADA connected resources to receive dispatch control from AEMO, whether participating as a VSR or as a traditionally scheduled resource.

The current solution for providing dispatch controls to distribution connected scheduled generators in South Australia requires a passthrough of controls from AEMO to the DNSP and in turn the generator, via the TNSP SCADA system. The creation of this control pathway for distribution connected scheduled generators has historically incurred additional costs for TNSP SCADA development, with these costs initially borne by the DNSP but ultimately passed on to the connecting generator. We note that this issue is not present in all jurisdictions, with a direct link to AEMO already implemented for some DNSPs.

We recommend that AEMO review the suitability of existing communications pathways for dispatch controls where SCADA Lite is not available, engaging closely with DNSPs to reach a cost-effective solution for all parties where one is not already in place.

4. Monitoring and reporting framework and visibility mode

The Draft Determination does not progress AEMO's proposed visibility mode, noting that it this decision may be reviewed in future depending on the outcomes of the monitoring & reporting framework to be implemented by AEMO and the AER.

Whilst we understand the AEMC's position on visibility mode, there are significant benefits to be realised in the form of more efficient DOE generation and resultant market benefits that visibility mode could provide. We encourage the AEMC to consider these benefits when assessing the outcomes of AEMO and the AER's reporting, namely the value derived from DNSPs being provided with operational forecasts from a greater volume of resources, in turn delivering:

- More efficient spot pricing due, with constrained visibility mode forecasts driving further benefits in spot price development than unconstrained forecasts;

- Reduced conservatism in DOEs generation, and hence greater network capacity allocation to resources participating in visibility mode, which brings:

    - Reductions to marginal generator short-run marginal costs as per the AER's Customer Export Curtailment Value, derived from additional exported energy under a more efficient DOE;

    - Avoided customer reliability impacts as per the AER's Value of Customer Reliability (VCR) due to a reduction in constrained import energy under a more efficient DOE;

- We note that resources experiencing any level of import curtailment under a DOE will have chosen to connect under a flexible connection, and hence the impact of curtailment cannot be directly compared to that of a traditional connection and the associated VCR. We would recommend adopting a reduced VCR for these connections, acknowledging the reduced amenity impact to these customers.

4.1. Transparency of AEMO's operational forecasting methodology

We note that the AEMC identifies increased transparency of AEMO's operational forecasting methodology as a potential short-term reform based on the outcomes of AEMO and the AER's monitoring and reporting. We support this and would recommend that this be extended to include a review of the impact that distribution network constraints and the resultant curtailment have on AEMO's operational forecasting, and where opportunities may exist to best integrate distribution network limits at the transmission bulk supply point into AEMO's operational forecasting systems. This would allow for more fulsome consideration of constraints across the energy system in AEMO's operational forecasting process, namely the curtailment of *all* generation and load, as opposed to only that imposed on scheduled resources.

4.2. Network access arrangements for VSRs and scheduled generators

The Draft Determination outlines several potential future reforms to drive further VSR uptake where a need is identified through AEMO and the AER's monitoring and reporting, including *"greater network access for scheduled resources.*" As outlined in Section 2.2, the provision of bid data from VSRPs to DNSPs will allow for more optimal network capacity allocation to these resources under a DOE. Whilst this is not an intentional incentive provided by DNSPs to these resources, it is a direct benefit incurred to resources opting to participate as a VSRP.

In exploring the need for further incentives or reforms to drive VSR uptake, we recommend that the AEMC consider:

- the benefits that would already be incurred to VSRPs via this potential increased market access under a more optimal DOE;

- the impact of any potential reforms in this area on the current open access nature of the distribution network connections framework; and
    - how this may compare to the network access available to scheduled generators connected to the transmission network.

5. Interaction with the *Unlocking CER benefits through flexible trading* rule change

The Draft Determination attributes significant benefits to the interactions with the parallel *Unlocking CER benefits through flexible trading* rule change, namely the reduction in forecasting overheads for VSRPs by allowing for SSP participation in a VSR. We recognise that allowing for a VSRP to forecast only the flexible portion of a site load and include it in their VSR bids lowers the barrier to entry for VSR participation and will encourage greater VSR uptake. However, the introduction of SSPs also brings additional considerations in integrating VSRPs into the distribution network.

5.1. Provision of SSP bid data to DNSPs

As outlined in Section 2.2., we strongly recommend that VSR bid data to be provided to DNSPs at the individual resource level, including at the SSP level where relevant. However, the provision of VSR bids to DNSPs representative only of the response at a SSP can potentially lead to sub-optimal network capacity allocation in the DOEs provided to these resources. To generate a site-level DOE, DNSPs will need a forecast of the site-level behaviour. With VSR bids provided only at the SSP level, the requirement of producing a site-level forecast will fall on the DNSP. We see this as a transfer of responsibility for potential forecast error, and the resultant impact of inefficient spot market pricing from a VSRP to a DNSP.

Producing site-level forecasts requires an understanding of the expected behaviour of a site's inflexible loads. Whilst DNSPs currently perform this role to provide DOEs to existing resources, we expect that the VSRP would be likely to have greater insights into the potential behaviour of these inflexible loads, particularly where the VSRP may also be the FRMP for a given customer and hence be able to account for retail tariff response. We encourage the AEMC and AEMO to engage closely with DNSPs and VSRPs to explore arrangements to mitigate the risk of forecasting error in generating site-level DOEs for a VSR.

5.2. Provision of SSP VSR enrolment standing data to DNSPs

Our submission to the *Unlocking CER benefits through flexible trading* Draft Determination noted that the ability of a DNSP to uplift the data models of their network systems to account for a multi-layer NMI hierarchy will depend on their ability to generate an economic business case to do so, in turn dependent on the volume of SSP uptake.

The provision of standing data mapping the enrolment of SSPs to primary NMIs and VSR enrolment, as outlined in Section 2.4. could offer a cost-effective solution to provide DNSPs with visibility over the presence of a SSP on a given connection point without the need for major systems uplifts.

We expect that a significant portion of the future SSP population will be made up of resources enrolled in a VSR. Provision of standing data for these sites will thus ensure that DNSPs have, at a minimum, a mapping of SSP to primary NMI for sites that are enrolled in a VSR, regardless of their ability to justify wider systems uplifts to provide full SSP visibility at all sites.

2.2. Site mediation of DOEs to SSPs

Additional complexities are introduced when considering the provision of site-level DOEs for VSRs consisting of one or more SSPs. Whilst the VSRP will be able to forecast the response of the SSP based, the impact of the site level DOE on the SSPs desired response will depend on the control hierarchy in place at that site. This issue was highlighted in our response to the *Unlocking CER benefits through flexible trading* rule change, in which 3 models were outlined for potential mediation of site capacity between one or more SSPs and the primary NMI.

We expect that Option 1 outlined in our submission, 'Primary FRMP as site mediator' would be the architecture in place at these sites. In this case, the DOE is provided to a site-level CSIP-AUS client, likely integrated into a site-level 'master' control system operated by the primary FRMP of the site with full visibility and control over all downstream 'slave' devices, including those on SSPs.

Each of the SSPs will be allocated a portion of the site-level DOE, based on the optimisation strategy deployed within the site master. Depending on whether the VSRP is also the primary FRMP, the VSRP may or may not have control and/or visibility over the site master and the capacity allocation that it

performs. This introduces a level of uncertainty in the SSPs ability to provide the response that the VSRP expects of it despite the VSRP having full visibility over the site-level DOE, potentially leading to non-conformance in VSR bids.

The potential impact of this issues is further compounded where multiple SSPs are located on a single site, each with a different FRMP and each enrolled in a separate VSR operated by separate VSRPs.