



25 September 2020

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Dear Jai,

AUSTRALIAN ENERGY MARKET OPERATOR – SUBMISSION TO DER ORCHESTRATION ROLES AND RESPONSIBILITIES ISSUES PAPER

AEMO welcomes the Energy Transformation Taskforce's *Issues paper – DER Roadmap: Distributed Energy Resources Orchestration Roles and Responsibilities* (Issues Paper), dated 14 August 2020, and supports the discussion that the paper will prompt on roles and responsibilities of parties.

At a time of unprecedented change across Australia's electricity sector, industry-wide discussion is essential to identify and pursue the most efficient pathways that facilitate transition to a decentralised system. Collaboration between partners, customers, innovators, businesses, policy makers and the wider industry is essential to share views and inform the development of frameworks that will realise the full potential value from effective Distributed Energy Resources (DER) integration.

To this end, AEMO supports the Issues Paper's proposal to evolve the roles of the Network Operator, the System Manager, the Market Operator and Retailers as a means of facilitating DER integration while seeking to minimise the total cost of electricity supply. Under the proposed arrangements, AEMO's role of the Market Operator would evolve to include the Distribution Market Operator (DMO) role as outlined in the DER Roadmap.

AEMO has reviewed the Issues Paper and considered the proposed roles for the DMO, Distribution System Operator (DSO) and DER Aggregator and preliminary aspects of their participation. Recognising the preliminary nature of this Issues Paper and the stakeholder engagement process, AEMO understands there will be further development through related papers and DER Roadmap actions (especially Actions 22-27). Of importance will be defining the policy and design for the active participation of DER to provide services to the power system, market and network under dispatch arrangements, and how this will be facilitated by the roles of the DSO, DMO and DER Aggregator.

Given the above, the DER Roadmap's Guiding Principles¹ and AEMO's position as the independent Market Operator and System Manager for the Wholesale Electricity Market (WEM) in the South West Interconnected System (SWIS), this submission provides some initial commentary on matters that will likely impact AEMO's existing roles under the WEM Rules; with the understanding that

¹ Energy Transformation Taskforce (2019), *Distributed Energy Resources Roadmap*, Energy Transformation Implementation Unit, Department of Treasury, December, p.37.

further refinements will be necessary. AEMO's submission then responds to the specific questions raised in the Issues Paper in regard to the role of the DMO.

The key messages offered by this submission include:

- Increased visibility of DER, along with opportunities to incentivise customers to allow the control of their DER, will be critical to delivering efficient power system security, reliability and market efficiency outcomes as DER increases to contribute to the WEM and the SWIS.
- AEMO remains of the view that the hybrid model considered in the Issues Paper will provide the most efficient outcome as it draws on the existing capabilities of both the Network Operator and the System/Market Operator, while also creating the opportunities for synergies that enable the participation of aggregated DER.
- The execution of Actions 22 and 23 (DER Orchestration Pilot) will provide the testbed to explore and identify efficient data exchanges between all actors, participation arrangements for DER Aggregators, DER Aggregator capability for service provision, and the participation requirements for service provision.
- The existing Network Control Services (NCS) framework may be used as the basis to enable the effective dispatch/deployment of DER Aggregators for network services alongside market services (i.e. 'value stacking') via AEMO's central market platform (within the hybrid model construct).
- Registration and participation arrangements need to support value delivery to customers by DER Aggregators by allowing for DER Aggregators to operate at scale across the WEM/SWIS. This can be facilitated through simplified registration arrangements, efficient compliance arrangements, avoiding the duplication of requirements and allowing choice for service provision.
- The performance of DER Aggregators (and therefore DER) in the provision of market services needs to be considered within a similar framework to that of the existing generator performance regime, where minimum requirements apply to all DER, and specific service delivery performance requirements align to the registration and participation framework.

AEMO looks forward to further collaboration with the Energy Transformation Implementation Unit (ETIU) to help finalise aspects of the detailed design over the coming months. For any further questions or information in relation to this submission please contact our Manager, Distributed Markets WA, Tom Butler, on 0431 248 097.

Yours sincerely,



Scott Chapman

Group Manager, Distributed Markets and Services

Attachments: AEMO submission in response to ETIU Issues Paper

Whole-of-system optimisation and the 'hybrid model'

The Open Energy Networks initiative that AEMO undertook in partnership with Energy Networks Australia identified a 'hybrid model' as the preferred approach for the optimisation of DER in the economic provision of energy, reserve capacity, network and system services while delivering direct value to customers.

The hybrid model seeks to combine the best aspects of other models considered (i.e. the Single Integrated Platform (SIP) and the Two Step Tiered (TST) Frameworks). Under this model, AEMO runs a single market platform while the DSO remains responsible for operating the distribution network. The interfaces between the DSO and DMO are in place to exchange the data needed for effective coordination, promote transparency and to enable aggregators to access the market and to provide network services. This design intends to achieve whole-of-system optimisation efficiently and effectively by:

- Giving the DSO visibility of and access to DER capability that can be effectively used to minimise network constraints;
- Enabling AEMO to use this information as part of a co-optimised dispatch, which looks at the network needs and market services that DER can provide;
- Avoiding duplication of platforms that are undertaking equivalent DER orchestration activities; and
- Enabling efficient participation and access by DER Aggregators.

Under the hybrid model, wholesale market access would be extended to enable active participation of DER through a DER Aggregator. Importantly, the individual DER devices must comply with standardised communications and control capabilities to facilitate their participation. If parties are looking to access the wholesale market and be paid through the services they offer to the market, then those parties should be enabled to directly engage with the market platform or interface. As the Market Operator and System Manager, AEMO's role is to make it easy for those parties to do so through a single wholesale platform.

Any DER that participates in the wholesale market will need to operate within the confines of the distribution network operating envelope defined by the DSO. Under the hybrid model for the WEM, the DSO would be Western Power. This would ensure that DER participation does not jeopardise local security of the networks. To that end, it is essential that the relevant parties (AEMO, Western Power and DER Aggregator) collaborate to create a system architecture that allows wholesale economic dispatch to work seamlessly with distribution-level constraint management. These systems must enable automation and communications at sufficient speeds as wholesale economic dispatch occurs seconds before each 5-minute dispatch interval.

Under the hybrid model, the DER Aggregator manages the day-to-day customer relationship. In return for payment from the DER Aggregator, customers cede some control of their DER assets such that the DER Aggregator can provide services to both the network and the wholesale market. If customers are to realise value and participate, and DER Aggregator business models are to remain viable, the hybrid model must be enabled at an efficient cost and with the ability to 'stack value' from multiple services. To achieve this, the DSO must assess and enable the DER Aggregator to provide, and be rewarded for, services to the network (i.e. investment deferral or operational support). The DMO will need visibility of these arrangements so that it can manage the power system and market efficiently. In addition, AEMO must dispatch and settle DER Aggregators for their participation in the relevant market services that support the power system as a whole.

Accommodation of DER in-market services

AEMO considers that, within the short-term timeframe of the DER Roadmap, a broad objective to build for all market and network services may not be the most effective means to enable DER participation². Consequently, the DER Orchestration Pilot known as 'Project Symphony', which is being implemented under Actions 22 and 23 of the DER Roadmap, has been designed to trial a range of market use cases of aggregated DER. This includes the provision of system services that, while being facilitated by the market, are needed to support specific power system needs (while also designing the appropriate performance and compliance arrangements to support service provision).

The Issues Paper proposes the accommodation of DER within the Reserve Capacity Mechanism (RCM), to allow aggregated DER to earn Capacity Credits; noting that the WEM Rules already provide for a Demand Side Program (DSP) to participate in the RCM.

The accommodation of aggregated DER within the RCM requires careful consideration of ongoing rule changes and the timings of the overall WEM Reform program. DER is likely to incorporate a mix of intermittent generation, load and storage such that consideration will need to be given to the impact of the ERA's Relevant Level Methodology review, the ERA's Benchmark Reserve Capacity Price methodology review, and the proposed Rule Change to amend the Relevant Demand calculation. In addition, the reform of the RCM is countenancing significant changes to award capacity in a constrained network and will set out the certification of capacity for storage, and the associated obligations.

It is yet to be considered how the reliability contribution of an aggregated DER facility may be measured and awarded in the RCM, or how the new registration regime will treat an aggregated DER facility that spans either one or several electrical locations. AEMO considers that deferring the integration of DER within the RCM does not detract from the capability of DER to contribute to reducing the RCM demand and costs of individual loads (referred to as Individual Reserve Capacity Requirement, or IRCR).

However, early design work on RCM integration can commence within the timeframe of the DER Roadmap. This includes giving preliminary consideration to how DER can most effectively make capacity available to the market, how DER would demonstrate the availability of its capacity, and what refunds should apply. These considerations will need to have regard to concurrent RCM design changes, the finalised design of the registration and participation framework, and will need to draw on learnings from Project Symphony.

Network support services

Section 4 of the Issues Paper relates to the 'new roles' of the DSO, DMO, DER Aggregator and Consumers. With respect to the roles of the DSO, the Issues Paper states³ -

"the DSO can enter into contracts with aggregators which can provide network support services if such services have a lower cost than augmenting the network."

The section also provides a list of issues related to DSO functions that require further thought. Included in this list is 'reliability and market services'.

² To respond to the urgency of addressing system security issues, as well as providing further opportunities to deliver good outcomes for SWIS customers.

³ Energy Transformation Taskforce (2020), *Issues paper – DER Roadmap: Distributed Energy Resources Orchestration Roles and Responsibilities*, Energy Transformation Implementation Unit, Department of Treasury, 14 August, p.22.

It is unclear from the Issues Paper whether network support services might be provided under the equivalent of a NCS contract (a construct that already exists under Chapter 5 of the WEM Rules); or whether these services would be provided via the 'alternative options' framework contemplated by the changes to the Electricity Network Access Code. In AEMO's view, aggregated DER can, and should, be managed in the same way under either approach.

An NCS contract refers to a service provided by a contracted generator or a DSP to the Network Operator⁴. If necessary, the Network Operator can enter into an NCS contract with a Market Participant, potentially a DER Aggregator (or a Retailer in this role) in future, to defer a network investment at a specified location in the network. Under the WEM Rules as currently drafted, there are conditions on the Network Operator and the Market Participant who enter into an NCS contract. The Market Participant must apply to AEMO for Certified Reserve Capacity in respect of the facility that is providing network support⁵ and the Network Operator must provide AEMO with details of the NCS contract⁶ so that AEMO can coordinate the dispatch of the network support with its dispatch functions for the broader power system.

Under the WEM reforms, the NCS contract will be replaced with Non-Co-optimised Essential System Services (NCESS), and providers of NCESS will not be required to apply for Certified Reserve Capacity. AEMO considers that the new NCESS arrangements may be extended to the kind of contracts with DER Aggregators contemplated in the Issues Paper under Section 4. The Network Operator would undertake a cost-benefit analysis to compare any non-network solution against a network solution before entering into a contract for network support.

The DER Roadmap envisages a future where customers are engaged by multiple energy service providers or DER Aggregators to provide services to the network and the broader electricity market (that is, value-stacking to provide multiple services). For example, a single customer may be contracted by the DSO via a DER Aggregator to provide network support services alongside the DER Aggregator also participating in frequency control service provision for the WEM.

The ability to offer services to multiple parties offers the potential to gain the maximum benefit from a customer's asset investments and the capabilities of those assets, in terms of reward to the individual customer as well as lower overall costs for all customers. Therefore, so that customers can realise the value of their assets to the network, system and market, it will be essential to enable value-stacking of services (for example, voltage support, energy and frequency control services simultaneously) with a sufficient level of visibility to the System Manager (AEMO). To achieve these outcomes, the interactions between the DSO, AEMO and DER Aggregators must be designed to prioritise or decide between the service offerings to resolve conflicts in dispatch in the most efficient manner.

The WEM Rules sets out a priority for dispatch under clause 7.6.1A, requiring that a registered facility subject to an NCS contract is dispatched in priority to a registered facility under any other arrangement where this accommodates achieving the dispatch criteria. This philosophy will also apply to NCESS following the related reforms. AEMO's view is that network support services provided by DER Aggregators should also be dispatched as a priority, as per the existing framework. AEMO is also of the view that a coordinated delivery of instructions from both the DSO and DMO would manage conflict and enable DER Aggregators to value stack multiple services from their DER portfolio. This priority arrangement should apply irrespective of whether a service is an NCS, a NCESS or an 'alternative option' service. As such, the most appropriate mechanism is for all services to be provided under the WEM Rules and not via an 'alternate option' service.

⁴ See WEM Rules 5.1.1 and 5.1.2.

⁵ See WEM Rule 5.2A.2.

⁶ See WEM Rule 5.3A.3.

Registration and participation (DMO Roles and Responsibilities)

Question M1: Taking into consideration how the future registration of aggregated DER is outlined in the Registration and Participation Framework in the Wholesale Electricity Market paper, are additional changes required to incorporate aggregated DER in the WEM?

Frameworks for registration and participation need to present least-cost or otherwise efficient solutions for encouraging DER Aggregators to successfully engage and enable customers to provide market and network services. It is important to strike the right balance with technical requirements that enable visibility and controllability, while avoiding overly burdensome registration and participation requirements that discourage market entry and participation.

The facility aggregation model in the *Registration and Participation Framework in the Wholesale Electricity Market* paper provides a high-level construct for integrating DER into the new Reformed Registration Framework, through the use of the Facility sub-type 'Small Aggregation'. The paper also places emphasis on the concept of a single location for a facility - either a connection point or an 'electrical location'. The latter is expected to be a transmission node (TNI).

AEMO agrees it is important for dispatch under SCED to be based on an understanding of the location of dispatchable facilities that can materially affect network flows. From a technical perspective, it may be necessary to limit the number of DER Aggregators located behind a TNI, for example, to ensure that the capability of a DER Aggregator (as a facility) can be verified and/or assessed where it intends to provide specified services to the Real-Time Market (RTM). A minimum size requirement may also apply to such a facility, as determined by the Essential System Services (ESS) accreditation framework. Having said this, AEMO recognises that restrictions applied to DER aggregation through the electrical location approach may create barriers to efficient entry and participation for DER Aggregators seeking to provide other energy services. This may be due to such things as:

- The practicality of the DER Aggregator sourcing sufficient volumes of accessible DER customers behind each TNI to satisfy participation thresholds, potentially preventing overall scale efficiencies from being realised.
- Multiple registration processes increasing costs for entry and participation for any single DER Aggregator where its resources are located behind multiple TNIs.

How DSPs will be treated under proposed new WEM Rules may also lend some insights on what arrangements might best enable the participation of DER Aggregators with service offerings other than ESS. While the new rules will enable a DSP to span multiple electrical locations, such a facility will be required to bid at the price ceiling and will be dispatched some time ahead of the next market interval. In summary, a DSP will be able to register as a single facility, even where that facility spans across several TNIs, but there will be some bidding restrictions. This is because under SCED, as a general rule, the assumption for constraints is that distribution limits (with respect to each relevant TNI) will be reflected in offers to the market.

AEMO considers that the likely small scale of some DER Aggregators' portfolios behind each TNI could potentially lead to high costs should the DER Aggregator be required to undertake multiple registrations and material investments to monitor and confirm performance of service provision. Furthermore, a DER Aggregator may not have visibility of a customer's electrical location, and therefore could not target prospective customers efficiently.

It should be noted that even where the registration framework is designed to support the entry of DER Aggregators, the costs of participation - which include the cost of registration, trading systems and administering settlement processes (among other things) - will likely provide an implicit minimum size for market participation in the provision of some services. As suggested above, a

minimum size may be relevant to the provision of ESS, in addition to a requirement for the facility's resources to be co-located to effectively supply the service to the market.

All told, the effectiveness of aggregated DER participation depends on customers' realisation of value. Consequently, frameworks for registration and participation must sensibly allow for aggregated DER's participation where the value gains are the greatest for the DER Aggregator and its customers. The challenges articulated above require exploration through the DER Roadmap's efforts, and AEMO encourages ETIU not to make definitive decisions at this time that would limit further opportunities for refinement through DER Roadmap work.

Some additional design *options* that could be explored to create a more flexible model for DER aggregation might include:

- Requiring DER above a certain threshold to register and participate individually.
- Allowing the aggregation of DER customers across multiple electrical locations, with registration requirements allowing AEMO to determine the impact of the DER Aggregator on the power system and market, and the threshold at which it would prevent additional DER enrolment (this assessment process could be documented in a WEM Procedure).
- Providing AEMO with the power to require disaggregation of an existing DER Aggregator if it considers that security or market impacts are material.
- Avoiding restrictions on bid/offer prices for aggregated DER facilities that span multiple locations.
- For the purposes of central dispatch and the determination of prices in the RTM, assume a loss factor of 1 for DER aggregations across multiple electrical locations. This places the onus on the DER Aggregator to set prices in its Real-Time Market Submissions to account for the network losses for its individual DER customers.

Should small aggregations be treated in the same manner as DSPs for market participation, the technical requirements applicable to these aggregations may require revision to ensure visibility to AEMO as they are rolled-out at scale across the SWIS.

As discussed above, the registration and participation regimes must be designed to enable DER Aggregators' participation for network and market services in a way that does not impose unreasonable costs for market entry. The approach should also avoid the duplication of processes. A simplified approach that avoids registering with both the DMO and the DSO, would establish the requirements for service offering in a single framework, including for testing and certification, thereby accommodating the requirements for service provision as needed. In this way, subject to technical requirements, a DER Aggregator can be selective about which services they provide within that framework.

Question M2: Should energy exported from DER be more explicitly integrated into the WEM?

Following clarification on this question from ETIU, AEMO understands that this question asks whether energy exported from DER devices (such as PVs), which currently represent a reduction on the Notional Wholesale Meter, should be offered and dispatched in the market (i.e. in the same way as energy from Market Participant facilities).

AEMO sees this question linking to the policy position taken on consumer choice, that is, whether consumers should have the option of not joining an aggregation scheme, and if so, whether conditions should apply to the operation of non-aggregated DER devices. An example of a condition may be a limit on the export of energy into the power system under a specified scenario (i.e. at levels beyond self-consumption) to improve 'accounting' arrangements for settlement.

While AEMO supports measures to obtain better metering data and metering infrastructure to separate settlement from the Notional Wholesale Meter, there is no sound justification for *requiring* thousands of sub-10kW generators to be brought into central dispatch. The exception is where those generators elect to participate in the market via a DER Aggregator.

AEMO considers that all new DER devices should comply with the new inverter standards (AS4777, as per Action 1 of the DER Roadmap) and have capability for remote control. The latter includes the ability for the DER device to be curtailed for the purpose of managing system security, as a measure of last resort. However, this is a matter for separate consideration to settlement.

AEMO also notes the Issues Paper's statement that because "a market operator is independent of any market participation, network operator or resource owners... all trading (including any off-market third-party activities) at the distribution level is aligned with the market, and power system security and reliability objectives."⁷ To ensure such 'alignment' AEMO will need sufficient visibility of the activities of DER Aggregators that are not actively participating in market services. This visibility may be enabled through placing obligations on such parties to provide specified information to AEMO (i.e. potentially through registration) or by requiring those activities to be coordinated with, or dispatched by, AEMO.

Monitoring and compliance (DMO Roles and Responsibilities)

Question M3: Monitoring and compliance for participation in energy, capacity and ESS markets need to be considered for aggregated DER. How should aggregated DER be monitored and measured for compliance?

In fulfilment of the WEM Objectives⁸, specifically with respect to encouraging competition among generators and retailers in the SWIS, and to avoid discrimination against energy options, the performance standards of a DER Aggregator (as the 'aggregated DER facility') should, in principle, be the same as those of a registered facility in accordance with the service that the registered facility is providing to the market. However, differential treatment of energy market participants may be warranted in some circumstances, for example, where the participant is sufficiently small in size.

AEMO notes that differential treatment based on the size of the participant is not without precedent in the WEM Rules and would facilitate the energy market participation of a small DER Aggregator. For example, a DER Aggregator of 2 MW comprising aggregated DER across 400 sites. As energy produced at individual sites may be too small to be significant in terms of network constraints, the use of SCADA for real-time operations would likely provide little benefit compared to assuming perfect dispatch compliance. Noting also that that transmission-connected generators are required to have a high standard of metering in terms of resolution, frequency and low-latency.

⁷ Energy Transformation Taskforce (2020), *Issues Paper – DER Roadmap: Distribution Energy Resources Orchestration Roles and Responsibilities*, Energy Transformation Implementation Unit, Department of Treasury, 14 August, p. 26.

⁸ WEM Rule 1.2.1 The objectives of the market are:

- a) to promote the economically efficient, safe and reliable production and supply of electricity and electricity related services in the South West interconnected system;
- b) to encourage competition among generators and retailers in the South West interconnected system, including by facilitating efficient entry of new competitors;
- c) to avoid discrimination in that market against particular energy options and technologies, including sustainable energy options and technologies such as those that make use of renewable resources or that reduce overall greenhouse gas emissions;
- d) to minimise the long-term cost of electricity supplied to customers from the South West interconnected system; and
- e) to encourage the taking of measures to manage the amount of electricity used and when it is used.

Imposing a requirement for SCADA would likely present significant cost challenges for small aggregations of DER. Local metering arrangements might therefore facilitate more efficient outcomes for such DER aggregations, and ex-post metering data may be effective and prove sufficient for compliance purposes. In other cases, some limited higher-speed monitoring may be necessary.

A further question to be explored is the efficacy of the AMI meters and communications infrastructure to collect metered data; noting that the data collected should be sufficient for settlement purposes. One example of a recent change has been the South Australian Government's revised metering arrangements⁹.

Through the VPP trial in the NEM, AEMO's experience has been that non-revenue or 'third-party' metering has been used successfully to verify contingency frequency response performance by DER, and consequently used to determine clawback payments for these services. Through Project Symphony AEMO will be exploring similar approaches to performance verification for DER in the WEM. There may also be providers that can provide metering at sufficient accuracy and allowable error in the measurements required for settlement at an efficient cost. As a result, it may not be appropriate to exclude this as a potential solution in the WEM.

AEMO recommends that these nuances are explored and defined through Project Symphony before a design decision is made on the matter.

Question M4: What performance standards should apply to aggregated DER facilities?

The WEM Reforms are establishing new arrangements for generator performance under a new Chapter 3A and Appendix 12 of the WEM Rules. The new Generator Performance Standards (GPS) regime includes self-monitoring and centralised monitoring to ensure ongoing compliance for those facilities registered for market participation. It must be noted that accreditation for ESS provision in the market is predicated on the registered facility being able to meet the GPS set out in Appendix 12 and having a GPS monitoring plan in place approved by AEMO. The requirements on facilities for the provision of ESS will be located in a separate instrument, that is, a procedure made under Chapter 2 of the WEM Rules.

In fulfilment of the WEM Objectives, specifically with regard to promoting the economically efficient, safe and reliable production and supply of electricity and electricity related services, and avoiding discrimination against energy options, the new ESS accreditation arrangements could be expanded to capture DER Aggregators who register for market participation to provide ESS, and potentially for network support, under the revised registration regime. The performance standards/requirements for the individual DER devices would be covered by the Technical Rules.

It should be noted that the new ESS accreditation regime (and GPS arrangements) will apply to a 'generating unit' at a single location (i.e. behind a single connection point). As mentioned above, the proposed new accreditation rules allow an aggregation of DER under a single DER Aggregator to be registered as a single facility, and for the TNI to be used as the basis for the electrical location. Therefore, consideration needs to be given to how to treat a DER Aggregator comprising many units capable of generation where these units are spread over many connection points located behind a single TNI or spread over many locations on the network.

AEMO notes that the performance standards under the Technical Rules would also apply to DER devices that are not under an aggregation scheme, that is, not under a DER Aggregator registered under the WEM Rules for participation in the market. Furthermore, AEMO notes that the Technical Rules are currently under review; and consideration is being given to aligning (to the extent

⁹ https://www.energymining.sa.gov.au/_data/assets/pdf_file/0005/370607/Draft_Technical_Regulator_Guideline_-_Smart_Meter_Minimum_Technical_Standard_and_Deemed_to_Comply_Wiring.pdf

practicable) performance requirements in the Technical Rules with those of the GPS framework under WEM Rules (including notification to AEMO) for those distribution-connected generators who are participating in the market. The review will also determine the revised requirements for generators not participating in the market and for small generating units.

Question M5: Are any additional arrangements needed to incorporate aggregated DER facilities into the new scheduling and dispatch process (SCED)?

Question M6: Other than for device level communications, what other communication is required to manage aggregated DER? For example, communications between the aggregator and the DSO (Western Power) or AEMO.

Questions M5 and M6 both relate to information requirements and sharing, and systems for communications, and therefore will be dealt with together.

AEMO considers that a strong focus must be given to understanding the information that will be required and the systems needed to enable the automation of data sharing between parties – the DER Aggregator, DSO and DMO. This will be necessary, for example, to support RTM dispatch which occurs seconds before the start of the dispatch interval. The data requirements plus a number of fundamental operating arrangements must first be settled in regard to communicating information between parties before it can be determined how best to embed these requirements and arrangements in the context of SCED. AEMO proposes to undertake this design work through later actions in the DER Participation workstream of the DER Roadmap implementation program.

AEMO notes that among the roles recommended by the Issues Paper for the DMO is the role to¹⁰:

“interface with the DSO to ensure distribution network issues are resolved in an efficient and coordinated manner.”

At a minimum, the DMO will require visibility of the specific resources that the DSO wishes to deploy to resolve network issues (and when they are to be deployed) so that the DMO can schedule and dispatch market resources efficiently, avoiding conflicts. AEMO’s view is that a coordinated single ‘dispatch’ system will reduce operating costs for the operational DER orchestration model, and for DER Aggregators to enter and operate in the market, while also managing potential conflicts. Under this model, the DSO would remain primarily accountable for deploying DER Aggregators to provide network support services, with AEMO’s dispatch systems acting as the conduit to relay the signal to trigger the DER Aggregator to respond.

An iterative and collaborative process for information transfer between the DSO and AEMO (as the DMO and System Manager) will need to be designed to support dispatch and tested through Project Symphony. The process will need to allow for changes to be managed before the final dispatch instruction is issued. Retention of a gate closure period (initially 15-minutes for the first 6-months of the new WEM arrangements) may be the way to manage this; however, any reduced administrative cost (by allowing more time for DSO-DMO back-and-forth) must be weighed against the likely loss of market efficiency (caused by the gate closure window).

Information sharing and communication between the DMO and the DER Aggregator will be vital as well. Consistent with AEMO’s description of the hybrid model above, the role of the Market Operator and its systems would be extended to enable DER participation through a DER Aggregator (i.e. a VPP, third party aggregator or Retailer). Should parties look to access the market and be paid through the services they offer to the market, then they would need to directly engage in a single wholesale platform or interface managed by AEMO. Communications and information requirements

¹⁰ Energy Transformation Taskforce (2020), *Issues paper – DER Roadmap: Distributed Energy Resources Orchestration Roles and Responsibilities*, Energy Transformation Implementation Unit, Department of Treasury, 14 August, p.25.

that apply to Market Participants would need to be extended to DER Aggregators, such as the use of SCADA to support real-time operations.

For the purposes of visibility and ensuring system security can be maintained, communications on 4 second frequency with low-latency would be preferable to allow aggregated DER's participation in the market for ESS provision. Consideration should also be given to any requirement to view the DER Aggregator's sub-second response (as per transmission-connected facilities) in order to demonstrate the DER Aggregator's ability to provide, and be certified for, Frequency Control services.

AEMO agrees that DER Aggregators need to remain accountable for communications and control to DER equipment. This approach places risk with the party that is best placed to manage it and encourages innovation. However, the specific capabilities and requirements for this should be explored through Project Symphony.

Transitioning of passive DER

The Issues Paper suggests that customers may choose not to participate in an aggregation scheme, but to simply use DER for their own needs. AEMO considers that customer choice should be placed at the heart of arrangements to integrate DER, including where the customer chooses not to participate in an aggregation scheme. However, it is also vital to ensure that DER devices that are not enrolled with a DER Aggregator operate in a way that supports power system security.

To encourage customers to join on to an aggregation scheme, a clear design for the scheme and its financial incentives must be communicated so customers can understand the need for, and the benefits from, handing over control of their assets to the DER Aggregator. This is especially important for customers who will be investing in new, or upgraded, DER devices. Otherwise, customers may object to mandatory participation in an aggregation scheme.

Further consideration is therefore required to determine what, if any, conditions should apply to the operation of passive DER that is not aggregated, whether obligations should apply to customers who hold unaggregated DER, and how these conditions and obligations may be applied under the regulatory framework.

It should be highlighted that work is currently being undertaken as part of Action 1 of the DER Roadmap to update AS4777 (inverter standards). Work will also be required to monitor fleet performance to further develop the standard over the coming two years, allowing for a fleet of passive DER that is as prepared as it can be to support system security.

As part of this work, consideration will need to be given to how to manage the situation where most customers prefer not to join an aggregation scheme. For example, whether the Network Operator, either directly or under instruction from AEMO, should be empowered to intervene outside of emergency scenarios to prevent the power system security and/or reliability from being put at risk.

Monitoring and compliance of DER devices

As discussed above, the monitoring and compliance of a DER Aggregator's performance against performance standards is fundamental to facilitating that DER Aggregator's participation in the market. Equally important is the need to identify what arrangements must be put in place for the monitoring and compliance of individual DER devices against prescribed technical requirements and standards, and the party (or parties) on whom responsibility should fall to undertake such actions.

Section 4 of the Issues Paper sets out a list of proposed DSO functions. AEMO supports the DSO being responsible for determining the technical arrangements for the connection of new DER devices and managing the technical and commercial control of DER connections, and notes these responsibilities stop short of managing the ongoing compliance of DER devices after their initial

connection. However it is noted that the discussion with respect to the DSO and monitoring is limited to ‘network monitoring’, specifically, whether there is a need for ‘network monitoring devices at critical points of the network over and above any network visibility provided by advanced meters’¹¹. The network monitoring role does not appear to extend to individual DER devices after they have been connected to the network.

Section 4 also proposes a list of services to the energy system that DER Aggregators might provide from their portfolio of DER supplied under contracts with DER owners. The role of the DER Aggregator is limited to the ‘interface between customers with DER and energy markets’. However, participation in service delivery to the DSO or DMO would require a level of technical performance to provide these services with confidence. AEMO considers that the DER Aggregator is best placed to ensure its aggregated DER portfolio meets the required performance criteria, which may include monitoring and providing information to the DSO and DMO to verify performance. .

Where DER devices are not part of an aggregation scheme, consideration should be given to what extent, if any, those devices must be subject to on-going monitoring and/or compliance to ensure that power system and network security can be managed. The party responsible for such oversight, where required, could be the network service provider. However, the viability and effectiveness of this arrangement should be confirmed through Action 4 of the DER Roadmap.

Control arrangements for security and emergencies

Consideration should be given to requiring that all new DER devices, both covered and not covered under an aggregation scheme be enabled for remote intervention by a responsible party in emergency conditions and where power system security is at risk.

Consistent with the hybrid model articulated above, AEMO (as the System Operator) must be empowered to send an instruction to the DER Aggregator with respect to the operation of its portfolio, and to the DSO with respect to the operation of DER devices not under an aggregation scheme. To enable these arrangements, the DSO must be empowered under the WEM Rules to remotely intervene with non-aggregated DER devices on instruction of AEMO for the purpose of maintaining power system security.

The Technical Rules must also provide sufficient scope to allow Western Power to remotely intervene with non-aggregated DER devices to maintain the security of the network and the power system. AEMO notes that as part of the Technical Rules review the communication requirements and standards for the remote control, monitoring and metering for small generating units was specifically considered. The preferred option saw the Technical Rules providing revised requirements for all generators to be enabled with remote control and monitoring capability with communications and metering standards as acceptable to Western Power. The revised requirements would enable Western Power to activate the remote control capability of the very small generating units where this is required in future.

AEMO supports these proposed changes to the Technical Rules, and suggests that prescription is included in the WEM Rules to require that where Western Power (as the DSO under the WEM Rules) activates remote control as an action taken under the Technical Rules for a prescribed system security outcome, that it must notify AEMO of this action.

¹¹ Energy Transformation Taskforce (2020), *Issues paper – DER Roadmap: Distributed Energy Resources Orchestration Roles and Responsibilities*, Energy Transformation Implementation Unit, Department of Treasury, 14 August, p.23.