

19 February 2021

Ms Anna Collyer  
Chair  
Australian Energy Market Commission  
Sydney South NSW 1235

Level 22  
530 Collins Street  
Melbourne VIC 3000

**Postal Address:**  
GPO Box 2008  
Melbourne VIC 3001

T 1300 858724  
F 03 9609 8080

By online submission ERC0280

Dear Ms Collyer

### **Options Paper – Integrating Energy Storage Systems into the NEM**

AEMO welcomes the opportunity to provide feedback on the AEMC's Options Paper on Integrating Energy Storage Systems in the NEM (Options Paper) published on 17 December 2020.

AEMO supports the AEMC's objective of exploring whether, and the extent to which, aspects of the Energy Security Board's (ESB's) two-sided market high level design could underpin the regulatory arrangements for more effective participation of grid scale and small-scale energy storage systems (ES) and hybrid systems in the National Electricity Market (NEM). AEMO endorses and supports transitioning the NEM toward a two-sided market in which market participants (representing end users and resources) participate in an increasingly active and price-responsive manner.

In addressing the objectives raised in AEMO's rule change proposal, AEMO recognises the need to avoid or minimise regulatory framework changes that may be inconsistent with the direction of the two-sided market. AEMO supports and encourages incremental change and evolution of the regulatory framework – central to this is the need to maintain a framework which is simple, flexible in design for future reforms, provides clarity to market participants over the short and long-term, and delivers operational certainty for AEMO in the exercise of our market and system operator functions.

Option 3 (modifying existing categories) and option 4 (Integrated Resource Provider), are presented as alternative registration and participation models to AEMO's proposed Bi-directional Resource Provider (Option 2). AEMO appreciates the AEMC's invitation for collaboration and feedback on these options and recognises the objectives of presenting these for stakeholder consideration. On review, AEMO considers that, if pursued, modifications and more detailed work to both Options 3 and 4 would be necessary to ensure that the issues raised in AEMO's rule change proposal are addressed, while also avoiding material changes to AEMO and industry participants' systems, procedures, processes and architecture. In particular:

- The classification and dispatch of ES and hybrid systems with two individual DUIDs based on direction of flow at the connection point will introduce a range of operational

challenges, including insufficient information to understand the assets that represent operational uncertainty.

- As AEMO understands the proposal, separating the classification of ‘generation’ and ‘load’ at the connection point appears to limit flexibility in service provision for market participants, has implications for consumer choice, and may create inconsistencies between the obligations of different categories of aggregator participants with like portfolios.
- While AEMO supports ongoing work to explore the long-term concept of a form of scheduling requirements applying to aggregated portfolios, AEMO highlights that the complexities and costs of operating a model where aggregated portfolios are scheduled have yet to be determined, and that a more developed design would be required to enable that work to be considered and implemented into the framework.

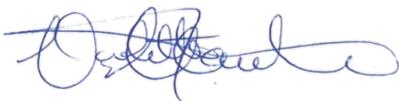
AEMO also supports potential changes to the NER that facilitate any market participant providing services in the short-term, if technically capable of doing so; including clarifying ancillary services provisions and supporting amendments to clarify the definition of load. Any potential changes would need to be subject to a cost and benefit analysis.

Further feedback detailing AEMO’s response to relevant questions is provided in Attachment A.

AEMO is keen to continue to work with the AEMC to identify opportunities to address the issues raised in its rule change proposal, and leverage existing systems and capabilities to deliver other changes considered to be within the scope of the rule change proposal in a manner consistent with the direction of the two-sided market work. Avoiding material changes to processes, procedures and systems, wherever practicable, will likely assist in enabling the outcomes of this rule change and changes to the framework to be implemented in a timely manner (taking account of the regulatory implementation roadmap) and at a lower cost.

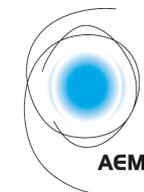
Should you wish to discuss any of the matters raised in this submission, please contact Kevin Ly, Group Manager Regulation on [kevin.ly@aemo.com.au](mailto:kevin.ly@aemo.com.au).

Yours sincerely



Violette Mouchaileh  
**Chief Markets Officer**

Attachment A: AEMO response to Integrating storage – options paper (stakeholder feedback template)



**Integrating storage – options paper: stakeholder feedback template**

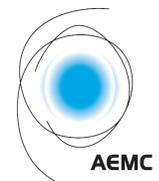
The template below has been developed to assist stakeholders in providing their feedback on the questions posed in this paper and any other issues that they would like to provide feedback on. The AEMC encourages stakeholders to use this template to assist it to consider the views expressed by stakeholders on each issue. Stakeholders should not feel obliged to answer each question, but rather address those issues of particular interest or concern. Further context for the questions can be found in the consultation paper.

Organisation: AEMO  
 Contact name: Kevin Ly  
 Contact details (email / phone): kevin.ly@aemo.com.au

Questions		Feedback
<b>Chapter 1 – Registration and participation framework</b>		
<b>Question 1: Registration and classification (p. 17)</b>		
1	1. Is introducing a new participant category, an Integrated Resource Provider (option 4), to better facilitate entry and participation of storage and hybrid facility, more preferable than modifying existing participant categories (option 3)? Are either option 3 or 4 more preferable to options 1 and 2?	<p><b>SUMMARY</b></p> <p>AEMO considers that it will likely be simpler, clearer and most cost effective to introduce a single participant category for grid-scale energy storage systems (ES) and hybrid systems to ensure all potential combinations are covered, e.g. ES standalone or combinations of ES, generating units and load (hybrid systems). As the two-sided market design is developed to a stage at which market participant categories can be “collapsed” to a single universal or ‘trader’ category with the same generic participation requirements for all market participants, the model proposed for the Bi-directional Resource Provider (option 2), recognising two-way flows in a single dispatchable unit, could equally be used to facilitate that transformation.</p> <p>If the AEMC determines there is a significant issue with introducing a new market participant category, AEMO can see potential in amending the existing Generator category to better recognise and integrate grid-scale bi-directional assets ES (as single dispatchable units) and hybrid systems to address the issues raised in AEMO’s rule change proposal. Further, definitions and classifications associated with Market Customer and Market Small Generation Aggregator (MSGGA)</p>



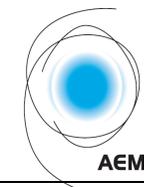
		<p>categories could be amended to recognise the aggregation of bi-directional assets and energy flows.</p> <p>Only two new <b>market</b> participant categories have been introduced since national electricity market (NEM) start, including the MSGA and Market Ancillary Service Provider (MASP). Both are aggregated service providers and were introduced to address retailer competition issues. Under the Wholesale Demand Response (WDR) mechanism the MASP category will be renamed Demand Response Service Provider (DRSP) and a further aggregated service (WDR) is introduced<sup>1</sup>. Based on the information provided in the options paper, and subsequent discussions with the AEMC, AEMO is not able to conclude that either option 3 or 4 is a suitable alternative to address the issues in its rule change proposal. AEMO is concerned about a number of specific elements of both options as currently formulated. At present, the key elements of concern include:</p> <ul style="list-style-type: none"> <li>▪ Adding a new category, the Integrated Resource Provider (IRP), with a view to becoming the future universal category (option 4) – this is linked to the ESB’s two-sided market concept of collapsing all market participant categories that ‘trade’ except the Market Network Service Provider (MNSP)<sup>2</sup>. AEMO does not consider that amalgamating grid-scale and aggregated portfolios will necessarily result in operational efficiencies or National Electricity Rules (NER) simplicity or clarity. AEMO also considers that the fundamental ‘trader of services’ concept is captured in the NER by the defined term – Market Participant.</li> <li>▪ Classifying ‘generation’ and ‘load’ (options 3 and 4) – AEMO understands this seeks to provide a technology-neutral foundation for a service-based drafting concept. The AEMC has indicated that ES should not be defined, but can be adequately recognised by classifying ‘generation’ and ‘load’. This proposition is very different from the premise of AEMO’s rule change proposal, and AEMO considers that the benefits and consequences of the proposed separate classification approach for import and export need further examination and explanation.</li> <li>▪ Dispatch of ES and hybrid systems with two DUIDs for ‘generation’ and ‘load’ at the connection point (options 3 and 4) – this is linked to the ESB’s concept of trading services at the connection point, meaning that market participants would provide energy and FCAS bids and offers at the connection point and NEMDE would dispatch market participants at that point. This change represents a fundamental shift in the way the NEM is operated, raising a number of operating and security concerns, without addressing the issues raised in AEMO’s rule change proposal regarding the operation of two separate DUIDs for ‘generation’ and ‘load’. Key operational concerns include:</li> </ul>
--	--	--



Questions		Feedback
		<ul style="list-style-type: none"> <li>- Reduced visibility and controllability of major hybrid system components required for effective and secure market and system operation.</li> <li>- Limited flexibility of hybrid systems incorporating intermittent generation to offer combined load or generation in energy and FCAS dispatch.</li> <li>- Reduced operational and financial flexibility for market participants of ES and hybrid systems, with increased risk, cost and ambiguity associated with significant disparity in dispatch arrangements between existing categories and a new IRP.</li> <li>▪ The dynamic scheduling approach (options 3 and 4) – this is linked to the concept of services only being provided (and dispatched) at the connection point. While there is insufficient detail to evaluate this concept, at this stage a separate scheduling classification seems impractical to implement or enforce, and unnecessary in the context of the longer term development of the NEM.</li> <li>▪ Aggregated portfolios in dispatch (option 4) – noting the ultimate two-sided market goal of all ‘generation’ and ‘load’ participating in dispatch, moving to this model at this stage is premature. There is significant work to be undertaken to determine how market participants with aggregated portfolios should participate in the NEM. Noting the ESB’s DER workstream is ongoing, the outcome of this work may not necessarily be consistent with option 4, and it is not clear what current issues option 4 seeks to address. It would represent a step change necessitating review of many AEMO procedures, operational practices and systems, which will come at a high cost. In principle, AEMO is also concerned that:             <ul style="list-style-type: none"> <li>- Including aggregated portfolios in dispatch now, in conjunction with the proposal to dispatch at the connection point, will disincentivise active participation of end users and inhibit unbundled service provision behind the connection point. AEMO supports flexible participation models that maximise an end user’s ability to choose the service provider.</li> <li>- Market Customers provide services from similar assets behind connection points but would not be subject to the same obligations as IRPs with aggregated portfolios. To avoid creating perverse incentives between categories, the AEMC will need to identify a plan to address this or articulate why a difference should exist.</li> </ul> </li> </ul>

<sup>1</sup> The Market Stand-alone Systems Resource Provider will also be included in the NER, however that participant category will not participate in the NEM.

<sup>2</sup> It appears the MNSP has not been considered. If a technology neutral approach is the objective and technical requirements are considered unimportant, then there should be no reason to omit this market participant category



		<p>AEMO has provided more information regarding these points in the sections below.</p> <p><b>DETAILED REASONS</b></p> <p><b><i>Adding a new category with the intent of this being the future universal category (option 4)</i></b></p> <p>AEMO does not support option 4 as proposed in the Options Paper. AEMO does not consider that the introduction of a single registration category for participants with grid-scale and aggregated portfolios, at this stage, can deliver simplification of the registration process or clarity in the NER. Particularly as an interim step, it will involve a high degree of complexity and detail in rule drafting to avoid creating more ambiguity both in terms of NER obligations and AEMO's processes.</p> <p>The 'shared' aspect between existing registration categories relates to collecting relevant organisational information. Streamlining this to avoid unnecessary duplication is within AEMO's control and is already an AEMO project. Increasingly, however, market participants are seeking to register with special purpose companies, or as trustees of trusts for different projects, or specific market service offerings. This makes it less likely that organisational information will be common to market participants across different participant categories.</p> <p>Necessarily, the information AEMO collects at registration is different for grid-scale systems and aggregated portfolios. The information that needs to be obtained at registration to meet NER requirements is very different, and it should be noted that there are much lower technical obligations and requirements on non grid-scale market participants. Aggregated portfolios, on the other hand, require specific AEMO and NSP systems and processes to support their ongoing management as they create or transfer connection points over time or seek to provide additional services. Given the potential contribution of aggregated services in the distribution network contributing to network operation challenges, this is something that the ESB's demand-side participation arrangements will need to explore.</p> <p>Unless all market participants are subject to the exact same technical and participation requirements, e.g. performance standards, dispatch, dispatch conformance and compliance, constraint formulation, and forecasting obligations, ramp rates, combining their participant categories at this stage will not deliver measurable efficiency improvements or a clearer approach for market participants. Given the current 'light' regulation approach for aggregated portfolios, it seems unlikely that grid-scale NER obligations would be imposed on market participants with aggregated portfolios, or vice versa – nor does AEMO consider that would be appropriate. The AEMC's options paper and ESB's work acknowledge that aggregated portfolios are focussed on flexible participation models including a "scheduled-lite" approach for DER resources. The</p>
--	--	---



Questions	Feedback
	<p>implication is that different requirements will continue to apply to market participants with grid-scale assets and aggregated portfolios.</p> <p>It is therefore difficult to ascertain measurable benefits of this aspect of option 4 at this stage in the evolution of the market. AEMO considers it more useful to consider these types of changes through the ESB’s demand-side participation workstream in consultation with stakeholders or in a separate AEMC review or rule change proposal.</p> <p>AEMO’s view is that it is necessary to take practical and achievable steps to increase efficiency and clarity of the participation framework. These should include NER amendments to recognise the bi-directional energy flows already occurring at Market Customers (retailers) and MSGA’s connection points to facilitate participation and reduce the immediate issues in the market (e.g. ambiguity over Market Customers providing FCAS on the import and export-side, and MSGAs seeking to classify their connection points as ‘loads’ to provide FCAS). AEMO identified the nature of these changes in its submission to the AEMC’s consultation paper.</p> <p>An alternative option to introducing a new participant category is to amend existing participant categories to resolve the issues identified in AEMO’s rule change proposal. However, further development work will be required on option 3 to avoid the issues discussed in this submission associated with concepts that also appear in option 4. If the AEMC prefers to focus on option 3, AEMO is keen to work with the AEMC to achieve the outcomes of simplifying the NER to ensure AEMO can simplify the registration process.</p> <p><b><i>Classifying ‘generation’ and ‘load’</i></b></p> <p>Options 3 and 4 both suggest that ‘generation’ and ‘load’ would be classified at the connection point for grid-scale and aggregated portfolios. It seems that this is intended to replace the need to define or describe ES because that would not be considered ‘technology neutral’.</p> <p>AEMO does not support classifying ‘generation’ and ‘load’ at the connection point, for several key reasons:</p> <ul style="list-style-type: none"> <li>▪ The key issues identified in AEMO’s rule change proposal stem from the fact that the NER currently define load and generation as separate and binary concepts when the physical reality is many connection points have bi-directional flows. A key objective of the proposal is to recognise this reality in the NER. For ES, this includes recognition of their capability to transition</li> </ul>



Questions	Feedback
	<p>between import and export flows during a dispatch interval (potentially multiple times). The proposed solution in options 3 and 4 suggests that the issues that AEMO has raised, following significant consultation with industry, are not material enough to be addressed in this rule change.</p> <ul style="list-style-type: none"> <li>▪ Similarly, as the AEMC recognised in the WDRM context, market services may be provided using both import and export capabilities at a connection point, potentially during the same interval (i.e. moving through zero to provide the service). Entrenching separation between import and export in the classification framework seems to reduce the flexibility to provide such services.</li> <li>▪ For energy market purposes the NER already address import and export flows at a connection point with no need for separate classification, with settlements based on net energy flows.</li> <li>▪ It will be necessary for the NER to recognise ES (or inherent ES characteristics) in some way, in order to attach appropriate NER requirements to the registered participants who use them to provide energy or services. There are some fundamental differences in capabilities that require broad asset types to be acknowledged in the regulatory regime for this purpose – in AEMO’s view this does not offend the general principle of technology neutrality.</li> <li>▪ It is not clear how two different classification approaches (the import/export concept and the current generating unit and load classification) can co-exist in the NER, even as an interim or transitional step.</li> </ul> <p><b><i>Dispatch of ES and hybrid systems with two DUIDs for ‘generation’ and ‘load’ at the connection point (options 3 and 4)</i></b></p> <p>Options 3 and 4 intend that trading of energy and other services occurs at the connection point. This change would require market participants to provide energy and FCAS bids and offers at the connection point and for NEMDE to dispatch the ‘generation’ and ‘load’ (import and export) at the connection point. While AEMO understands the ESB’s concept, the tangible benefits of making this change need to be articulated, particularly at this time or as an interim step, and the detailed business and system impacts identified. AEMO has identified some key impacts below, which need to be considered and worked through with the AEMC and stakeholders before a change of this magnitude could be implemented. It should also be noted that under option 2 (Bi-directional Resource Provider), AEMO would be able to consider how hybrid systems could aggregate in</p>



Questions	Feedback
	<p>dispatch. This would allow a staged implementation approach, that is, focus on getting the fundamentals in place and then work out the more complex arrangements.</p> <p><i>Constraints</i></p> <p>Constraint formulation is a complex task, which has grown more difficult in the current power system transformation as new technologies, issues and interactions continue to emerge at an increasing rate. Constraints are applied by AEMO to manage power system limitations and FCAS requirements and are an input into NEMDE. Constraints are used to manage the variation in output that can be delivered for a generating unit or load, ES currently being treated as both. Network constraints represent a specific power system limitation or, thermal limits, voltage stability, transient stability, network support and control. Other constraints are applied by AEMO to manage the dispatch of individual generating units e.g. contingency management, discretionary limits, directions, and dispatch non-conformance.</p> <p>For hybrid systems, the application of constraints at a single ‘generation’ and a single ‘load’ DUID at the connection point would not represent the individual constraints appropriately and cause significant complexity and work in constraint formulation and managing those constraints. This is because the assets behind the connection could behave differently from each other. This could cause operational issues when constraining units on or off. AEMO considers that there are specific power system concerns where it is inappropriate to manage these at the connection point, e.g. system strength issues. For example, a hybrid system that includes wind turbines and a battery, if under certain outage conditions AEMO needs to limit the number of wind turbines and their MW (because this is the asset causing the power system issue) and the battery is not required to be curtailed, net connection point flow constraints could not be built to do this. Additionally, AEMO may need the battery to respond in a different way to the wind turbines for a certain service.</p> <p>Market participants who are aggregating units in a hybrid system must also be aware of the benefits of doing so and the technical impossibility of disaggregation.</p> <p>Constraint formulation at the connection point level for all grid-scale hybrid systems will be a complex and inevitably costly market reform. AEMO is not able to assess or estimate the impact and cost of this change.</p> <p><i>System security and managing power system operation</i></p>



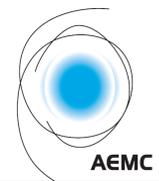
Questions	Feedback
	<p>AEMO assumes that market participants would need to manage their own single ‘generation’ and ‘load’ DUIDs. This would require all market participants to provide their own forecasts for the hybrid facility for the ‘generation’ and ‘load’. It should be noted that for operational purposes AEMO will continue to forecast these hybrid systems and underlying units consistent with our consensus forecasting approach<sup>3</sup> and to benchmark and verify participant forecasts. AEMO will need to collect information on the assets behind the connection point for real-time operations as well as forecasting and forecast validation purposes, over different time horizons. Also, it will continue to be more useful to collect disaggregated information on the assets within a hybrid system, to understand potential temporal energy, capacity, and technical constraints. Disaggregated asset information allows for more reliable measurement and forecasting, and can be aggregated where it is useful to do so. If only aggregated information were collected, the data cannot be reliably disaggregated.</p> <p>AEMO needs to understand the assets (at the terminal level) that represent greater operational uncertainty. Where a hybrid system includes a variable renewable resource, AEMO will need to understand the relative participation of these assets within the hybrid system for reliability assessment purposes, this includes the availability of inverters and turbines.</p> <p>AEMO would find it extremely difficult to manage power system security if required to manage some ES and hybrid systems at the connection point level while managing existing generating systems and ES at the asset level. When power system events occur, having multiple approaches will add unnecessary complexity. Aggregations at the connection point level make it more difficult to understand what a market participant can deliver or reduce, which could compound power system security issues, e.g. how will AEMO know which underlying asset to constrain if dispatch only occurs at the connection point level.</p> <p><i>FCAS</i></p> <p>Typically, NEMDE dispatches the energy and FCAS at the terminal level, which is measured by SCADA (4 second data) for the slow and delayed services and by high speed meters for the fast services. The market ancillary service specification (MASS) indicates that the power flows can be measured at or close to the relevant connection point. If measurement occurs at the terminal level it does not need to account for the losses between the terminal and connection point. If this is</p>

<sup>3</sup> Consensus forecasts are created by combining, comparing and contrasting several forecasts.



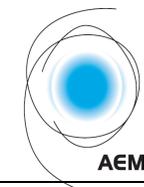
Questions	Feedback
	<p>moved to the connection point, the market participant will need to account for the losses between the terminal and connection point and bid or offer accordingly. While NEMDE would be able to handle this, there are several aspects that need to be worked out including:</p> <ul style="list-style-type: none"> <li>▪ How market participants will handle the losses for dispatch purposes.</li> <li>▪ How AEMO would use the data at the connection point and compare the enablement amount from NEMDE.</li> <li>▪ The impact on AEMO’s systems and processes.</li> </ul> <p>If a hybrid system includes wind turbines and a battery and is treated as a single DUID, there is a need for a margin of safety to be incorporated in the FCAS trapeziums to cover forecast uncertainty of the wind turbines. The hybrid system would not be able to operate at its maximum possible power whenever it is enabled in any of the FCAS markets<sup>4</sup>. This is likely to limit the incentive for a market participant to dispatch a hybrid system because an individual battery that is currently a scheduled generating unit does not need a forecast error margin to be calculated in its dispatch offer.</p> <p>FCAS trapeziums would need to be developed to describe the FCAS capability of a hybrid facility at the connection point, instead of the individual asset terminal level. This would be a complex task and would need to vary for different hybrid facilities depending on the assets in that facility.</p> <p><b><i>The dynamic scheduling approach (option 3 and 4)</i></b></p> <p>AEMO understands that the concept of dynamic scheduling refers to a market participant’s ability to potentially switch between a scheduled and semi-scheduled unit classification at which time the corresponding NER obligations are to be applied. The AEMC’s Options Paper suggests this concept as a potential way of dealing with DC-coupled hybrids and to address the variability associated with a hybrid system’s combination of load, generating units and ES under Options 3 and 4. Further, the AEMC suggests that dynamic switching could occur based on a dynamic operational threshold such as “time and/or energy storage state of charge”.</p> <p>AEMO notes that the AEMC is currently consulting on a proposed rule change to amend semi-scheduled generator dispatch obligations so that, subject to energy resource availability, they</p>

<sup>4</sup> Refer to section A3.4 of the Hornsdale Wind Farm 2 FCAS trial for more information on the FCAS headroom calculation



Questions	Feedback
	<p>would have the same obligations to comply with dispatch targets as scheduled generators<sup>5</sup>. The merits of creating special scheduling arrangements and additional conditions specific to hybrid systems need to be carefully assessed, this should include the legacy it will leave as hybrid systems become a prevailing part of the energy supply mix. The dynamic scheduling obligations on a market participant as described by the AEMC might extend to an obligation to follow dispatch targets, based on available state of charge in batteries associated with the hybrid system. In contrast, a semi-scheduled generator’s obligations are subject to energy resource availability. As an intermittent generating unit’s output is not readily predictable and a battery’s state of charge is, the relationship between semi-scheduling and dynamic scheduling requires further explanation.</p> <p>AEMO’s powers to declare a generating unit as non-conforming to dispatch instructions need to be considered. From a dispatch and pricing perspective, NEMDE does not distinguish between scheduled and semi-scheduled generating units. Currently, dispatch conformance monitoring for semi-scheduled generators is limited to semi-dispatch intervals only and determined by processing the output from the NEMDE solution accounting for various factors including network constraints. It is unclear how a dispatch conformance monitoring approach is to be applied under the dynamic scheduling proposal. Two other issues require further consideration in any possible dynamic scheduling concept:</p> <ul style="list-style-type: none"> <li>▪ Batteries operating in the NEM do not always (and in some cases, rarely) use energy dispatch instructions to charge and discharge. Instead, the action of regulating frequency charges and discharges the battery independently of its energy dispatch instructions.</li> <li>▪ The current FCAS market design allows for co-optimising between energy and FCAS dispatch. This uses a trapezium to describe the trade-off between energy and each service. AEMO is concerned that dynamic scheduling may require switching between different trapeziums for hybrid systems based on a unit’s classification dependent on state of charge. This can’t be implemented with the current optimisation technology and requires further clarification of the proposed design.</li> </ul>

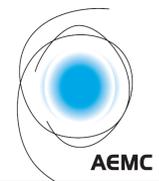
<sup>5</sup> Available on the AEMCs website. Rule Change: Semi-scheduled generator dispatch obligations. AEMO understand the draft rule amends the NER to require semi-scheduled generators to meet a MW dispatch target (for a non-semi-dispatch interval) or cap (for a semi-dispatch interval) subject to variations in resource availability.



		<p><b>Aggregated portfolios</b></p> <p>Under option 4, AEMO understands that market participants with aggregated connection points comprising 'exempt' ES and hybrid systems would register as an IRP and participate in dispatch having classified two separate DUIDs for 'generation' and 'load' at each connection point (this is also suggested for option 3). Both options 3 and 4 effectively require that energy and FCAS can only be provided by the financially responsible market participant for each of the connection points in the aggregation. Under option 4, the AEMC would not allow the MSGA to classify ES and provide FCAS.</p> <p>If this is to be the universal model, it seems inconsistent with the third-party aggregator models that have been developed in the NEM through the MASP and DRSP mechanisms. Additionally, under this approach, MSGAs would continue to be excluded from FCAS markets. These options will result in a reduction in flexible market participant trading models and, in turn, less competition and choice for consumers. By inhibiting unbundled service provision behind the connection point, active participation of end users is likely to be disincentivised.</p> <p>Currently, market participants who are aggregators and are financially responsible for connection points (Market Customers (retailers) and MSGAs) classify those connection points with only one NMI classification (e.g. SMALL, LARGE or GENERATR). Options 3 and 4 would require the creation of a second 'dummy' NMI at each connection point where an ES or a hybrid system is connected. This is a significant change that is not necessary for efficient system operation or market settlement. It would require costly system, procedure and process changes by AEMO and LNSPs, including in relation to metering, MSATS and network fee allocations. Moreover, creating this artificial separation would exacerbate the issues raised by AEMO in its rule change proposal. AEMO encourages the AEMC to seek more information from the LNSPs about the impact of this design element on their systems and processes.</p> <p>Option 4 (and elements of option 3 as currently proposed) would:</p> <ul style="list-style-type: none"> <li>▪ Increase the differences between existing participant categories and the IRP, despite the existence of similar assets at their connection points. Although not acknowledged in the NER, many Market Customer load connection points have 'exempt' ES and generating units behind the meter. Option 4 would result in unequal treatment of 'exempt' ES and hybrid facilities between registered participant categories. Similarly option 3, by suggesting 'light' scheduling</li> </ul>
--	--	---

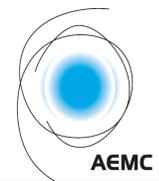


Questions	Feedback
	<p>obligations for MSGAs, does not indicate any expectations for Market Customers who also have significant 'exempt' ES in their portfolios.</p> <ul style="list-style-type: none"> <li>▪ Increase the incentive to have separate connection points for the same small site. This may occur because treatment of 'generation' and 'load' at the connection point assumes that all load and generation is controllable, this is not always the case in a hybrid system, and rarely to the same extent. If there is uncontrollable load at the connection point, then market participants would find alternative ways of avoiding participation in dispatch, e.g. by creating another connection point or registering as a Market Customer.</li> <li>▪ Be a large step change that will necessitate review of all AEMO operational practices and systems. There would need to be a business impact assessment to determine the impact and cost. At a high level, there is significant effort to identify areas that will need to be uplifted to cater for aggregated portfolios and this will be required to manage more 'active' participants and data. This will include uplift of systems, operational documents and practices, and likely increases in staff numbers for education and account management.</li> </ul> <p>Supported by a range of state-led DER initiatives, the growth of small-scale ES and other DER across the NEM by end users is forecast to continue. The technical capabilities and characteristics of small-scale ES, being both controllable and responsive to market price, suggest that all market participants who use small-scale ES to provide energy and ancillary services will have a similar level of capability to participate in the market in a more visible way. AEMO therefore considers that the same obligations should apply to all market participants offering services based on the same capabilities. Designing an appropriate participation model for aggregated portfolios needs to also consider that these will include retail customer connection points that have loads or generating units that may not be controllable.</p> <p>Determining how aggregated portfolios should participate in scheduling and dispatch and how existing or new NER obligations are to apply involves a significant body of work. This includes detailed solutions and cost benefit analyses to identify which real and emerging issues need to be addressed by the regulatory framework, and how market participants with aggregated connection points can most efficiently offer energy and services in the NEM to maximise consumer benefits.</p> <p>AEMO notes that the ESB is currently working with stakeholders through its demand side participation initiatives to identify whether a scheduled-lite approach is appropriate to facilitate participation of these resources, and a clear transition path is expected to be identified through these ESB workstreams.</p>



Questions		Feedback
		<p>In the interim, although not AEMO’s preferred approach, existing categories can potentially be adapted to deal with the principal issues raised in the rule change proposal relating to bi-directional flows, for ES and hybrid systems in grid-scale and aggregated portfolios.</p> <p>AEMO considers it could be appropriate to ‘collapse’ participant categories that have significant overlap of roles, requirements and responsibilities, once those requirements have been clarified.</p>
<b>Question 2: Classifying MSGAs (p. 18)</b>		
1	<p>Do you agree that, if an Integrated Resource Provider category (option 4) is established, battery aggregators should use that category and MSGAs should not be allowed to classify storage units exempt from the requirements to register as a Generator? And in that case, should the current arrangements regarding the provision of market ancillary services by MSGAs be maintained?</p>	<p>Refer to AEMO’s response to question 1.</p> <p>Consistent with the ESB’s Directions Paper (January 2020) supporting the development of flexible trading models<sup>6</sup>, AEMO considers that the NER should be amended to clarify that an MSGA can classify small generating units and ES and, if technically capable, the assets at that connection point be allowed to provide FCAS or other services from both the import and export side. However, the AEMC would need to consider the costs and benefits of MSGAs providing FCAS. AEMO sees this change as consistent with the objectives of the two-sided market workstream that supports end user choice, facilitates participation and enhances competition in the NEM.</p> <p>AEMO also considers that it would be efficient and cost effective to make these changes at the same time as implementing AEMO’s proposed rule and the ancillary services changes identified in AEMO’s submission to the AEMC’s consultation paper.</p>
<b>Question 3: Existing storage participants (p. 19)</b>		
1	<p>Should existing storage participants be transitioned to a single participant category (as they are currently registered as both a Market Generator and Market Customer)?</p>	<p>AEMO considers that market participants with grid-scale ES or hybrid system should be able to choose if they transition to a single participant category.</p>

<sup>6</sup> ESB, Post-2025 Market Design Directions Paper, January 2021, p. 73. See: <https://esb-post2025-market-design.aemc.gov.au/32572/1609802925-p2025-january-directions-paper.pdf>



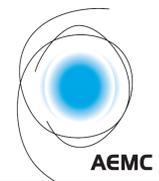
Questions		Feedback
<b>Question 4: Scheduling of hybrid facilities (p. 20)</b>		
1	What proportion of a hybrid facility's sent-out generation capacity would need to be dispatchable for the whole of the hybrid facility's sent-out generation to be able to follow dispatch instructions, under a single DUID?	No comment.
2	Would a dynamic approach to scheduling obligations, for example shifting between scheduled and semi-scheduled obligations based on the state of charge of the storage unit, be appropriate, and how should this operate?	<p>AEMO understands that the concept of dynamic scheduling refers to potentially switching between scheduled and semi-scheduled unit classifications and obligations. The AEMC's options paper identifies this as potential way of dealing with DC-coupled hybrids and, for option 3 and 4, the variability in a hybrid facility's combination of load, generating units and ES. Further the AEMC suggests that switching could occur based on a dynamic operational threshold based on "time and energy storage (although not defined). Question 4 also indicates that the AEMC is considering this approach for hybrid systems.</p> <p>Based on the information provided on this approach, AEMO does not consider this to be a practical solution and the benefit of this change needs further consideration. Creating special arrangements and conditions needs to be considered further, particularly the legacy it will leave as hybrid systems become the prevailing part of the supply mix. Further discussion of the potential issues involved in a dynamic scheduling approach is included in AEMO's detailed response to Question 1.</p>
3	Could the same approach be taken to scheduling load where storage is added to a Market Customer's site, or should different considerations apply?	Refer to AEMO's previous comment.
<b>Question 5: Number of price bands (p. 21)</b>		
1	Do you agree that 20 price bands would be appropriate for grid-scale batteries or would another number of bands be more appropriate?	AEMO could implement 20 or 10 price and quantity bands for ES as a single classification (DUID). The number of price and quantity bands should not be considered as a material driver for retaining separate classifications, and for implementing the aggregated directional classification proposed in

Questions		Feedback
		options 3 and 4. AEMO's proposed rule is for ES to be treated as a single asset (not as 'generation' and 'load') and participate in dispatch with a single DUID.
<b>Question 6: Dispatching hybrid facilities (p. 21)</b>		
1	Are there certain configurations of hybrid facilities that cannot, or should not, be dispatched at a single connection point?	Refer to AEMO's response to question 1. AEMO notes that hybrid systems are developing and there will be many different scenarios, AEMO's proposed rule (that is, proposed clause 3.8.3) would allow for market participants to choose to aggregate their dispatchable assets. AEMO considers that this developing area requires the NER to allow market participants the flexibility to choose to operate in a manner, instead of being required to aggregate at the connection point, that best suits their business model.
2	What benefits are achieved by dispatching a hybrid facility at a single connection point, and what issues arise?	As noted, mandatory dispatch at a connection point is a significant change for market participants and AEMO. Options 3 and 4 would require dispatch at the connection point, this will bring operational challenges particularly if different obligations apply to existing grid-scale systems under separate classification systems. When there are power system challenges, AEMO considers it would be difficult to understand what can be expected to be delivered from the assets within the hybrid and what it can direct. Having two, perhaps even three processes (e.g. with aggregated portfolios) would be very difficult to manage at times when there are power system security issues.
<b>Question 7: Performance standards (p. 22)</b>		
1	What issues may arise if performance and access standards are set at the connection point for hybrid facilities? Would these standards need to be amended to provide appropriate flexibility for hybrid facilities?	Performance standards are currently set at the connection point. AEMO's rule change proposal identifies that performance standards are currently based on Registered Participant category. The performance standards for Customers are generally less onerous than for Generators, and in many respects are not mirror image obligations. It follows that the NER does not provide for suitable performance standards for ES, which comprise equally dynamic and controllable capacity for both export and import. This gap must be addressed and should not depend on the Chapter 2 participation model selected. In the absence of defining ES (or two-way/bi-directional units), the AEMC will need to consider how best to draft appropriate performance standards to address ES capability.

Questions		Feedback
<b>Chapter 3 – Recovery of non-energy costs</b>		
<b>Question 8: Options for the recovery of non-energy costs (p. 27)</b>		
1	Which option do you consider to be the most appropriate for the recovery of non-energy costs from market participants? Please provide detail on why it would be the most appropriate option.	<p>AEMO considers that calculating non-energy cost recoveries based on consumed and sent out energy flows for all relevant market participants results in a fair treatment for all market participants. It will also resolve a number of issues caused by Market Customers having connection points with bi-directional energy flows, including:</p> <ul style="list-style-type: none"> <li>▪ Eliminating the need for temporarily substituting AGE values where a regional demand of less than 1MWh occurs, as proposed in AEMO's recent rule change on this issue</li> <li>▪ The Market Customer non-energy cost recovery market flooring issue</li> <li>▪ The inequity involved in fewer Market Customers bearing a disproportionately larger share of non-energy costs if they have fewer connection points with non-market generation behind the meter.</li> </ul>
2	Are there any other factors the Commission should consider when deciding how non-energy costs should be recovered from market participants?	No further comment.
3	Are there any implementation issues the Commission should consider?	As outlined in AEMO's rule change proposal, AEMO is only able to implement option 2 once the Global Settlement rule comes into effect on 1 May 2022, which makes the consumed and sent out energy metering data available to AEMO.
<b>Chapter 4 – Additional issues relating to storage</b>		
<b>Question 9: Network service provider connection points (p. 34)</b>		
1	Do you support the solution outlined in this options paper for resolving the potential issues with establishing standards for NSP owned energy storage?	AEMO does not require any additional role in the determination of performance standards for NSP-owned and operated ES beyond its current advisory matters. AEMO does not envisage that it would be a party to a proxy 'connection agreement'. This is not necessary for Network Service Provider (NSP) owned/operated ES. It is in the NSP's interest to ensure that ES performance



Questions		Feedback
		<p>standards are consistent with achieving the NSP’s network performance standards, which feed into the system standards.</p>
2	<p>If not, do you consider there to be other potential solutions for resolving this issue?</p>	<p>To restate the issue, it arises from the NER requirement that the performance standards for a generator, customer or MNSP must be recorded in a <i>connection agreement</i>, and the access standards in the NER schedules are largely centred on performance at a <i>connection point</i>. The definitions of both terms rest on the concept of an enduring physical interface between a network and the facilities of another person, and the associated provision of network services by the NSP to that other person across the physical interface. By definition, a commercial arrangement between an NSP and another person appointed (for example) to trade the market services provided by an NSP owned/operated battery is not a connection agreement.</p> <p>To remove the need to construct an artificial connection agreement between the NSP and the person who will be the registered market participant for an ES that is owned and operated by the NSP itself, AEMO suggests that in such cases the NER allow for the performance standards to be documented and submitted to AEMO for registration independent of a connection agreement negotiation process. Submission would follow the usual AEMO approval process in respect of AEMO advisory matters.</p> <p>As a related matter (to be considered for future two-sided market reviews or rule changes), the ongoing reliance on the connection agreement causes increasing gaps in the matrix of obligations necessary for the effective functioning of both network and market operations relating to aggregated portfolios and a two-sided market ‘trader’ services model, in two main ways:</p> <ul style="list-style-type: none"> <li>▪ Obligations to observe performance requirements are placed on market participants (e.g. retailers and other aggregators) who will likely change over time and will not be parties to the connection agreements in which those requirements are documented.</li> <li>▪ The aggregation of individual connection points to provide markets services may create a need for additional NSP requirements that cannot practically be provided for in the connection agreement framework.</li> </ul>



Questions		Feedback
<b>Question 10: DC coupled systems (p. 38)</b>		
1	What capital, operational or efficiency benefits do DC-coupled systems provide participants and the NEM as a whole, and how might these benefits help consumers in line with the NEO?	No comment.
2	Do you support amending the NER to permit the registration and operation of DC-coupled systems? If so, how should they register and operate?	These are hybrid systems and should be treated as such. AEMO considers that DC-coupled batteries and intermittent generation systems are likely to be sized in such a way as to be controllable and could participate in dispatch as a scheduled unit. The AEMC may need to consider if specific compliance arrangements are justified and how these fit with the technology neutrality concept.
<b>Question 11: Provision of ancillary services (p. 40)</b>		
1	Do you support AEMO's proposal to redraft ancillary services provisions in Chapter 2 of the NER to make it more consistent with the services approach to regulation currently being considered by the ESB's two-sided market work? Please explain why or why not.	<p>AEMO's suggested approach is a relatively minor change that seeks to facilitate greater FCAS participation for all relevant market participants. Once the necessary NER changes are made, AEMO could implement this following a Market Ancillary Service Specification (MASS) consultation. This can be achieved by clarifying the current NER without the need for substantial drafting changes, that is, they are specific to Chapter 2 only.</p> <p>While AEMO considers this approach is consistent with the ESB's two-sided market principles because it facilitates greater participation, it does this at a relatively low implementation cost for relevant market participants and without the need for significant redrafting of Chapter 2 and other NER chapters. AEMO considers this change can be made to facilitate participation and is not dependent on option 2, 3 or 4. However, if the NER intent is for Market Customers to have connection points with bi-directional energy flows (which is already the case), AEMO considers the definition of load should be amended to reflect the physical flows and this would enable AEMO's MASS to reflect this too without any interpretative issues.</p>