AEMC

RULE

Australian Energy Market Commission

OPTIONS PAPER

NATIONAL ELECTRICITY AMENDMENT (INTEGRATING ENERGY STORAGE SYSTEMS INTO THE NEM) RULE 2021

PROPONENT
AEMO

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ABOUT THE AEMC

The AEMC reports to the Council of Australian Governments (COAG) through the COAG Energy Council. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the COAG Energy Council.

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1 INTRODUCTION

1.1 Why are we consulting with you?

Energy storage facilities, including hydro and batteries, are playing an increasingly important role in our energy system. The regulatory framework needs to change to reflect this. The Australian Energy Market Commission (Commission) is considering a rule change request from the Australian Energy Market Operator (AEMO) that seeks to amend the National Electricity Rules (NER) to support the participation of energy storage systems in the national electricity market (NEM).

On 20 August 2020, the Commission published a consultation paper seeking stakeholder feedback on the issues raised by AEMO in its rule change request. Stakeholders had mixed views on the best solution to deal with the issues AEMO identified and a number raised the link between this rule change and the Energy Security Board's (ESB) two-sided market work in the post-2025 market design project. AEMO also raised further issues relating to storage in its submission, on which stakeholders have not yet had an opportunity to comment.

Because of this feedback and the link with the ESB's two-sided market project, the Commission is seeking to consult further on several issues, including:

- *Registration and participation*: The Commission is considering four options for how storage and hybrid facilities register and participate in the NEM. These cover a spectrum of options ranging from no change to more significant changes that attempt to move the market towards the trader-services model proposed in the two-sided market project.
- *Scheduling, dispatch, and performance standards*: How should generation and load from storage and hybrid facilities be scheduled and dispatched, and where should performance standards be set: at the connection point or the asset level?
- *Non-energy cost recovery*: How should non-energy costs be recovered from all market participants, including storage and hybrid facilities?
- *Additional storage-related issues raised by AEMO in its submission to the consultation paper:*
  - connection issues arising where the owner of a storage system is also the local network service provider
  - suggestions for simplifying the ancillary services provisions in the NER
  - opportunities to clarify how DC-coupled systems should register and participate in the NEM.

1.2 Context for this options paper

In response to the consultation paper on this rule change, the Commission received 38 submissions. The majority of stakeholders are generally supportive of the main objectives of the rule change request, which include:

- removing barriers to storage participation and clarifying how hybrid facilities should register

- creating a level playing field between different technologies and participants in the NEM.

However, stakeholders had generally mixed views as to the best solutions to resolve the issues raised. A number of stakeholders noted a preference that any changes align with other market reforms, in particular the ESB's two-sided market initiative, under the post-2025 market design program. The two-sided market initiative is further outlined in Section 1.1. A key objective of the ESB's two-sided market design is to make it easier for participants to enter the market and offer innovative energy services to consumers. This necessitates the development of a technology-neutral market design for the NEM and emphasises NER obligations being placed on services rather than participant categories or technologies.

As discussed in the consultation paper on this rule change, AEMO's rule change request proposes a solution that would continue the current practice of attaching obligations to participation categories and technology types or assets. AEMO did not reference the two-sided market initiative in its rule change request, simply because its request (submitted in August 2019) predated the ESB's post-2025 market design program. The Commission has granted an extension of time for this rule change to allow further engagement on alternative solutions that better align with the two-sided market design.[1]

The next sections in this chapter provide:

- an outline of the two-sided market reforms and its relationship with this rule change to provide context for the discussion on the issues
- the summary of issues and stakeholder feedback that have triggered the need to engage further on the alternative options presented in chapters 2 and 3
- a brief description of the additional storage-related issues covered in chapter 4.

Chapter 2 presents and seeks feedback on alternative solutions for how storage and hybrid facilities could register and participate in the NEM.

Chapter 3 presents and seeks feedback on an alternative solution for how non-energy costs could be recovered from all market participants.

Chapter 4 provides an overview of new issues AEMO raised in its submission to the consultation paper, outlines possible solutions and seeks stakeholder feedback on these.

This paper seeks to engage on two of the issues raised in AEMO's rule change request and only provides a summary of these issues and stakeholder feedback. More detail on the issues and solutions proposed by AEMO can be found in AEMO's rule change request and the Commission's consultation paper.[2]

This paper does not represent formal Commission views. The Commission has not yet reached a decision to rule in or rule out any option in this paper or previously engaged on in the consultation paper.

Submissions to this options paper will be open for a period of eight weeks and will close on **11 February 2021**.

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1 The date to publish the draft determination has been extended to 29 April 2021. You can find the Notice of extension on the project page here.

2 You can find he rule change request and consultation paper on the project pager here.

You must lodge written submissions to this options paper via the Commission's website. To lodge a submission, please:

1. refer to the submission template on the project page at https://www.aemc.gov.au/rule-changes/integrating-energy-storage-systems-nem
2. complete the submission template (answering the questions you want to respond to) or draft a submission using your own preferred format
3. access the 'lodge a submission' webpage here: https://www.aemc.gov.au/contact-us/lodgesubmission
4. provide your details, noting the project name and reference number:
   - Integrating energy storage systems into the NEM
   - ERC0280
5. upload your completed submission
6. if using the submission template, also upload a signed and dated cover letter on company letterhead.

The Commission's guide for making submissions is at:
https://www.aemc.gov.au/ourwork/changing-energy-rules-unique-process/making-rule-change-request/tips-making-submission

Please note, the Commission publishes all submissions on its website, subject to confidentiality requirements and certain other exceptions as noted on our submissions webpage. Please clearly mark any sections of your submission which you consider contain confidential material.

If you have any questions about this project, please contact either:

- Joel Aulbury on (02) 8296 0648 or joel.aulbury@aemc.gov.au
- Kate Wild on (02) 8296 0622 or kate.wild@aemc.gov.au.

1.3 Two-sided market reforms

A key initiative under the ESB Post 2025 reforms is to develop policies and market designs that would help transform the NEM into a more developed two-sided market. A two-sided market brings about a more efficient system by better valuing the latent demand flexibility already existing within the system. When the demand side can better respond to price signals, it behaves in ways that benefit the system, reducing load when prices are high and increasing when prices are low. This reduces the need for investments in peaking generation and unnecessary network infrastructure upgrades.

The two-sided market initiative is seeking to respond to the opportunity that recent advances in technology and digitalisation presents for unlocking the potential of the demand side of the market.

To bring about a more developed two-sided market a number of barriers must be removed. The ESB's policy approach is to create a participation framework that supports the development of a two-sided market that focuses on addressing the costs and complexity of

market entry. This includes addressing the costs which are particularly burdensome for smaller participants. It also includes considering how to facilitate new business models and technologies, such as energy storage systems and business models that involve aggregating end users' capability to provide demand response and other services, e.g. virtual power plants.

The Rules have been amended in recent years to add new categories of registered participant, resulting in one entity potentially needing to register in different categories in order to provide a range of services. This generally adds complexity and potential ambiguity for market participants and new entrants. There is also increasing overlap of formerly distinct categories (e.g. Market Customers representing 'load' connection points can be net exporters of energy at some intervals due to solar and other DER uptake).

An increasing number of regulatory workarounds and frequent rule changes have been used to accommodate these developments but this approach is becoming inefficient and may distort incentives to participate in the market.

Additionally, the NEM arrangements, particularly for wholesale market participation, use 'asset focused' regulation. That is, participant categories (and the associated regulatory obligations) are based on the assets present at the connection point, as opposed to the services bought or sold. This approach will become more complex as the number of services and service providers increase and new asset combinations emerge (e.g., hybrid facilities with load, generation and storage all behind a single connection point).

A solution to this problem, which has been developed under the two-sided market, is to move towards the 'trader services' model, which is outlined below.

1.3.1 The Trader services model under a Two-Sided Market

The ESB is considering changes to the wholesale market participation framework – the 'trader services model' – that would:

- Simplify the existing registration process in the NEM by accommodating existing categories (other than network service providers) in a single 'trader' category. This would be one universal registration category covering all commercial parties participating in the NEM (e.g. retailers, aggregators, generators, scheduled loads, ancillary service providers).
- Provide for greater regulatory flexibility that supports innovation by seeking to attach obligations to services at connection points as opposed to attaching them to registration categories and assets.
- Enable new participation models that allow end users to obtain services from more than one trader at a site. For example, an end user may have a contract with a trader providing standard retail services for the end user's uncontrolled load, and a separate arrangement with another trader that trades the end user's distributed energy resources (DER) output or controlled load and buys and sells services on their behalf in the wholesale market.

The key entities and elements in the trader-services model are set out in the ESB's April 2020 paper on moving to a two-sided market, which can be found here.

1.3.2 Relationship between the Integrating Storage in the NEM rule change and the Two-Sided Market Initiative

Moving to the trader services model represents a relatively large change for energy sector participants and will not be done all at once. The implementation of the model requires careful sequencing with new service-based Rules being phased in and co-existing with the 'old NEM' approach for a period. This phasing would be informed by AEMO's systems and process changes and consideration of the best ways to minimise the direct costs for participants in order to avoid affordability impacts for customers.

1.4 Overview of issues and stakeholder feedback

This section of the paper provides an outline of the issues (including those new issues raised by AEMO) on which we are consulting further, and provides a summary of stakeholder views on these issues. These issues are:

- registration and participation frameworks
- the recovery of non-energy costs
- new issues raised by AEMO relating to:
  - issues with Network Service Provider (NSP) connection points
  - simplifying NER Chapter 2 ancillary services provisions
  - DC coupled systems.

1.4.1 Registration and participation framework

Issue

The NER do not define storage technologies and as a consequence there are no specific registration categories and classifications for storage units and hybrid facilities. To clarify how storage units register and participate in the NEM, AEMO has developed the *Registering a battery system in the NEM - fact sheet*, which requires large batteries (greater than 5MW) to register in two participant categories.[3]

AEMO considered that the current arrangements for registering storage units and hybrid facilities likely cause unnecessarily high administration costs for AEMO and registration costs for intending participants, make the registration process slower and more complex and uncertain than it needs to be.[4] AEMO considered these outcomes may reduce the integrity of the NER, create barriers to entry, reduce competition and create inefficiencies. And, if material, these may increase costs for consumers, contrary to the NEO.[5]

3 Batteries are required to register as both a Market Generator and a Market Customer. The *Registering a Battery System in the NEM* fact sheet can be accessed here.

4 AEMO, Integrating energy storage systems into the NEM rule change request, pp. 17, 18.

5 Ibid, pp. 17, 54.

To solve these issues, AEMO proposed to amend the NER to:

- Introduce a new registered participant category, a bi-directional resource provider (BDRP), in which standalone storage units and hybrid facilities would register.
- Clarify that market small generation aggregators (MSGAs) can aggregate small storage units.
- Clarify aggregation Rules that would apply to hybrid facilities i.e. participants would only be able to aggregate units with the same classification, technology and energy conversion models, although AEMO would have discretion to allow aggregations that don't meet these requirements. Obligations would be set, and dispatch would occur, at the unit level (not at the connection point of the hybrid facility).

Stakeholder feedback

Most stakeholders agreed the existing registration process is complex, duplicative and costly, and they welcomed the opportunity to clarify and streamline the process.[6] However, not all of these stakeholders considered that changes to the Rules were required. Some stakeholders considered incremental changes could be made to improve the registration process for storage and hybrid facility proponents without making significant amendments to the NER. Other stakeholders considered we should be making incremental changes that align with large market reforms indicated in the two-sided market project. These incremental changes would incorporate a move towards a technology-neutral market design that places NER obligations on services rather than participant categories or technologies.

Stakeholders commented on the following key areas:

- level of interest in registering hybrid facilities
- AEMO's proposed approach to registration, classifications and new definitions for storage and hybrid facility
- the role of MSGAs.

These are discussed below.

Hybrid facilities

Most stakeholders were either interested in registering hybrid facilities or could see the benefits from clarifying the registration process for these facilities. The benefits of hybrid facilities identified by stakeholders were that these facilities allow:

- greater flexibility with how the facility would operate and also for the system as a whole.[7]
- a better use of excess energy where, instead of being curtailed, it can be stored and released into the network when it is needed.[8]

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6 Submissions to the consultation paper: AGL, p. 3; ARENA, p. 4; Citipower, Powercor, United Energy, p. 7; ENGIE, p. 3; Essential Energy, p. 3; GE Hydro, p. 15; Maoneng, p. 6; Enel X, p. 5; Fluence, p. 11; Tilt Renewables, p.1; Grids Energy, p, 1; CEC, p. 2; Tesla, p.2.

7 CEC, submission to consultation paper, p. 2.

8 Consultation paper submissions: Maeoneng, p. 5; Monash, p. 8; BECA p. 4, Tilt Renewables, pp. 1-2; UPC\AC Renewables, p. 4; Fluence, p. 10; Transgrid, p. 1.

- participants to minimise causer pay liabilities.[9]
- participants to increase revenue.[10]

Reposit Power did not support the NER facilitating the registration of hybrid systems. This is because it did not support the hybrid structure because of a concern that it could result in large amounts of power behind a small number of connection points, which would be hidden from the market.[11] Reposit Power considered this would not be an efficient outcome for the NEM noting that the main benefit of the hybrid structure would be that it would help participants minimise their causer-pay liabilities.[12]

The Australian Energy Council (AEC) also considered that a distinction between bi-directional units and hybrid facilities is not needed, and this can already be managed by AEMO and battery operators under existing processes.[13]

Conversely, other stakeholders such as UPC\AC Renewables and Fluence supported a hybrid facility being able to register and operate as a single dispatching unit in the NEM.[14] AGL considered a new participant category may enable greater participation for new technologies through a clearer registration process.[15]

Energy Queensland noted it has received applications for both DC and AC coupled hybrid systems and supports different types of technologies aggregating as a hybrid system.[16] Energy Queensland considered that, from a network perspective, billing and the connection agreement would be at the connection point but suggested additional points behind the connection point would need to be defined to provide transparency and avoid confusion.[17]

Enel X noted that there are many 'hybrid' sites currently at the residential and industrial level, as many are consumers with behind the meter generation to manage reliability or minimise electricity costs.[18]

AEMO's proposed approach to registration and classifications

Some stakeholders questioned if AEMO's proposed approach of introducing a new participant category, the BDRP, in the Rules was the right solution.[19] While stakeholders generally agreed that there was an issue around complexity and that there was a need for clarification with how storage and hybrid facilities registered, many considered that an approach more in line with the two-sided market design should be adopted.

9 Maoneng, submission to consultation paper, p. 5.
10 BECA, submission to consultation paper, p. 4.
11 Reposit Power, submission to consultation paper, p. 4.
12 Ibid, p.4.
13 AEC, submission to consultation paper, p. 2.
14 Submissions to consultation paper: UPC\AC Renewables, p. 3; Fluence, p. 10.
15 AGL, submission to consultation paper, p. 3.
16 Energy Queensland, submission to consultation paper, pp. 9-10.
17 Ibid, p. 10.
18 Enel X, submission to consultation paper, p. 4.
19 Submissions to consultation paper: AEC, p. 2; Endeavour Energy, p.3; Neoen, p. 2; Reposit Power, p. 6; EA, p.3; Origin, p.1; ERM, p. 1.

For example, EnergyAustralia and Ausgrid supported an alternative approach that would see pragmatic and incremental 'do now' solutions implemented in the short-term to address specific issues raised in the AEMO rule change request. Further, complex and longer-term reform would then occur once the outcomes of the two-sided market design and other related rule changes were known with sufficient clarity. Both considered this approach would strike an optimal balance between addressing exigent, short-term issues while minimising the costs and risks associated with inconsistencies between storage framework reforms.[20] Endeavour Energy considered the simplified and more flexible registration framework being considered in the two-sided market project is better placed to keep pace with evolving business models.[21]

Those stakeholders who did support the BDRP considered it would reduce administration costs and make the process of registration more transparent.[22]

The Clean Energy Council (CEC) supported the introduction of a BDRP for single storage assets, but did not see AEMO's proposed solution resolving the issues for hybrid facilities as it was not clear if storage could charge from co-located generation without receiving dispatch instructions from AEMO.[23]

In its submission to the consultation paper, AEMO considers that its rule change proposal is consistent with the two-sided market principles and that its proposed rule may provide foundational steps towards the ESB's two-sided market reform. This included that its proposed rule change will:

- continue to allow end users to participate and engage in the market
- create a more level playing field in regard to information symmetry and the recovery of non-energy costs.[24]

Clarification on MSGAs classifying small storage units

Stakeholders who commented on this issue generally agreed that the NER should clarify if MSGAs can classify exempt batteries in their portfolios, with a majority of these stakeholders supportive of MSGAs being able to classify small batteries under 5 MW.[25]

Yes Energy, Enel X and Tesla all supported MSGA also being able to provide market ancillary services. [26]

20 Submissions to consultation paper: Ausgrid, p. 2; EnergyAustralia, p. 3.

21 Endeavour Energy, submission to consultation paper, p. 1.

22 Submissions to consultation paper: Enel Green Power, p. 1; Infigen, p. 2; Maoneng, p. 7; Monash, p. 9; GE Renewables, p. 1; Transgrid, p.2; Yes Energy, p. 6.

23 CEC, submission to consultation paper, p. 3.

24 AEMO, submission to consultation paper, pp. 3-4.

25 Submissions to consultation paper: AGL, p.4; ARENA, p.5; Yes Energy, p.7; Monash, p. 8; Citipower, Powercor and Unite Energy, p. 9; Reposit, p.8; Enel X, p.8; Tesla, p.8.

26 Submissions to consultation paper: Yes Energy, p.7; Enel X, p.8; Tesla, p.8.

1.4.2 Recovery of non-energy costs

Issue

AEMO's responsibility is to operate the power system in a safe, secure and reliable manner. AEMO fulfils this by controlling technical characteristics of the system through various market and non-market ancillary services and regulatory mechanisms. AEMO generally recovers the cost of these services and mechanisms from participants in proportion to the energy consumed or sent out in relevant trading intervals (currently 30 minutes).[27]

AEMO considers non-energy cost recovery is inconsistent between grid-scale batteries and other market participants, including exempt batteries, which can be registered with an MSGA. Grid-scale batteries are charged based on the two participant categories in which they are registered (market generator and market customer). This results in charges incurred for both consumed and sent out energy (gross meter data with two data streams).

Other registered participants including market generators, market customers and MSGAs are charged based on being registered in a single participant category, where the consumed and sent out energy is netted within an interval (net meter data with one data stream). This net meter data provides an energy value for market settlement, fees and non-energy cost recovery calculations. This arrangement has been in place since the commencement of the NEM and is reflected in the NER settlement formula as adjusted gross energy (AGE).[28]

According to AEMO, the current arrangements for non-energy cost recovery results in market participants with technologies other than grid-scale batteries being able to minimise the costs and charges that apply to them. This may lead to a perverse outcome for market participants registered in a single category with significant two-way flows. For example, if a market customer has a significant amount of generation behind its market load connection points it:

- reduces the amount being recovered due to the effect of netting between consumed and sent out compared to the outcome if consumed and sent out energy occurred at separate connection points
- can lead to payment being made to the market customer rather than recovered from the market customer if sent out energy exceeds energy consumed.

AEMO proposes that MSGAs (and grid-scale battery participants in the proposed BDRP) should pay non-energy cost recovery based on consumed and sent out energy, not netted between the two. AEMO considers that this approach is consistent with causer or beneficiary pays principles since it reflects, and places a value on, a registered participant's contribution when non-energy services are needed.[29]

AEMO also proposed that, to ensure non-energy cost recovery occurs consistently for all registered participants, the Commission may wish to consider whether it is also appropriate

27 A full list of the NEM non-energy costs and who these costs are recovered from can be found in table 5.2 of the consultation paper here.

28 AEMO, *Integrating energy storage systems into the NEM - rule change request*, p. 15.

29 AEMO, *Integrating energy storage systems into the NEM - rule change request*, p. 19.

to recover non-energy costs from market customers and market generators in the same way as AEMO has proposed for BDRPs and MSGAs.[30] This would require changes to all NEM non-energy settlement recovery formulas.

Stakeholder feedback

Most stakeholders did not provide explicit comments on non-energy costs. However, those that did were split on whether they supported or opposed AEMO's non-energy cost recovery proposal.

Stakeholders who supported AEMO's proposed solution

Most stakeholders who supported AEMO's proposal want non-energy cost recovery based on consumed and sent out energy for all market participants[31] or otherwise suggested non-energy cost recovery should be technology neutral and recovered equitably.[32] Some stakeholders[33] suggested non-energy cost recovery changes for other registered participants should be considered through the broader ESB two-sided market reform or otherwise considered holistically.[34]

Stakeholders who opposed AEMO's proposed solution

Stakeholders who opposed AEMO's proposal offered the following range of reasons or alternative solutions:

- GE Hydro supported costs being allocated on causer/beneficiary pays basis, but argued fixed speed pumped hydro should be excluded from paying these costs on either generation or load.[35]
- Beca considered that behind-the-meter power flows do not need to be measured for fee or charge purposes.[36]
- Enel X stated that fees and charges for market participants should be based on whether the participant was a net generator or a net consumer over a period. If netting is not adopted there should be a broader review of how fees and charges are applied across all participants.[37]
- EnergyAustralia proposed incremental changes including the calculation of non-energy charges based on a net meter data stream - this would also be in keeping with existing arrangements for pumped hydro where pumping load is treated as auxiliary supply and effectively netted for the purposes of calculating participant fees and charges.[38]

30 Ibid, p. 29.
31 Yes Energy, Monash University, AEC, Neoen and Telsa: submissions to the consultation paper
32 Energy Queensland submission to the consultation paper, p 16
33 Essential Energy submission to the consultation paper, p 3., Infigen submission to the consultation paper, p 4.
34 Grids Energy submission to the consultation paper, p 3.
35 GE Hydro, submission to the consultation paper, p. 16.
36 Beca submission to the consultation paper, p. 7.
37 Enel X submission to the consultation paper, pp. 11-12.
38 EnergyAustralia, submission to the consultation paper, p. 5.

- ERM Power considers the materiality of non-energy cost allocation is small. However, the NEO would be better served by either excluding grid-scale storage loads from non-energy cost recovery, or levying charges only on round-trip losses. Storage loads are not 'final' consumption, they are an intermediate step in serving final demand for electricity services.[39]
- Enel Green Power proposed a different cost recovery structure to battery energy storage systems via a subscription style charge (for example, $ MW/month) based on capacity size, which would create an even playing field between small and grid-scale batteries.[40]

As a result of this mixed feedback and given AEMO's suggestion to look at this more broadly, we are consulting on an alternative option - see chapter 3.

1.5 New issues raised by AEMO

AEMO's submission to the consultation paper identified three new issues relating to the integration of energy storage and hybrids into the NEM which it recommends the Commission take into consideration in the rule change.[41] AEMO advised that it only became aware of these issues following submitting the rule change request in August 2019. Through this options paper, the Commission is seeking your feedback on the significance of these new issues raised by AEMO and the appropriateness of the solutions AEMO has proposed. The Commission has also set out potential additional solutions to the new issues AEMO has raised for feedback.

The new issues raised by AEMO are discussed in Chapter 4:

- issues with Network Service Provider connection points, where the owner of a storage system is also the local network service provider
- simplifying NER Chapter 2 ancillary services provisions to better align with a two-sided market
- clarifying how DC coupled systems are to register and participate in the NEM.

39 ERM Power, submission to consultation paper, p. 6.
40 Enel Green Power, submission to the consultation paper, p. 11.
41 AEMO submission to the consultation paper, pp. 6-8.

2 REGISTRATION AND PARTICIPATION FRAMEWORK

The Commission is seeking feedback from stakeholders on two options not explored in the consultation paper for how storage and hybrid facilities register to participate in the NEM. These alternative options seek to align changes to integrate storage and hybrid facilities with the objectives of the two-sided market design, as discussed in Chapter 1, to remain technology-neutral and transition to a service-based model rather than an asset focus.

This chapter sets out:

- a summary of the options the Commission is considering for how storage and hybrid facilities would register and participate
- further detail on the options not discussed in the consultation paper (options 3 and 4 — the 'alternative options').

2.1 Summary of options for registration and participation framework

Following stakeholder feedback on the consultation paper, the Commission is considering several options for how storage and hybrid facilities register and participate in the NEM. These cover a spectrum of options ranging from no change to the current registration framework to more significant changes. This includes the option to establish a framework for storage and hybrid facilities that would be consistent with the trader-services model being progressed in the two-sided market work (see section 1.3 for further information).

While the Commission is interested in seeking feedback on registration models that would be more consistent with the two-sided market's trader-services model, it is not intended to investigate fully implementing this model. This is because redefining all participant categories is a substantial change for the market and the Commission considers it is not within scope of this rule change. As noted in section 1.1.2, the implementation of the trader-services model requires careful sequencing, with new service-based Rules being phased in and co-existing with the 'old NEM' approach for a period.

While there is an opportunity to make broader changes in the framework to move towards a two-sided market, the focus of the Commission in this project is on addressing the issues identified by AEMO in its rule change request. The intent of any changes made through this rule change would be to address these issues, and take new storage and hybrid facilities towards the two-sided market framework, while the ESB works through the details for existing participants.

We outline below a summary of the potential spectrum of options the Commission has identified for further consideration (noting that these are not the only potential approaches, and variants or combinations of these options may be considered).

- **Option 1** —the current arrangements, where grid-scale batteries register as both a Market Customer and Market Generator. The Commission sought stakeholder feedback on the current arrangements in the consultation paper.
- **Option 2** — AEMO's proposed solution which seeks to introduce definitions for storage and hybrid facilities, proponents of which would register in the new BDRP participant

category, as an alternative to these technologies and participants being treated as Market Generators and Market Customers. The Commission consulted on this option in the consultation paper.

- **Option 3** — modifications to existing participant categories to simplify the registration process for storage and clarify how hybrid facilities would register, without establishing a new participant category or introducing new technology-specific definitions. Obligations on participants would continue to be set at the connection point, potentially with flexibility to apply certain technical standards at the unit level for hybrid facilities if required. This option would reduce the differences between participant categories, in terms of recognising bi-directional flows under existing categories that were originally expected to have one-way energy flows. This may make it easier to transition in the future to a universal participant category model. The Commission considers that this option would be an incremental step towards the participation frameworks envisaged for a two-sided market.
- **Option 4** — introduces a new participant category — the Integrated Resource Provider. The Integrated Resource Provider participant category is a technology-neutral approach. Participants registered in this category would be able to provide a range of services, including generation, scheduled load and FCAS. Obligations would be attached to services at connection points as opposed to attaching them to registration categories and assets. Initially, proponents of new storage and hybrid facilities would register in this category. However, this option establishes a participant category that could eventually become the universal registration category envisaged through the ESB's two-sided market reforms. This option is a bigger step towards the trader-services model than option 3.

The purpose of this chapter is to describe and seek stakeholder feedback on options 3 and 4 only. This is because stakeholders have already provided feedback on options 1 and 2 through the consultation paper. The Commission has not set out the full details of all the obligations that would apply to storage and hybrid participants under options 3 and 4. Further details will be worked through with stakeholders as part of the process to test a preferred registration model. Clarifying the registration approach is an important step, which will facilitate clearer communication with stakeholders on the next layer of detail in the lead up to the draft determination.

Table 2.1 below provides a summary of the proposed alternative options, with options 1 and 2 included for comparison. Section 2.2.1 to section 2.2.2 discuss further detail on the alternative options. This detail does not represent any decision by the Commission on the potential options, and we are interested in hearing stakeholder views on all issues raised.

Table 2.1: **Summary of key features of participation framework options for storage and hybrid facility proponents**

KEY FEATURES	OPTION 1 — NO CHANGE / CURRENT ARRANGEMENTS	OPTION 2 — AEMO'S PROPOSED SOLUTION	OPTION 3 — MODIFICATIONS TO EXISTING PARTICIPANT CATEGORIES	OPTION 4 — INTRODUCE A NEW PARTICIPANT CATEGORY 'INTEGRATED RESOURCE PROVIDER'
How would a proponent register and classify?	Standalone storage — Participants would register as a Market Generator and Market Customer Hybrid facility — currently not clear.	Standalone storage — A participant would register in the proposed BDRP category with its unit classified as a bi-directional unit (if there were multiple storage units each would be classified as a bi-directional unit). Hybrid facility — Participants would register in the proposed BDRP category, with each asset classified separately. For example a battery would classify as a bi-directional unit, a wind farm would classify as a semi-scheduled generating unit. Small standalone storage – Participants register in the	Standalone storage — register as a Market Generator, and classify generation and load at the connection point. Hybrid facility — register as a Market Generator. It would classify generation and load at the connection point, although flexibility for applying technical standards at the unit level if criteria met. Small storage – Participants (including those intending to aggregate smaller storage units) may register in the MSGA category with units classified as market generating units and market loads.	Standalone storage and hybrid facilities — register as an Integrated Resource Provider, and classify generation and load at the connection point. Small storage — Participants (including those intending to aggregate smaller storage units) may register as an Integrated Resource Provider and classify generation and load at the connection point.

KEY FEATURES	OPTION 1 — NO CHANGE / CURRENT ARRANGEMENTS	OPTION 2 — AEMO'S PROPOSED SOLUTION	OPTION 3 — MODIFICATIONS TO EXISTING PARTICIPANT CATEGORIES	OPTION 4 — INTRODUCE A NEW PARTICIPANT CATEGORY 'INTEGRATED RESOURCE PROVIDER'
		MSGA category with units classified as small bi-directional units.		
How would a proponent participate in dispatch?	Standalone storage — Participants would be dispatched with two separate DUIDs (one for scheduled load, one for scheduled generation) Hybrid facility — currently not clear.	Standalone storage — Participants would be dispatched with a single DUID of 10 price bands to participate in both generation and load. Hybrid facility — Participants would be dispatched such that each generating, storage or load unit within a hybrid facility would have 10 price bid bands in total for each unit. Note: While 10 price bid bands was proposed by AEMO, this option could still maintain the current 20 price bid bands for storage facilities.	Standalone storage and hybrid facilities — Participants would be dispatched at the connection point with two separate DUIDs. Participants would have 20 price bid bands (10 for each load and generation DUID).	As per option 3. Standalone storage and hybrid facilities — Participants would be dispatched at the connection point with two separate DUIDs. Participants would have 20 price bid bands (10 for each load and generation DUID).

KEY FEATURES	OPTION 1 — NO CHANGE / CURRENT ARRANGEMENTS	OPTION 2 — AEMO'S PROPOSED SOLUTION	OPTION 3 — MODIFICATIONS TO EXISTING PARTICIPANT CATEGORIES	OPTION 4 — INTRODUCE A NEW PARTICIPANT CATEGORY 'INTEGRATED RESOURCE PROVIDER'
How would performance standards apply?	Standalone storage — at the connection point, which for a standalone asset is effectively the same as at the asset. Hybrid facility — currently unclear.	Standalone storage and hybrid facilities — at the connection point, but based on the assets in the facility, to provide AEMO with greater visibility of those assets (rule change request p. 18, p. 45; submission to consultation paper p. 9).	Standalone storage — at the connection point. Hybrid facility — at the connection point. There may be a need for flexibility in how standards would apply to hybrid facilities (i.e. at the connection point or asset).	As per option 3. Standalone storage — at the connection point. Hybrid facility — at the connection point. There may be a need for flexibility in how standards would apply to hybrid facilities (i.e. at the connection point or asset).

2.2 Registration and classification under options 3 and 4

As noted earlier, the Commission has a dual objective for this rule change:

1. addressing the issues raised by AEMO in the rule change request
2. making sure any changes to address these issues are in line with a move towards a two-sided market.

In our view, a critical decision for this objective is to determine the approach to registration and classification for storage and hybrid facilities. That is, should we:

- Keep registering them as Market Customers and Market Generators (option 1)?
- Define storage through a new technology-specific category (option 2)?
- Modify existing categories to accommodate bi-directional flows (option 3)?
- Create a new category which lends itself to becoming the 'universal' category as envisaged by the two-sided market trader-services model (option 4)?

This options paper outlines two alternatives on which we are seeking feedback. This feedback, together with the feedback we received on options 1 and 2 in response to the consultation paper, will assist the Commission in refining the option to pursue for the draft determination. Once we have reached an initial position on the option that is likely to best facilitate the Commission achieving its objectives for this project, we will be better able to work with stakeholders on the necessary detail for issues including scheduling, dispatch, performance standards and non-energy costs. The Commission will establish a technical working group in early 2021 to work through these issues with industry affected stakeholders.

2.2.1 Option 3 — Modifying an existing participant categories

The aim of modifying existing participation categories would be to make the categories more flexible and bi-directional, as an alternative to creating a new category. It would allow Market Generators, Market Customers and MSGAs to provide scheduled generation and scheduled load through storage or hybrid facilities, without needing to register in more than one category. Proponents of new storage or hybrid facilities could be required to register as Market Generators if providing sent-out generation at or over the threshold for registration as scheduled or semi-scheduled (currently 30 MW), and would otherwise register as Market Customers or MSGAs (as applicable).

It would be mandatory for all entities that own, operate or control new large storage (e.g. grid-scale batteries and pumped hydro plants) and hybrid facilities with bi-directional energy flows to register as a *Market Generator*.[42] New large storage facilities are currently required to also register as Market Customers, where the electricity consumed by this system is not auxiliary load.[43] Under this option, this requirement for two separate registrations would be

42 If the participant's generating unit's sent out generation is not purchased in its entirety by the Local Retailer or by a Customer located at the same connection point.

43 Auxiliary load is electricity consumed within the power generation station necessary for power generation (such as pumps,

removed. Instead, the Market Generator category would be amended to require Market Generators to classify all loads (above auxiliary load, which would be defined) at the connection point as market loads.

Where a new storage or hybrid facility does not provide sent-out generation at or above the level to register as a Market Generator, but has grid-supplied load of 5MW or more, the Market Customer for that facility would classify the facility as a market load.

Entities that own, operate or control storage or hybrid facilities with both generation and load below these thresholds could choose to register as MSGAs, if they wish to participate in the market.

2.2.2 Option 4 — Integrated Resource Provider

This option is a variant of option 2, AEMO's proposal to introduce a new participant category, for use by proponents of new storage and hybrid facilities. Option 4 differs from option 2 as it would aim (to the extent practicable) to use technology-neutral drafting and to apply obligations based on services rather than on assets, in relation to participants in the new category of Integrated Resource Providers. Our view is that this is likely to allow for an easier transition to the participation framework being developed in the ESB's two-sided markets work (again noting that a move straight to the full trader-services model is not practical through this rule change).

Option 4 also differs from option 3 in that it would be setting up a new participant category that would aim, to the extent practicable, to apply obligations by services rather than by assets.

It would be mandatory for all new grid-scale storage (e.g. grid-scale batteries and pumped hydro plants) and hybrid facilities with bi-directional energy flows to register in the Integrated Resource Provider category. Integrated Resource Providers would be required to classify all loads at the connection point as market loads (if in excess of the auxiliary load threshold).

Given the extent of the changes under this option, we are proposing that existing storage participants would remain registered under their existing arrangements for a period. However, it would be optional for existing participants to transition into the Integrated Resource Provider category if they saw benefit in doing so.

> QUESTION 1: REGISTRATION AND CLASSIFICATION
>
> 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?

blowers, fuel preparation machinery).

2.2.3 MSGAs under Option 3 and Option 4

For option 3, the MSGA category could be amended to clarify that MSGAs can classify small storage facilities as market generating units and market loads, and to allow MSGAs to classify facilities they control as ancillary services generating units and/or ancillary services loads.

Under option 4, we are proposing that the MSGA category would not allow the classification of storage units exempt from the requirement to register as a Generator. The starting assumption, to be tested, is that it would be preferable for aggregators of small batteries (that might otherwise have sought to classify storage units through the MSGA category) to use the Integrated Resource Provider category. Under this approach, the current arrangement that MSGA participants are not allowed to provide market ancillary services would be maintained.

> QUESTION 2: CLASSIFYING MSGAS
>
> 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?

2.2.4 Existing participants under Option 3 and Option 4

Participants with existing storage facilities

If option 3 is pursued, existing storage participants, who are currently registered as both a Market Generator and Market Customer, would remain in their current registrations (until in the future all market participants are transitioned into the new universal category as part of the broader two-sided market reforms).

Under option 4, existing storage participants currently registered as an MSGA could, after a suitable period, be transitioned across to the Integrated Resource Provider category.

Participants with existing facilities that add storage capabilities

Under option 3, existing registered participants that currently have predominantly one-way flows of energy at a connection point, and choose to add storage units or other plant resulting in two-way flow over e.g. 5MW in each direction, would not need to register in an additional category, but would need to classify the relevant connection point as a market load and market generating unit.

Under option 4, these participants would need to register in the Integrated Resource Provider category (if the new plant results in generation and/or load at the connection point that is above the registration threshold for that category).

QUESTION 3: EXISTING STORAGE PARTICIPANTS

Should existing storage participants be transitioned to a single participant category (as they are currently registered as both a Market Generator and Market Customer)?

2.3 Scheduling and dispatch under options 3 and 4

Following confirmation of the registration and classification requirements for storage and hybrid facilities, it will be necessary to determine the requirements for scheduling and dispatch.

2.3.1 Scheduling

Storage facilities

Under option 3, generation and load from grid-scale storage proponents would continue to be scheduled as they currently are. Market generators would be required to classify market loads at the connection point as scheduled loads. The threshold at which Market Generating units are classified as scheduled is currently under review in the *Generator registration thresholds* rule change and the final decision in that rule change will determine the threshold for scheduled generators.[44] [45]

Under Option 3, for MSGAs that have classified small batteries, a new approach to scheduling battery generation and load may be enabled through the 'scheduled-lite' approach currently under consideration in the two-sided markets work and the *Generator registration thresholds* rule change. [46]

For option 4, we are proposing that all participants in the Integrated Resource Provider category would have their generation and load (if above the auxiliary load threshold) scheduled, subject to the comments below on scheduling hybrid facilities. The generation scheduling threshold could be set at either 5MW or at a lower bound, such as 1MW.[47] This would be decided in alignment with the Generator registration threshold rule change considerations. Participants would have their portfolios considered in aggregate in relation to this threshold.

44 AEMC, *Generator registrations and connections* consultation paper. The current framework sets the threshold for automatic scheduled (or semi-scheduled) classification at 30 MW for all generators except for batteries which must be scheduled if five MW or more. Generating units, other than batteries, can be classified at the discretion of AEMO as semi-scheduled or non-scheduled if they are between five and 30 MW. Owners/operators of generating units below 5 MW are exempt from registration.

45 The *Generator registration thresholds* rule change can be accessed here.

46 'Scheduled lite' is a concept being explored in the post-2025 work program as a potential new way to schedule more load and generation with fewer obligations than the current fully scheduled participants categories.

47 A 1MW threshold for scheduling would be the current lower bound given the NEMDE limitation to accept only integer based bids. This level will be used for participation and scheduling in the wholesale demand response mechanism, for example.

Participants would have their portfolios considered in aggregate in relation to this threshold.[48] Participants with capacity below the scheduling threshold may still register in this category and participate as non-scheduled load and generation.

Hybrid facilities

The intention of both options 3 and 4 would be to have generation and load from hybrid facilities scheduled at the connection point.

Many stakeholders identified benefits to registering as a hybrid facility, for example it avoids curtailment, is a better use of excess energy and minimises causer-pay liabilities. These benefits are possible because the proponent is able to control load and generation at the connection point within the hybrid facility. Because of this ability to control energy flow we consider that hybrid facilities would likely be scheduled for load and generation at the connection point.

However, the Commission has identified that there may need to be some flexibility on this, due to the variability in possible combinations and size of load, storage and/or generation that could make up a hybrid facility. It may be appropriate to have a flexible approach to scheduling hybrid facilities.

One option is that if a hybrid facility has a generating unit or load that AEMO would otherwise classify as scheduled, the entire facility would be classified as scheduled. Given that such a facility may also have generating units that would have (if stand-alone) been classified as semi-scheduled or non-scheduled, this approach may not be attractive. To provide flexibility and make this approach practical it may be appropriate to apply a dynamic scheduling obligation that could vary over time, for example based on the state of charge of a storage unit within the hybrid facility. A similar approach could be taken to scheduling loads where a storage unit is added to a previously non-scheduled load site.

Alternatively, an entity with a mix of load, generation and storage at a site would retain the ability to establish separate connection points, for certain assets, to maintain fixed scheduling obligations to each asset, rather than establishing a single hybrid facility.

The Commission is seeking feedback on issues associated with scheduling a hybrid facility, for both generation and load.

QUESTION 4: SCHEDULING OF HYBRID FACILITIES

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?

48 This would be considered initially across each region.

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?
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?

2.3.2 Dispatch

Under both options 3 and 4, we are proposing that scheduled generation and scheduled loads would each have 10 price bid bands to nominate volumes for dispatch. That is, a large generator with a small (unscheduled) auxiliary load would have 10 price bands for dispatch of its generation, and a grid-scale battery with both scheduled generation and load would have 20 price bid bands (10 for each), consistent with the current arrangements.

This would also mean that the two services provided by a grid-scale battery, load and generation, would have separate DUIDs. DUIDs for generation and load from the same battery would be linked in NEMDE to resolve dispatch conflicts. Maintaining the same number of price bid bands for bidding in dispatch, for generation or load, may assist in maintaining competitive neutrality between Market Participants, but we would be interested to hear from stakeholders if 10 or a different number of price bid bands is more appropriate.

Hybrid facilities could be dispatched from the connection point under two DUIDs, one DUID for scheduled load and one DUID for scheduled generation with 10 price bid bands for each. Similar to the questions raised above in respect to scheduling, the Commission would like to know if there are issues associated with dispatching a hybrid facility's scheduled generation from a single DUID at the connection point.

QUESTION 5: NUMBER OF PRICE BANDS

Do you agree that 20 price bands would be appropriate for grid-scale batteries or would another number of bands be more appropriate?

QUESTION 6: DISPATCHING HYBRID FACILITIES

1. Are there certain configurations of hybrid facilities that cannot, or should not, be dispatched at a single connection point?
2. What benefits are achieved by dispatching a hybrid facility at a single connection point, and what issues arise?

2.4 Performance standards under options 3 and 4

To operate the power system securely and reliably, AEMO needs to understand what demands may be placed on the system in a range of circumstances and what services and other responses (such as ride-through capabilities) are available to keep the system stable. Performance standards are currently used for this purpose (among other tools, such as technical information provided as part of the registration and connection processes).[49]

Under option 3, the current approach to applying performance and access standards would be maintained. When scheduled storage facilities connect to the NEM, they are required to meet a single set of performance standards agreed at the connection point for either a stand-alone battery system or a hybrid facility. The Commission is interested to hear from stakeholders on whether performance and access standards set out in the NER, and applying at the connection point, would need to be amended to provide appropriate flexibility for hybrid facilities.

Under option 4, requirements for performance standards would be set at the connection point for Integrated Resource Providers (the same way they apply to participants under the current rules), and based on the services they provide, to the extent this is technically practicable. This approach intends to set standard requirements in a way that makes the connection process clearer for participants with standalone storage and hybrid facilities. The intention is that the Integrated Resource Provider category would allow participants to group different technologies together into a single DUID for dispatch. This would mean that the performance standards would also need to apply at the DUID level.

> QUESTION 7: PERFORMANCE STANDARDS
>
> 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?

2.5 Other issues

There are a number of other issues the Commission would need to consider under each of the proposed options.

2.5.1 Services

Under option 3 a participant registered as a Market Generator, Market Customer or MSGA, and under option 4 a participant registered as a Market Generator, Market Customer or Integrated Resource Provider, would be able to provide market ancillary services if it classifies a facility as an ancillary service facility, a new term that would cover ancillary service

49 Access standards in the NER, see clause 5.3.4A(i) of the NER, are negotiated between a connection applicant, a network service provider and, where relevant, AEMO, to set the specific levels of technical performance of equipment that a connection applicant is seeking to connect to the power system. Once the technical performance of the equipment is agreed, the specific levels agreed become the performance standards for that connection and form part of the connection agreement between the parties.

generating units and ancillary service load.[50] This is, provided it meets technical specifications determined by AEMO in the Market Ancillary Service Specification (MASS).

There would be no limitations on registered participants providing other services, such as non-market ancillary services or additional services introduced in the future, as long as the entity could meet AEMO technical requirements.

2.5.2 Non-energy costs

The same approach and method for recovery of non-energy costs could be adopted for each participation model option. This approach is currently being explored through this rule change and is discussed in chapter 3.

2.5.3 Network use of system charges

The same approach and method for network use of system charges could be adopted for each participation model option. This issue is currently being explored through this rule change.

50 As proposed by AEMO in its submission to the consultation paper. This is further discussed in chapter X.

3 RECOVERY OF NON-ENERGY COSTS

In light of AEMO's suggestion in the rule change request that the Commission consider a consistent approach to the recovery of non-energy costs across all market participants, and stakeholders' divided views on the solution outlined in the consultation paper, we are seeking further feedback from stakeholders on an alternative approach to recovering non-energy costs from market participants. This alternative option seeks to 'level the playing field' for all market participants, not just between grid-scale batteries and smaller storage units classified by MSGA participants. This chapter sets out:

- three options we are considering, including an approach that would change how non-energy costs are recovered from all market participants
- questions seeking stakeholder feedback on the alternative option
- worked examples showing conceptually how non-energy costs would be recovered.

3.1 Options for the recovery of non-energy costs

Three options under consideration for the recovery of non-energy costs are:

- Option 1 — the current arrangements (no change), where non-energy costs are recovered based on the participant category you are registered in, and from:
  - grid-scale batteries based on separately measured consumed and sent out energy
  - other participants based on net metered energy data.
- Option 2 — AEMO's proposed solution which seeks to amend the current arrangements to recover non-energy costs in the same way from grid-scale batteries, hybrid facilities and MSGAs (where consumed and sent out energy is measured separately).
- Option 3 — the same as option 2 but applied to all market participants. Recovery of non-energy costs to be based on a participant's consumed and sent out energy in an interval, irrespective of what participant category they are registered in. Consumed and sent out energy would be measured separately for all market participants i.e. there would be no netting of consumed and sent out energy data.[51] Consumed and sent out energy would be measured at the connection point. It would not include the energy produced and consumed behind the connection point, for example, roof-top solar that produces energy and is consumed on site.

Table 3.1 provides further detail on how each option:

- is consistent with the causer pays principle[52]
- aligns with the 2SM reforms, as described in chapter 1
- impacts on market participants.

51 Any changes would not take effect until the National Electricity Amendment (Global settlement and Market Reconciliation) Rule 2018 No. 14 comes into effect on 1 May 2022.

52 i.e. it ensures that a participant who contributes to the need for the service also contributes to the cost associated with delivering that service. AEMO considers this approach best reflects and places a value on a participant's contribution when non-energy services are needed.

Section 3.3 provides worked examples describing how non-energy costs are or would be recovered for each option.

Table 3.1: **Assessment of options for non-energy cost recovery**

FEATURES	OPTION 1: NO CHANGE / CURRENT ARRANGEMENTS	OPTION 2: APPLY 'CAUSER PAYS' APPROACH TO MSGAS AND BDRPS (AEMO'S PROPOSED APPROACH)	OPTION 3: APPLY 'CAUSER PAYS' APPROACH TO ALL MARKET PARTIC-IPANTS
Consistent with causer pays principle?	Mixed. Only the recovery of non-energy costs from storage proponents who are registered in two participant categories and market participants who have unidirectional energy flows reflect the causer pays principle. Storage proponents registered in two participant categories will continue to pay relatively more than those participants who: • can net between their consumed and sent out energy • are registered in one participant category (eg Market Customer) even though they have bi-directional energy flows at the connection point.	Mixed. Only the recovery of non-energy costs from storage proponents who are registered in the new BDRP category, MSGAs and market participants with unidirectional energy flows will reflect the causer pays principle. BDRPs and MSGAs will pay relatively more than those participants who: • can net between their consumed and sent out energy • are registered in another participant category (eg Market Customer) even though they have bi-directional energy flows at the connection point.	Yes, for all market participants. Non-energy costs would be recovered from all participants based on the separately measured consumed and sent out energy at each connection point, and would be irrespective of which participant category they are registered in.
How does it align with 2SM reforms?	This option is the least aligned of the three options as grid-scale batteries are treated differently to other participants.	Not aligned. More consistent for two market participants but not a technology neutral or service based approach.	This option is the most aligned option and is consistent with a technology neutral and service based approach.
Impact on market participants?	This option presents 'no change', so there will be no immediate impact on market participants. But there currently exists an	This option is likely to impact MSGAs and existing pumped hydro (registered as a market generator with pumping load	This is likely to impact on all market participants (a grid-scale battery is likely to pay less and all other participants are

FEATURES	OPTION 1: NO CHANGE / CURRENT ARRANGEMENTS	OPTION 2: APPLY 'CAUSER PAYS' APPROACH TO MSGAS AND BDRPS (AEMO'S PROPOSED APPROACH)	OPTION 3: APPLY 'CAUSER PAYS' APPROACH TO ALL MARKET PARTIC-IPANTS
	allocative efficiency distortion with how non-energy costs are recovered from market participants. As more market participants with bi-directional flows enter the NEM this will further distort cost recovery. AEMO's settlement systems were not designed for a power system with significant two-way flows.	treated as auxiliary supply). The Commission understands auxiliary load can be up to five percent of its generation - it would now be included in non-energy cost recovery.	likely to pay more), although the total amount of costs recovered will not change. Market participants will no longer benefit from netting off consumed and sent out energy between connection points (which results in costs being disproportionately borne by other market participants). However, the cost impact for each participant may be minimal as the recovery of costs will be spread over a larger market participant base.

Source: AEMC

Note:

1. By 'causer pays principle' we are referring to the economic principle which seeks to attribute costs proportionally to the causers of those costs, not AEMO's causer pays procedure.
2. Sent out energy refers to positive energy flow measured at a connection point meter. Consumed energy means negative energy flow measured at a connection point meter (and does not include any consumption of energy that was generated onsite).

3.2 Questions for stakeholders

In the consultation paper, the Commission outlined the proposed assessment framework for this rule change request. The framework identified six criteria, including creating a level playing field (i.e. a technology neutral approach) and promoting competition, which the Commission will use to assess this rule change against the national electricity objective (NEO).[53] The primary objective of this rule change is to remove barriers to entry for storage and hybrid facilities, and appropriately accommodate their participation in the energy market. We are interested to hear from stakeholders which option they think best achieves the NEO and reduces barriers for storage to better integrate into the NEM.

QUESTION 8: OPTIONS FOR THE RECOVERY OF NON-ENERGY COSTS

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.
2. Are there any other factors the Commission should consider when deciding how non-energy costs should be recovered from market participants?
3. Are there any implementation issues the Commission should consider?

3.3 Worked examples

This section provides worked examples to describe how non-energy costs are recovered under the options outlined above.[54] Table 3.2 shows consumed energy and sent out energy for a market of five participants in a region for a settlement interval. There are six scenarios outlined below the table to describe how non-energy costs would be recovered for an FCAS contingency lower[55] and FCAS contingency raise event[56] under the three options:

- Scenarios 1, 2 and 3 can be compared to see how non-energy costs are recovered differently between options for an FCAS contingency lower event
- Scenarios 4, 5 and 6 can be compared to see how non-energy costs are recovered differently between options for an FCAS contingency raise event.

53 The full assessment framework is described in the consultation paper here, pp. 4-5.

54 This approach is overly simplistic to describe the differences between the options. It does not incorporate the likely settlement methodology AEMO would apply to determine causer pays for FCAS contingency services. For example AEMO currently use individual causer pays contributions (allocated to Market Participants with metering sufficient to identify frequency performance) for the Regulation FCAS cost recovery methodology.

55 Contingency lower requirements are set to manage the loss of the largest load/transmission element on the system; all payments for these services are currently recovered from market customers.

56 Contingency raise requirements are set to manage the loss of the largest generator on the system; all payments for these services are currently recovered from market generators.

Table 3.2: **Stylised example of consumed energy and sent out energy for five participants in a region for a settlement interval**

	MARKET PARTICI-PANT 1	MARKET PARTICI-PANT 2	MARKET PARTICI-PANT 3	MARKET PARTICI-PANT 4	MARKET PARTICI-PANT 5
Registration	Market Customer	Market Customer	Market Customer and Market Generator (grid-scale battery)	Market Generator	Market Generator
Consumed energy (MWh)	40	35	10	10	15
Energy sent out (MWh)	5	35	15	25	20
Net consumed energy (MWh)	35	0	N/A	N/A	N/A
Net energy sent out (MWh)	N/A	N/A	N/A	15	5

Source: AEMC stylised example to illustrate potential options for non-energy cost recovery.

3.3.1 FCAS lower options

Scenario 1 — Recovery of costs under option 1

An FCAS contingency lower service was needed in this interval. 45MWh is the aggregated regional consumed energy at the connection point for market customers under this scenario for the interval outlined in the table. The cost of this service is $100 and would be recovered only from market customers, as follows:

- market participant 1 would pay: 35/45 x $100 = $78
- market participant 2 would pay: 0/45 x $100 = $0
- market participant 3 would pay: 10/45 x $100 = $22

Both market participant 1 and 2's consumed energy is netted against their sent out energy. However, market participant 3's consumed energy and sent out energy are measured separately. This means that market participant 2 has a net zero value for consumed energy and is not required to contribute towards the cost of the FCAS contingency lower service despite contributing to the need for the service.

Scenario 2 – Recovery of costs under option 2

An FCAS contingency lower service was needed in this interval. 60MWh is the aggregated regional consumed energy at the connection point for market customers under this scenario for the interval outlined in the table. For this scenario only, market participant 5 is an MSGA. The cost of this service is $100 and would be recovered from market customers, grid-scale batteries and MSGAs (i.e. all market participants except market generators) as follows:

- market participant 1 would pay: 35/60 x $100 = $58
- market participant 2 would pay: 0/60 x $100 = $0
- market participant 3 would pay: 10/60 x $100 = $17
- market participant 5 would pay: 15/60 x $100 = $25

Both market participant 1 and 2's consumed energy is netted against their sent out energy, however market participant 3 and 5's consumed energy and sent out energy are measured separately. Market participant 2 has a net zero value for consumed energy and is not required to contribute towards the cost of the FCAS contingency lower service despite contributing to the need for the service.

Scenario 3 – Recovery of costs under option 3

An FCAS contingency lower service was needed in this interval. 110MWh is the aggregated regional consumed energy at the connection point for all consumed energy under this scenario for the interval outlined in the table. The cost of this service is $100 and would be recovered from all market participants. Under an alternative framework, where all costs are recovered based on separately measured consumed and sent out energy, regardless of which category the participant belongs to, the cost would be recovered as follows:

- market participant 1 would pay: 40/110 x $100 = $36
- market participant 2 would pay: 35/110 x $100 = $32
- market participant 3 would pay: 10/110 x $100 = $9
- market participant 4 would pay: 10/110 x $100 = $9
- market participant 5 would pay: 15/110 x $100 = $14

All market participants will pay non-energy costs proportional to their share of the aggregated consumed energy which aligns with the causer pays approach for their contribution to the need for this service.

3.3.2 FCAS raise options

Scenario 4 – Recovery of costs under option 1

An FCAS contingency raise service was needed in this interval. 35MWh is the aggregated regional sent out energy at the connection point for market generators under this scenario for the interval outlined in the table. The cost of this service is $100 and would be recovered only from market generators, as follows:

- market participant 3 would pay: 15/35 x $100 = $43
- market participant 4 would pay: 15/35 x $100 = $43

- market participant 5 would pay: 5/35 x $100 = $14

Both market participant 4 and 5's sent out energy is netted against their consumed energy, however market participant 3's sent out energy and consumed energy are measured separately. This means that market participant 3 contributes more to the cost of the FCAS contingency than market participants 4 and 5 despite market participants 4 and 5's contributing more to the need for the service.

Scenario 5 – Recovery of costs under option 2

An FCAS contingency raise service was needed in this interval. 40MWh is the aggregated regional sent out energy at the connection point for market generators under this scenario for the interval outlined in the table. For this scenario only, market participant 1 is an MSGA. The cost of this service is $100 and would be recovered from market generators, grid-scale batteries and MSGAs as follows:

- market participant 1 would pay: 5/40 x $100 = $12.5
- market participant 3 would pay: 15/40 x $100 = $37.5
- market participant 4 would pay: 15/40 x $100 = $37.5
- market participant 5 would pay: 5/40 x $100 = $12.5

Both market participant 4 and 5's sent out energy is netted against their consumed energy, however market participant 1 and 3's sent out and consumed energy are measured separately. Market participants 1 and 3 will pay the same amount as market participant's 5 and 4, respectively, even though they sent out less energy. This means market participants 1 and 3 will pay proportionally more than their contribution to the need for the service.

Scenario 6 – Recovery of costs under option 3

An FCAS contingency raise service was needed in this interval. 100MWh is the aggregated regional sent out energy at the connection point for all sent out energy under this scenario for the interval outlined in the table. The cost of this service is $100 and would be recovered from all market participants. Under the alternative option, where all costs are based on separately measured consumed and sent out energy, regardless of which category the participant belongs to, the cost would be recovered as follows:

- market participant 1 would pay: 5/100 x $100 = $5
- market participant 2 would pay: 35/100 x $100 = $35
- market participant 3 would pay: 15/100 x $100 = $15
- market participant 4 would pay: 25/100 x $100 = $25
- market participant 5 would pay: 20/100 x $100 = $20

All market participants will pay non-energy costs proportional to their share of the aggregated sent out energy which aligns with the causer pays approach for their contribution to the need for this service.

4 ADDITIONAL ISSUES RELATING TO STORAGE

AEMO's submission to the consultation paper raised further examples of issues relating to the integration of storage facilities in the regulatory framework, and recommended the Commission consider them in this rule change request:[57]

- NSP connection points
- Chapter 2 ancillary services provisions
- DC-coupled systems.

AEMO advised that it became aware of these further examples of integration issues after submitting the rule change request in August 2019.[58]

We are seeking stakeholder feedback on the significance of these issues and the appropriateness of the solutions proposed. This chapter:

- describes these new issues
- sets out potential solutions to resolve them
- asks stakeholders whether these solutions are appropriate.

4.1 Network Service Provider connection points

4.1.1 What is the issue?

The NER do not prevent NSPs from owning storage projects under certain conditions. However, the NER require that a connection agreement is negotiated between two separate parties, the connection applicant and the NSP. From this, AEMO has identified that the NER do not contemplate a connection agreement process for storage systems where the owner and the local NSP are the same party, and as a result performance standards and system strength assessments cannot be applied to NSP-owned storage projects.

NSP owned energy storage

In its submission to the consultation paper, AEMO outlined that although the primary function of these energy storage facilities is to provide regulated network support services, NSPs tend to fund these investments, at least partly, through trading in the energy and FCAS markets.[59] The AER's ringfencing guidelines permit these assets to participate in the NEM's contestable energy and FCAS markets as long as these market trading operations are conducted by a separate party who registers as an intermediary.[60]

There are currently two NSP-owned energy storage projects operating in the NEM; these are:

57 AEMO submission to the consultation paper, pp. 6-8.

58 Ibid, p. 6.

59 AEMO submission to the consultation paper, p. 6.

60 The AER published an issues paper in November 2020 discussing the application of these guidelines to NSP owned energy storage devices, available here. Refer to clause 2.9.3 of the NER for more information about intermediaries.

- ElectraNet's Dalrymple Battery Storage Project operating in South Australia's Lower Yorke Peninsula.[61]
- AusNet's Ballarat Battery Storage System operating in regional Victoria.[62]

In October 2020, TransGrid announced another NSP-owned energy storage project, the Wallgrove Grid Battery Project. This project is set to begin operations in the coming years.[63]

Issue with connecting NSP owned energy storage systems

The definition of a 'connection agreement' in Chapter 10 of the NER and the process for establishing or modifying connections in the NEM both require the registered participant seeking to connect an asset to the NEM to be a separate legal entity from the NSP to whose network it is seeking to connect.[64] AEMO considers that if the connection applicant and the local NSP are the same entity, there is nothing in the NER to legally facilitate the negotiation of connection agreements.[65] AEMO noted that without any point of distinction between one person's facilities and another, the connection concepts in the NER are subject to a theoretical failure and do not allow performance standards and system strength assessments and remediation to be applied.[66]

This has not been an issue until now because of the specific ownership and operational arrangements pursued in existing NSP-owned energy storage projects. For example, although AusNet is the asset owner of the Ballarat battery project mentioned above, market operations are formally leased to Energy Australia, which was also responsible for completing the connection application.[67] Similarly, while ElectraNet owns the Dalrymple battery project and is responsible for the provision of its regulated services, AGL leases this asset from ElectraNet for the provision of all competitive market service and was also responsible for filing the connection agreement with ElectraNet.[68] In both of these circumstances, separate parties other than the relevant NSPs formally leased part of these energy storage assets and were therefore able to create sufficient ownership boundaries to permit their connection under the NER through formally negotiating access agreements.

The NER do not prevent a situation where an NSP could both own and operate energy storage and seek to connect it to its own network. However, if this were to occur, the NER would not support the establishment of a connection agreement for this type of project.[69] To deal with this, AEMO has requested that a clear pathway be made for NSP-owned energy storage to establish a set of performance standards and system strength requirements for operation in the market.[70]

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61 ElectraNet project page available here.
62 AusNet project page available here.
63 Media release available here.
64 Rule 5.3 of the NER.
65 AEMO submission to the consultation paper, p. 6.
66 AEMO submission to the consultation paper, pp. 6-7.
67 AusNet, *Ballarat BESS: knowledge sharing report,* August 2019, pp. 28-29, available here.
68 ElectraNet, ESCRI-SA project summary report: the journey to financial close, May 2018, p. 13 and 19., available here.
69 AEMO submission to the consultation paper, p. 7.
70 Ibid, pp 6-7.

4.1.2 Potential solution

While AEMO has suggested amending the NER to address this issue, it has not provided a specific solution to do so. A potential solution could be for AEMO to have a role in establishing the relevant standards and requirements, in conjunction with the NSP, where the local NSP is also the asset owner/applicant.

This solution could be seen as a logical extension of AEMO's existing function to advise NSPs to accept or reject certain negotiated access standards proposed by connection applicants.[71]

As the system operator, AEMO is uniquely placed as the only party, other than an NSP, who could effectively participate in the technical standards negotiation process. Functionally, this could be achieved by amending the obligations of NSPs and AEMO [72] to account for circumstances where technical standards are required for assets which are owned by and connected to the same NSP. This process would only apply if there were no other party able to enter the connection agreement, such as a separate operator.

As this process relates to the setting of performance standards and system strength requirements, this would require AEMO to move beyond its existing advisory role in relation to negotiated access standards. Instead of exclusively advising on whether to accept or reject negotiated access standards for connection agreements, having AEMO responsible for negotiating technical standards for NSP-owned storage would require them to also have a role in approving the automatic and minimum access standards for relevant new connections. Similarly, for system strength requirements, AEMO would be required to approve the entire system strength impact process for new connections to the grid rather than advising on the NSP's initial assessment as is currently the case.

While this solution would lead to a situation where appropriate technical standards could be applied to NSP-owned energy storage, it would likely involve significant establishment and ongoing costs for AEMO. Firstly, AEMO would incur costs establishing the internal processes and personnel required to be able to negotiate the relevant technical standards. Secondly, AEMO would incur ongoing costs related to personnel that would negotiate these standards. It would likely be appropriate to recover these costs directly from the relevant NSPs, as NSPs are currently obligated to recover these costs from typical connection applicants.

4.1.3 Questions for stakeholders

We are interested in stakeholder views on whether the potential solution described above is appropriate and whether stakeholders have other recommendations to facilitate the setting of appropriate technical standards for NSP-owned energy storage.

71 Refer to the definition of 'AEMO advisory matter' in Chapter 10 of the NER.

72 For example in clauses 5.2.3 and 5.2.6 of the NER amongst many others.

QUESTION 9: NETWORK SERVICE PROVIDER CONNECTION POINTS

1. Do you support the solution outlined in this options paper for resolving the potential issues with establishing standards for NSP owned energy storage?
2. If not, do you consider there to be other potential solutions for resolving this issue?

4.2 DC coupled systems

4.2.1 What is the issue?

AEMO has received enquiries from proponents that are seeking to connect facilities where generating units and energy storage share a single inverter. Facilities which share different technologies behind an inverter are known as DC coupled systems.[73]

AEMO considered that the NER currently provide no guidance for how DC coupled systems should register and participate in the NEM and this may pose a barrier to participation. In its submission to the consultation paper, AEMO requested that the Commission consider this issue as part of this rule change process, as it relates to the integration of storage and hybrid facilities into the regulatory framework. [74]

Stakeholder comments on this issue

Several stakeholders discussed issues related to DC-coupled systems in their submissions to the consultation paper. Energy Queensland noted in its submission that it has been increasingly fielding enquiries to install DC coupled and AC coupled system configurations (defined in the next section), and that the NER should permit the registration and aggregation of these hybrid systems.[75] BECA advised the Commission that generating systems are being designed such that energy storage can be cost-effectively installed to create either DC coupled or AC coupled hybrid systems in the future.[76]

What is a DC coupled system?

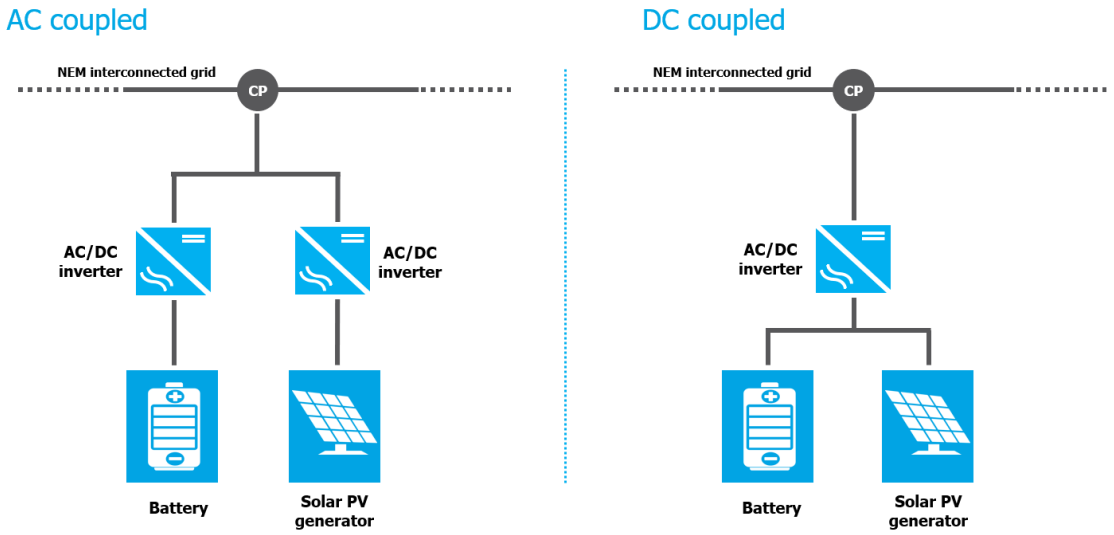
A 'DC-coupled' system is a grid-scale hybrid facility that comprises inverter-based generating and storage units that share an ac/dc inverter. An example of a DC-coupled system is a battery unit coupled to a solar photovoltaic generating unit.

Because these units share the same inverter and can store electricity from their generating units without passing through an inverter, these units may offer energy, capital and operational efficiencies.[77]

73 AEMO submission to the consultation paper, p. 8.
74 AEMO submission to the consultation paper, p. 8.
75 Energy Queensland submission to the consultation paper, p. 9.
76 BECA submission to the consultation paper, p. 2.
77 Doug Moorhead, *Hybrid Resources — DC Coupled*, Broad Reach Power, presentation at BEST Force Meeting, ERCOT, December 2019, available here.

AC-coupled systems are another kind of hybrid system configuration. Although AC-coupled systems and DC-coupled systems both combine multiple technologies behind a single connection point, the key difference is that each technology or unit in an AC-coupled system has a separate inverter. Figure 4.1 visually demonstrates the difference between these two types of hybrid system configurations.

Figure 4.1: Diagram of AC coupled and DC coupled systems



Source: AEMC analysis

The challenge of integrating DC coupled systems into AEMO systems

AEMO stated it is unable to integrate generating systems that combine different technologies behind an inverter because the NER provide no guidance about how these systems should register or operate.[78] AEMO noted these issues are more significant where these systems are grid-scale.[79]

Under the current arrangements, all the generation components in a DC-coupled system would have a single Dispatching Unit ID (DUID).[80] AEMO's operations identify generating units on the basis of inverters, meaning that different obligations under the NER could not be attached to the different assets that share an inverter. This is particularly problematic for grid-scale DC-coupled systems as they would combine assets with two different sets of participation obligations: scheduled generating units (the battery) and semi-scheduled generating units (variable renewable energy, such as solar).

78 AEMO, submission to consultation paper, p. 8.
79 Ibid.
80 Ibid.

4.2.2 Potential solutions

While AEMO suggested amending the NER to address this issue, its submission did not specify how this could be achieved. Potential solutions to resolve the issues associated with DC-coupled systems may include:

- assigning a single set of system obligations
- establishing dynamic trigger based obligations.

Assign a single set of system obligations

Description

An option could be to assign these systems a single set of performance obligations to permit them to participate together. For a DC coupled system, this could be achieved by setting obligations at the connection point rather than at their composite assets.

This DC coupled system would then be assigned scheduled or semi-scheduled central dispatch obligations. AEMO is of the view that it may be reasonable to require these systems to operate as scheduled generators because proponents generally adopt them to provide intermittent generation with energy shifting capacity, implying the facility operator is able to control the provision of energy and FCAS.[81]

Kinelli's submission to the consultation paper countered this view and implies these systems should be assigned semi-scheduled obligations where appropriate. Kinelli considered that it is not appropriate to classify the generation component of DC-coupled systems where its energy storage only affects a minor portion of output and it cannot charge directly from the grid.[82]

If the obligations for these systems are set at the connection point, it might be appropriate to take a flexible approach to scheduling DC coupled systems. It may only be suitable to schedule these systems at the connection point if, for example, a hybrid facility has a generating unit or load that AEMO would otherwise classify as scheduled and it makes up a certain proportion of their generation or load, then the entire facility would be classified as scheduled. In the case of DC coupled systems this would imply they would need to follow dispatch instructions if, for example, the capacity of its energy storage (and any other scheduled generator/load a part of the system) was above a certain proportion of total capacity.

Advantages and disadvantages of this solution

This approach also has clear advantages and disadvantages. The major advantage of this proposed solution is that it would effectively permit the registration of DC-coupled systems and allow their generation components to be aggregated to operate together in the NEM. However, given the mix of different technologies inherent to DC-coupled systems, it might not be operationally efficient to have their generation bound to a single set of operational obligations and technical performance standards at all times.

81 AEMO submission to the consultation paper, p. 8.
82 Kinelli submission to the consultation paper, p. 1.

Dynamic trigger based obligations

Description

As it may be inefficient to assign DC-coupled systems a single set of obligations to operate in the NEM, an efficient outcome could be for obligations to switch between scheduled and semi-scheduled obligations when the system triggers some dynamic operational threshold. Theoretically, it should be possible to design regulation for DC-coupled systems where their obligations are reflective of the operating constraints of a system at any given point in time to promote their most efficient use and therefore maximise their market benefit.

There are two metrics that could be used to assign obligations for these systems dynamically: time and energy storage state of charge (SoC). By basing obligations on time, these systems could nominate to operate as a semi-scheduled generator and use this period to charge their energy storage unit(s) during the day and then operate to discharge this capacity as a scheduled generator at peak times later in the day. These dynamic-trigger-based obligations could optimise this vision for the participation of certain kinds of DC-coupled systems which feature energy storage which cannot charge directly from the grid.[83] Energy storage SoC could also be used to assign system obligations dynamically where the system's generation would be classified as a scheduled generator above a certain threshold of SoC and then classified as semi-scheduled when below this threshold. This arrangement would ensure that obligations are reflective of the constraints of the systems at any point in time, and would only enforce operation as a scheduled generator when it is reasonable to expect the system to operate in that way. We seek feedback on what other operational metrics could be used assign dynamic trigger based obligations for these systems.

Advantages and disadvantages of this solution

The advantages and disadvantages of this potential solution concern a trade-off between optimising system participation and administrative complexity. This approach may better encourage optimal use of DC-coupled systems as it would not constrain them to only operating under a single set of requirements. This would allow these systems to dynamically optimise their output by having their obligations reflect operating constraints in real-time. This may not only increase the private benefits for proponents, but would likely also promote reliability outcomes for the NEM via this operational efficiency.

These potential advantages must be weighed against the likely costs of implementing such a solution and reflects the scale of changes required to integrate complex assets into energy systems. This may require major process changes for AEMO for a type of hybrid configuration that does not yet make up a significant proportion of capacity in the NEM. It would likely require major changes to the NEM's dispatch engine to permit market participants to switch between obligations within a single day. Furthermore, the effective incorporation of these assets into AEMO's operations would likely require participants to supply a host of new operating characteristics aside from those mentioned above to facilitate the improvement in data flows required to harmonise their participation in the NEM.

83 Kinelli submission to the consultation paper, p. 1.

4.2.3 Questions for stakeholders

We are interested in understanding if stakeholders support amending the rules to allow DC-coupled systems to register, and, if so, which of the three potential solutions (or other suggestions) to integrate DC-coupled systems into the NEM is preferred.

> QUESTION 10: DC COUPLED SYSTEMS
>
> 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?
> 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?

4.3 Chapter 2 ancillary services provisions

4.3.1 What is the issue?

In its rule change request, AEMO proposed a drafting approach for ancillary services provisions in Chapter 2 of the NER that would set requirements based on assets. In its submission to the Consultation Paper, AEMO considered this simplified drafting approach would be more consistent with future market reforms.[84]

Currently, ancillary services are provided by Market Participants with assets that are classified as ancillary services generating units[85] or ancillary services loads.[86] To be eligible to provide these services, a Market Participant must apply to AEMO to classify its unit, which involves meeting various requirements under the NER.[87]

One of the objectives of the two-sided market project is to simplify regulatory arrangements to reduce complexity in the registration process and make it easier for new and existing participants to provide new services, to facilitate innovation in services for customers.[88] One way to achieve this is to simplify the registration and classification process by reducing the number of separate categories, and to set obligations on services rather than assets (referred to as the 'trader-services' model).

AEMO's rule change request proposes to amend the NER to introduce a 'ancillary services bi-directional unit' (BDRP).[89] A BDRP could provide ancillary services from units with this classification. This change would effectively create an additional classification in the NER that could provide ancillary services.

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84 AEMO submission to the consultation paper, p. 7.
85 Clause 2.2.6 of the NER.
86 Clause 2.3.5 of the NER.
87 AEMO submission to the consultation paper, p. 7.
88 ESB, Post 2025 market design, consultation paper, September 2020, p.91, p. 93, available here.
89 AEMO, Integrating energy storage into the NEM - rule change request - proposed changes to Chapter 2, 3 and 10, p. 23, available here.

In its submission to the consultation paper, AEMO reflected that a simpler drafting approach could be taken which may be more in line with the two-sided market vision for the regulatory framework.[90]

4.3.2 AEMO's proposed solution

AEMO proposed that the Commission consider consolidating clauses 2.2.6, 2.3.5 and AEMO's proposed new clause 2.2A.4 of the NER, all of which relate to the provision of ancillary services, to permit simpler drafting consistent with the long-term two-sided market reform. AEMO does not propose any specific drafting for this consolidation, but provided the following advice on how it believes this could be achieved:[91]

- Define an umbrella term (e.g. 'ancillary services facility') to replace the separate definitions of ancillary service generating units, ancillary service loads and the proposed ancillary services bi-directional unit. AEMO considered that this definition could alternatively be specified in the MASS.
- Allow the relevant types of Market Participant (Market Customer, Market Generator and BDRP or Integrated Resource Provider, depending on the participation option chosen) to provide FCAS from 'ancillary services facilities' in accordance with the MASS.
- All other policy requirements would remain the same (but consolidated), noting most are currently replicated requirements for each asset.
- The MASS would identify the service (consumption or production-side) that can be provided from an asset or connection point.
- A Market Ancillary Service Provider (MASP) should not be allowed to 'unbundle' the consumption of a bi-directional facility as this is inconsistent with the original policy to improve the non-energy cost recovery mechanism where bi-directional flows apply (note, this is also an amendment to AEMO's proposed rule attached to the rule change request).

AEMO notes that this approach would be more consistent with a two-sided market where NER frameworks are more adaptable to change and better able to facilitate innovation.[92] It also outlines that, in its view, these proposed changes would help to better accommodate the reality that market participant categories no longer determine the behaviour of market participants at the connection point.[93] That is, these changes move the NER away from the notion that customers and generators only draw and discharge electricity into the grid respectively, and that it is desirable to clarify that ancillary services loads can provide FCAS by varying import and export quantities at a connection point.[94]

AEMO also pointed out the effective implementation of this proposed solution would require changes to the definition of load in the NER. In its rule change request, AEMO proposed changes to the definition of load in Chapter 10 of the NER. Please refer to the consultation

90 AEMO, submission to the consultation paper, pp. 7-8.
91 AEMO, submission to the consultation paper, p. 7.
92 Ibid, p. 7.
93 Ibid, p. 8.
94 Ibid.

paper for a discussion of this as well as other drafting language changes AEMO proposed in its rule change request.[95]

4.3.3 Questions for stakeholders

We seek feedback on whether stakeholders support the redrafting of ancillary services provisions in Chapter 2 of the NER in a move to a services-based approach to regulation.

> QUESTION 11: PROVISION OF ANCILLARY SERVICES
>
> 1. Do you support AEMO's proposal to redraft the ancillary services provisions in Chapter 2 of the NER to make them 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.

95 AEMC, *Integrating energy storage systems into the NEM,* consultation paper, p. 88

ABBREVIATIONS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AGE	Adjusted gross energy
BDRP	Bi-directional resource provider
CEC	Clean Energy Council
Commission	See AEMC
DUID	Dispatching Unit ID
ESB	Energy Security Board
ESS	Energy storage system
MASP	Market Ancillary Service Provider
MASS	Market ancillary service specification
MSGA	Market Small Generator Aggregator
NEL	National Electricity Law
NEM	National energy market
NEO	National electricity objective
NER	National Electricity Rules
NSP	Network Service Provider
SoC	State of charge