AEMC

RULE

Australian Energy Market Commission

DIRECTIONS PAPER

NATIONAL ELECTRICITY AMENDMENT (UNLOCKING CER BENEFITS THROUGH FLEXIBLE TRADING) RULE 2023

NATIONAL ENERGY RETAIL AMENDMENT (UNLOCKING CER BENEFITS THROUGH FLEXIBLE TRADING) RULE 2023

PROPONENT
AEMO

3 AUGUST 2023

INQUIRIES

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ABOUT THE AEMC

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

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SUMMARY

1 This Directions Paper sets out the Commission's initial views and the key areas it intends to progress for the AEMO rule change request on Unlocking CER benefits through flexible trading. Through this rule change, we aim to improve flexibility and trading of consumers' energy resources (CER) to unlock value for consumers. We are also aiming to facilitate better integration of flexible CER into the power system to deliver a more reliable and secure energy system that would benefit all consumers. The paper builds on and considers stakeholder input to the consultation paper published in December 2022.

2 We are seeking stakeholder input and views on the Commission's initial positions and key areas that it intends to progress through this rule change. Submissions are due on 14 September 2023.

Integrating CER is necessary for a successful energy transition

3 Households and businesses are taking up consumer energy resources at an accelerated rate as they offer consumers the opportunity to have lower energy bills and a greater level of control over their energy use. CER includes responsive/ flexible load and generation at customer premises such as rooftop solar panels, batteries, home and businesses energy management systems, and electric vehicles, as well as 'smart devices' such as controllable hot water systems. CER can also include responsive load at large customer sites such as refrigeration and heating ventilation and air conditioning (HVAC).

4 CER along with distributed energy resources (DER), such as neighbourhood batteries, are part of the power system and will have an important role in how the energy system performs and transforms.

5 These resources can change how energy in households, businesses, communities, and the wider system is generated, stored, and consumed. CER and DER can help to manage existing network infrastructure and play a crucial role in balancing fluctuations in energy demand and supply, particularly with more weather-dependent renewable generation in the market. This can reduce overall system costs and improve reliability.

6 Ensuring that consumers can benefit from their CER assets and if they choose to make these resources available can contribute to and operate within the system. This will be key to achieving an affordable, reliable, and secure low-emissions energy supply for all consumers.

7 If CER is integrated well, there will be positive outcomes for all market participants, with flow-on benefits such as cost-efficiency and reliability for consumers – including those who do not have access to newer CER technology. A range of studies have estimated the net benefit of effective integration and coordination of CER to be between $1 billion - $6.3 billion by 2030-2040 (CSIRO and Baringa consulting, 2019, ARENA, NERA consulting, 2022 respectively).

8 If the growing quantity of CER and DER is not integrated well, it has the potential to increase energy costs. For example, costly network and generation infrastructure would need to be built (which could be served by CER and consumer response at lower cost) to meet forecast

increases in electricity demand. This would result in additional costs for industry and customers. The market operator would also need to intervene to deliver greater security and reliability. This will also increase costs for consumers.

This AEMO rule change request is one of many CER reforms underway

9 This AEMO rule change request forms one of many CER reforms being progressed by market bodies and jurisdictions to integrate CER and DER into the energy market. The rule change proposal was developed within the Energy Security Board's (ESB) CER implementation plan that formed part of the ministerially endorsed ESB post-2025 work plan.

10 Although the ESB ceased at the end of June 2023 (being modified into the Energy Advisory Board from July 2023), it will publish a CER and data end-of-program report which shows the components of the CER work program and how they fit together.

11 We have also mapped and described the broader CER landscape in Chapter two of this directions paper. This gives stakeholders an understanding of how this specific rule change proposal may contribute to the broader goal of integrating CER into the energy market.

12 This rule change is considering how consumers and energy market service providers (e.g. retailers, financially responsible market participants (FRMPs), and aggregators) use and interact with CER to understand the opportunities for maximising the value of flexible CER.

13 For consumers, we are considering what they need to use their CER as they intended but also have the confidence to allow their CER to be used to support system needs at lower cost. This includes enabling choice, considering appropriate incentives including price outcomes as well as clear information and protections - noting differences within and across consumer segments.

14 For energy market participants, we will be considering the technical and market process changes (including financial arrangements) needed across the supply chain; that is, the changes needed to retail and wholesale markets, networks, and for the market operator to perform its role.

There are three key areas in AEMO's rule change proposal

15 AEMO's rule change request stated that current market arrangements do not adequately support the flexible trading of CER in the NEM. To enable flexible trading AEMO put forward a specific model – referred to as flexible trader model 2 (FTM2) and a high-level design. The model enables consumers to have a private metering arrangement for their flexible or responsive CER within their electrical installation and have these resources managed by a separate FRMP.

16 The model is intended to provide another way for CER to be managed separately from the consumer's passive load (i.e., lights/fridges etc) and seen in wholesale market settlements. It also allows for flexible trading of CER with multiple FRMPs at all types of consumer premises.

17 Most stakeholder responses to the consultation paper supported the premise that consumers

should be able to maximise the value of their CER and that CER should be better integrated into the NEM. However, stakeholder submissions did not support AEMO's specific proposal for flexible trading with multiple FRMPs for consumers and specifically residential consumers. There was a mix of reasons for this including but not limited to the significant implementation costs and complexity that would be required to give effect to the arrangements. Comments also suggested the proposal does not align with consumer preferences and there are a range of other reforms (such as interoperability and data) that would need to occur before progressing with AEMO's specific proposal.

18 Given stakeholder feedback, we have decided to break AEMO's rule change request into three core areas which we will take forward. They cover:

1. Optimising the value of CER flexibility by examining opportunities for separately identifying and managing flexible CER.
2. Flexible trading of CER with multiple energy service providers at residential and/or commercial premises.
3. Opportunities to improve how energy use is measured for street lighting and other street furniture (such as park BBQs).

19 The first two key areas build on and support the objectives of successfully integrating CER to achieve increased consumer benefits and a more efficient future power system.

20 The third area relates to improving arrangements for managing energy use from street lighting and street furniture given innovation in the measurement capability that is now being built into street lights. This offer benefits for local councils adopting energy efficiency measures and potentially lowering their energy costs.

21 We outline our views and positions for each of these below and in Chapters three to five of this paper.

Optimising the value of CER flexibility – separately identifying and managing flexible CER

22 The Commission sees there are opportunities to improve how flexible CER is separately identified and managed (ie., how consumers or their energy service providers (retailers or aggregators) use and interact with CER) in the market. These are separate from whether there should be flexible trading with multiple service providers at a single household or business premise.

23 Separately identifying CER allows it to be managed separately from other 'passive' consumer load. This enables specific products and services which can reward and harness the value of CER to be developed.

24 Key benefits for consumers include the availability of different CER network and retail pricing offers or direct payments for the use of their assets. For energy service providers, key benefits include the potential to participate in the provision of network or wholesale market services. For networks, key benefits include the ability to procure specific services from these resources, which will reduce the need for network augmentation. For the market operator,

aggregated CER represents a large and growing resource that can be used to deliver secure, reliable, and low emissions energy at lower cost.

25 There are a few ways CER can or could be separately identified and managed today. These include establishing a second connection point to the distribution network with a NEM compliant meter, or through a metering installation that has dual and/or subtractive metering (Dual metering is typically used for controlled hot water, and subtractive metering is used in embedded networks where there is a parent/child metering arrangement). There are also metering arrangements for participating in the ancillary services market.

26 Further, there are non-market options that use measuring devices behind the primary meter to help consumers optimise their generation and consumption, but these are not recognised for wholesale energy market settlement purposes.

27 AEMO has proposed a new option that allows for an additional settlement point behind a consumer's primary connection point. This allows for CER flows from that additional settlement point to be subject to different metering standards and recognised in wholesale energy market settlements. This option could apply to large and small consumers and businesses.

28 We will consider the existing approaches and merits of AEMO's proposed new option to determine what if any changes are needed to improve CER integration. Importantly, the Commission considers a range of options may be the preferred outcome given different consumer preferences and service provider business models. We will examine the existing and proposed models against our six assessment criteria outlined below.

29 We are seeking stakeholder input into these key considerations and will engage stakeholders further on technical and market functionality aspects as we progress with the rule change. As outlined below, we are specifically considering the costs and benefits of any proposed change.

30 In addition to the above, the Commission has identified an opportunity to consider the role of network and retail pricing in further unlocking the value of CER flexibility. Efficient pricing can deliver valuable signals. For example, efficient retail and network prices could incentivise consumers or their service providers (retailers or aggregators) to adjust their import or export of energy, or to agree for their CER to be used for the provision of network or market services. This could:

- improve the value consumers generate from their assets, via payment for services and/or reduced consumption costs
- reduce network congestion and augmentation costs, as well as increased network efficiency
- reduce retailer wholesale and hedging costs
- improve reliability, security and emissions reduction, as well as lowering costs for all consumers.

31 The Commission is considering these pricing issues as part of its forward-thinking initiatives and CER priorities, while it also acknowledges that establishing efficient pricing is a necessary

but not sufficient condition to successfully enabling the integration of CER.

Flexible trading of CER with multiple energy service providers at small and large customer premises

32 As noted, AEMO's rule change proposal is for all consumers to be able to engage with multiple service providers at their premises if they choose to. We outline the Commission views for each consumer segment below.

Small customers - households and small business

33 For small customers, multiple energy service providers, such as retailers and/or FRMPs at a single property may deliver some benefits via increased competition, innovation and choice. However, we consider that the implementation challenges and related costs for introducing AEMO's specific FTM2 arrangements with provision for multiple energy providers are likely to be significant for this segment of consumers.

34 For residential and small business consumers, we need to consider how energy-specific consumer protections would be applied and to whom. For example, if some CER services could be provided by parties that are not authorised retailers, which may be a way to enable market innovation, then new consumer protections would need to be designed for those secondary energy service providers. The level of protection would likely need to vary depending on the type of service being offered and the potential consumer harms that could occur. This would also include how responsibilities such as life support, disconnections, and hardship are split between the primary retailer and the second energy service provider.

35 We note that the AER is undertaking a review of consumer protections for future energy services and options for reform of the National Energy Customer Framework (NECF). Given the work is still in progress, the Commission is considering this rule change request based on the existing NECF arrangements. We are liaising with the AER on their review, and we will consider any outcomes of their work as required.

36 There is also a range of technical and operational challenges that would need to be solved for residential and small business consumers. For example, if an energy service provider operates at a second settlement point (behind the consumer's primary connection point), then we would need to consider how market communications are provided for network services or wholesale market interactions. For this segment of consumers, given consumer protections in place, there may be a need for these to go to and from the service provider via the consumer's retailer.

37 Further, there are competition issues to consider including the allocation of costs and balance of obligations where multiple service providers are considered. For example, as dynamic operating envelopes are introduced, the allocation of dynamic capacity between the retailer and the second energy service provider would likely need to be determined rather than left to commercial negotiation. In aiming to maintain competitively neutral arrangements, the relative service and revenue opportunity compared to the cost of providing consumer protections required for service providers and retailers is one key dimension to consider. In

this context , we would also need to consider who to allocate network service charges to, ie what would be the allocation between the existing retailer and the secondary energy service provider.

38 Given the breadth of changes that needed for market participant and system processes, and because the benefits of making the changes for residential consumers will accrue to some consumers but the costs will be faced by all, the Commission is proposing not to progress AEMO's specific proposal for multiple service providers with secondary meters at small customer premises at this time. The Commission notes that small customers would continue to be able to engage multiple service providers via existing mechanisms and in accordance with the current rules, e.g. if they have multiple connection points at a single property or provide ancillary services.

39 We consider that there could be an opportunity to progress a trial rule (ie., sandboxing) for AEMO's proposed FTM2 for small customers, allowing for small customer outcomes, market functions, and costs to be better understood.

Large customers - commercial and industrial

40 The Commission notes that some energy service providers are currently managing large consumers' energy resources separately from arrangements the large consumer has with their retailer. Noting this, we consider there are opportunities to improve on the available arrangements.

41 For example, some service providers use these consumer resources in the FCAS markets. This does not necessarily require the CER to be separately identified but does a range of requirements that need to be met under the market ancillary services specification.

42 Some service providers are also using the embedded networks framework to obtain a second connection point and national metering identifier allowing consumer resources to participate in the wholesale market as a small-generation aggregator.

43 The embedded networks framework was not set up for this type of engagement and we consider there is an opportunity to provide a more appropriate framework. We also note that large consumers do not require the same level of consumer protections that apply to small consumers. This removes some of the complexity of designing a fit-for-purpose arrangement.

44 On this basis, the Commission is seeking stakeholder feedback on options, including the elements of AEMO's FMT2 to improve flexible trading with multiple service providers for the different parts of large customers' price-responsive resources. The Commission recently released its consultation paper that is looking at how price-responsive resources can be integrated into the wholesale energy market.

Measurement of street lighting and public furniture

45 AEMO propose the NER include a new framework for the measurement of street lighting and other public furniture. This is because there has been innovation in how energy flows for street lighting can be measured (i.e. streetlights are being built with measurement and communications capability built into them). Further, using actual energy flow data rather than

an algorithm for electricity charges would improve market settlements and have benefits for consumers by potentially lowering energy costs paid by local councils. Chapter five provides more detail on AEMO's proposal.

46 There are benefits in progressing AEMO's proposed framework, and we note that stakeholder submissions supported a framework that recognises the measurement capabilities of these devices. The proposal also aligns with our consideration of different metering arrangements for CER. We are seeking stakeholder feedback on requirements for the metering installation, responsibilities of parties, and the potential application of the framework to all street furniture (including but not limited to street lighting). We also are seeking feedback on the costs for implementing AEMO's proposed option.

We are doing a CBA on the benefits of CER and the costs of any change

47 We have engaged Energeia to assess the costs and benefits of increased integration of CER flexibility – both to consumers and the system. They will prepare a report for this rule change and develop a modelling tool that the Commission can use in this and future rule changes and reviews. The work by Energeia will include:

- Modelling whole of system benefits from different types of load flexibility, focusing on CER connected to the low-voltage network. Energeia will focus on specific technologies (such as water heating, cooling, and electric vehicles) and estimate potential cost savings in the wholesale market, frequency services markets and network services, as well as the benefit of emissions reductions.
- Developing case studies that show how the benefits of CER will flow to customers with CER, customers without CER, and energy market service providers (including retailers, networks, and aggregators). Energeia will use retail prices, other incentives (such as solar PV and electric vehicle rebates), costs to customers, and standardised customer loads to inform how benefits will flow to these different groups.
- Forecasting the growth of flexible loads to 2050 to show the long-term benefits of optimising the value of CER flexibility.

48 Their work will also consider, where necessary, the costs of any changes proposed by the Commission for this rule change. Attached to the Directions Paper is Energeia's approach and methodology paper for stakeholder comment and feedback. Energeia's draft modelling results will be provided with the draft determination scheduled for publication at the end of the year. We will seek stakeholder feedback on the draft results at that time.

Our assessment criteria

49 Our consultation paper outlined our assessment approach for this rule change, including our proposed assessment criteria. We did not receive any stakeholder feedback on these. We will continue to apply our considerations having regard to these. Our criteria include:

- Consumer needs and outcomes (including associated protections)
- Market efficiency related to competition and innovation

- Technical requirements (and impacts on safety, security, and reliability), and
- Market functionality requirements including implementation costs.

50 We are also considering the impact of the proposed rule and other options on reducing greenhouse gas emissions; in particular, if there are material differences in emissions outcomes from different rule change options.

We welcome stakeholder feedback and value ongoing engagement

51 We value stakeholder input and engagement on this paper, including the questions set out below. We also welcome stakeholder feedback on any additional matters that may assist the Commission in making its decision.

Making a written submission

52 Stakeholder submissions to this paper must be lodged by 14 September 2023. To make a submission go to the Commission's website, www.aemc.gov.au, find the "lodge a submission" function under the "Contact Us" tab, and select the project reference code ERC 0346.

Other opportunities for engagement

53 We note there are many implementation considerations that cut across the needs of consumers, market participants and the market systems more broadly. We intend to engage stakeholders further through a series of forums and workshops to consider the detail of the options outlined in this paper as we progress toward the draft determination.

54 Chapter one provides an outline of our stakeholder engagement timelines, noting a stakeholder forum is being planned for mid to late September 2023. Please contact the project sponsor with questions or feedback at any stage.

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APPENDICES

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1 INTRODUCTION

1.1 This Directions paper

This paper sets out the Commission's views and positions for this rule change at this stage. It covers our analysis to date, taking into account stakeholder views from the consultation paper, and provides the directions taken by the Commission to identify the areas and options it will progress for the draft determination (and draft rule if necessary).

This chapter provides at a high-level AEMO's rule change request, the scope of the rule change, and our approach to assessment. Chapter two builds on the consultation paper that highlighted the importance of consumer energy resources (CER) integration in the future of the National Electricity Market (NEM) and the supporting CER reforms that are underway.

The rest of this paper outlines the key areas and options the Commission will further investigate and seeks stakeholder feedback on the suite of considerations for each of these. We consider AEMO's rule change request alongside a range of existing approaches as we seek the best means to maximise the value of CER flexibility that unlocks additional value for consumers.

1.2 AEMO's proposal to unlock CER benefits through flexible trading

As set out in the consultation paper, AEMO outlined in its rule change request that the current national electricity rules (NER) and in particular, the current metering arrangements, do not support consumers to easily access products and services which maximise the value of their CER uptake.

AEMO considers that the separate metering of CER - separate from inflexible or passive load (e.g. lights, fridges etc) - is a means to unlock more CER value for consumers and the market.[1]

In this context, AEMO also outlined in its rule change request that the current metering installation requirements do not facilitate non-traditional connection and measurement arrangements (such as a different meter type). AEMO highlights that the existing arrangement to establish a second connection point for wholesale market interaction is difficult and costly for consumers to do.[2]

To address these issues, AEMO has proposed a specific model (referred to in this paper as AEMO's model or FTM2) with a high-level design. This is to enable consumers and the market to separate flexible CER and have them managed and recognised in wholesale market settlements if they choose. The AEMO model also allows for a consumer to contract with more than one financially responsible market participant (FRMP). For example, having one FRMP (or retailer) for the consumer's flexible CER and another for their inflexible or passive

1 Australian Energy Market Operator, Rule change request - Flexible trading arrangements and metering of minor energy flows in the NEM, 6 May 2022 (AEMO rule change request), p. 3.

2 AEMO rule change request, p. 8, 9, 13.

load if they choose to. AEMO also note consumers could have all of their resources managed by one FRMP. [3]

AEMO also identified other cases where the new meter type could be used for currently unmetered loads, such as street lights and street furniture (e.g. park BBQ's).

1.3 Scope of this rule change

AEMO submitted its rule change in May 2022. We subsequently published a consultation paper in December 2022. We received 64 submissions to the consultation paper with stakeholders commenting on the possible benefits, implementation challenges, and reasons for not progressing the proposed rule**.** Stakeholder views are presented in Chapters three to five of this paper. During this rule change, we have continued meeting with stakeholders to discuss issues and areas for the Commission to consider.

Based on feedback and our initial analysis, we have broken AEMO's rule change into three core areas. These include:

1. Optimising the value of CER flexibility by examining opportunities for separately identifying and managing[4] flexible CER.
2. Opportunities for flexible trading of CER with multiple energy service providers at residential and/or commercial premises and
3. Opportunities to improve how energy use is measured for street lighting and other street furniture.

The first two recognise the broader objectives of the rule change to achieve greater CER integration in the NEM. The third area relates to a specific proposal by AEMO in its rule change request for improving existing arrangements for how energy from street lights and other street furniture is measured and accounted for in market settlements.

There are a number of reforms underway to achieve better CER integration. Noting this, and for the purposes of this rule change, we are not considering the following specific issues. This is because they are either being progressed in those other reforms or outside the scope of this rule change. These issues include:

- An explicit review of the role of network and retail pricing tariffs and structures
- Reforms to the provision and access of data and interoperability, and
- Interactions with the wholesale energy market.

We make some commentary on the importance of these reforms in this paper, to the extent that they enable greater CER uptake and integration in the NEM. Chapter two highlights those reforms that are seeking to address these broader areas.

We note that AER is undertaking a review of consumer protections for future energy services, hence we are not considering broader questions of consumer protections in this rule change. Given the review is still in progress, we are considering this rule change based on the existing

3 AEMO rule change request, Appendix B HLD p. 42.

4 That is, how consumers or their energy service providers (retailers or aggregators) use and interact with CER).

NECF arrangements. We are liaising with the AER on their review and will consider any outcomes of that process to the extent necessary for this rule change.

1.4 Our assessment approach

Considering the National Electricity Objective (NEO) and the National Energy Retail Objective (NERO), and the issues raised in the rule change request, the Commission is assessing the rule change request against the assessment criteria outlined below. The assessment criteria outlined below reflect the key potential impacts – costs and benefits – of the rule change request.

Our regulatory impact analysis methodology

The Commission's regulatory impact analysis may use qualitative and/or quantitative methodologies. The depth of analysis will be commensurate with the potential impacts of the proposed rule change. We may refine the regulatory impact analysis methodology as this rule change progresses, including in response to stakeholder submissions. Further discussion of our cost and benefit analysis assessment is given in Section 1.4.2 below.

Consistent with good regulatory practice, we also assess other viable policy options - including not making the proposed rule (a business-as-usual scenario) and making a more preferable rule - using the same set of assessment criteria and impact analysis methodology where feasible.

1.4.1 We will use six criteria to assess the issues and any change options

In the consultation paper, we outlined the following six criteria below. Stakeholder submissions did not specifically comment on the assessment criteria but did make commentary on the need for a costs and benefits analysis of any change options proposed.[5] Submissions also made commentary on the criteria below with respect to AEMO's specific proposal for separately measuring CER and introducing flexible trading with multiple service providers. Stakeholder views in this context are provided in Chapters three and four related to these issues.

Outcomes for consumers. For consumers who can use and choose to take up more flexible products and services for their CER, we are examining needs and benefits including:

- What consumers need to use their CER as they intended but also have the confidence for their CER to be used in a way that supports the power system at lower cost. This includes information, appropriate incentives, including pricing outcomes and appropriate protections where necessary.
- What changes are necessary so that consumers be appropriately protected when dealing with multiple FRMPs?
- Would the change give consumers a more direct connection to price incentives in a way that allows them to get more value out of their CER?

5 Australian Energy Council (AEC), p.2, Vector. p.5.

- What benefits that might be created for all consumers, including those without CER, such as increased security and reliability, more innovative services, or lower prices and how do they measure against costs?

Technical feasibility and impacts on safety, security, and reliability: To make our decision, we are considering if the rule change would create increased options for flexible demand and ancillary services. Likewise, we will consider if, by enabling resources to be independently treated in market settlements, the rule change will make it more likely for businesses and consumers to use and invest in CER in a way that efficiently promotes system reliability and security.

Principles of market efficiency, in particular, competition: The Commission will consider the overall impacts on market efficiency, with a key focus on if the proposal would create greater retail competition through disaggregating existing energy services and encouraging new energy services.

Increases to innovation and flexibility: We will consider if, over the longer term, the rule change is likely to increase the potential for innovation in services or service types being developed across these markets: retail market – i.e. new offerings for consumers; the wholesale electricity market; ancillary services markets; markets for network services.

Implementation requirements and functions and associated costs: We are carefully considering implementation requirements and the impact of any costs on all parties. We are also considering the interaction of this rule change with other reforms already underway. This is further discussed below.

Decarbonisation: The Commission is examining whether the rule change would efficiently enable the timely decarbonisation of the energy market and facilitate consumers using their CER in ways that reduce their emissions. When the new emissions component is incorporated into the NEO and NERO, we will consider the ability of the proposed reform to efficiently contribute to the achievement of government targets for reducing Australia's greenhouse gas emissions.[6]

1.4.2 We are undertaking a CBA on the benefits of CER and the costs of any change

We have engaged Energeia to assess the costs and benefits of increased integration of CER flexibility - both to consumers and the system. They will provide the Commission with a modelling tool that we can use to inform our decisions in this rule change, as well as future reviews and rule changes, and reviews.

Energeia's analysis will involve three key steps:

1. Developing a methodology to model the whole of system benefits different types of load flexibility, focusing on CER connected to the low-voltage network. Energeia will focus on specific technologies (such as water heating, cooling, and electric vehicles) and estimate potential cost savings in the wholesale market, frequency services markets, and network services, as well as the benefit of emissions reductions.

6 The Statutes Amendment (National Energy Laws) (Emissions Reduction Objectives) Bill 2023 was introduced into South Australian Parliament on 14 June 2023 and is expected to be passed later this year.

2. Developing case studies to show how the benefits of CER will flow to customers with CER, customers without CER, and energy market service providers (including retailers, networks, and aggregators). Energeia will use retail prices, other incentives (such as solar, PV and electric vehicle rebates), costs to customers, and standardised customer loads to inform how benefits will flow to these different groups.
3. Forecasting the growth of flexible loads to 2050 to show the long-term benefits of optimising the value of CER flexibility.

We will also consider the costs of implementing any changes proposed by the Commission for this rule change. Attached to this Directions Paper is Energeia's approach and methodology paper for stakeholder comment and feedback.

We will also publish Energeia's draft modelling results alongside our Draft Determination and rules (if needed) for stakeholder feedback.

> QUESTION 1: ENERGEIA COST AND BENEFIT ANALYSIS APPROACH AND METHODOLOGY
>
> Are there any other considerations or issues you consider should be included in Energeia's assessment approach and proposed methodology?

1.5 Opportunities for stakeholder engagement

The Commission is committed to ongoing engagement with stakeholders and has carefully considered stakeholder feedback to date in assessing the rule change. We are seeking further stakeholder feedback on the Commission's views and directions set out in this paper via submissions and participation in planned discussion forums.

Table 1.1 sets out the timeline for the rule change and opportunities for further stakeholder engagement.

How to make a submission

Go to the Commission's website, www.aemc.gov.au, find the "lodge a submission" function under the "Contact Us" tab, and select the project reference code ERC0346.[7]

The Commission publishes submissions on its website. However, we will not publish parts of a submission that we agree are confidential, or that we consider inappropriate (for example offensive or defamatory content, or content that is likely to infringe intellectual property rights).[8]

7 If you are not able to lodge a submission online, please contact us, and we will provide instructions for alternative methods to lodge the submission.

8 Further information is available here: https://www.aemc.gov.au/contact-us/lodge-submission

Table 1.1: **Indicative timing for the rule change and points for stakeholder engagement**

STAGE	TIMELINE
Commission publishes directions paper	3 August 2023
Stakeholder submissions due	14 September 2023 (6 week consultation period)
Stakeholder forums and workshops	September and October 2023
The Commission publishes a draft determination and may publish a draft rule	December 2023
Stakeholder submissions due	Mid January 2024
The Commission publishes a final determination and final rule (if any)	March/April 2024
Approximate implementation date, following implementation work by other bodies	Estimated Q3 2025

1.6 Concepts and language used for this rule change

The consultation paper outlined a range of concepts and terminology. We note these below for stakeholder reference.

Consumer energy resources (CER). Flexible load and generation at consumers premises. CER assets include rooftop solar panels, batteries, home, and business energy management systems, pool pumps, and electric vehicles (and charging), as well as 'newer smart devices' such as hot water systems and traditional controlled hot water. For large customers, these can include heating and air conditioning (HVAC), on-site refrigeration, and on-site backup generation. We also include distributed energy resources (DER) such as community batteries for the purpose of this paper.

Flexible trading of CER. Consumers can take up different product and service offers for their CER. For the industry, it means consumer resources and consumption can be better enabled to use in the wholesale energy and ancillary services market and for network services.

Connection point and **Settlement point:** Connection point is used throughout the rules (and in the electricity sector) to mean the point which is both:

(a) the physical point of connection between the consumer's premises and the distributor's network, and

(b) the point at which energy is measured for market settlement.

For the purposes of this paper, we use 'connection point' in a more limited way to cover only paragraph (**a**) above and the associated responsibilities, such as the connection contract or operational responsibilities.

As noted in the consultation paper, we use the new term '**settlement point**' to cover paragraph (**b**) and associated settlement obligations, such as metering requirements,[9] wholesale payment requirements[10] and customer billing requirements.[11]

Secondary settlement point. AEMO's proposed additional settlement points at a consumer's premises that would be behind the existing connection and settlement point (referred to as the **primary settlement point**), which would have a National Metering Identifier attached to them, and would be able to be separately identified in AEMO systems.

National Metering Identifier (NMI). Each metering installation associated with a connection point (or in the case of this paper, settlement point) is identified in MSATS with a unique NMI. An NMI is generally generated by the local distribution network.

Financially Responsible Market Participant (FRMP). Entities (e.g. retailers or aggregators) that a consumer would contract with for services provided at settlement points, where those services are traded in the wholesale markets. A FRMP does not necessarily have to be an authorised energy retailer (this will depend on whether it sells electricity to its customers), but, as defined in the NER, must be registered by AEMO to be able to participate in wholesale markets.

Small Generation Aggregator (SGA). A registered participant role within the NEM. An SGA supplies electricity from one or more small generating units to the NEM and is financially responsible for the electricity provided.

9 National Electricity Rules, Chapter Seven
10 National Electricity Rules, Chapter 3
11 National Energy Retail Rules

2 CER INTEGRATION IN THE NEM AND SUPPORTING WORK PROGRAM

This chapter sets out the broader context and environment for this rule change. It covers the:

- objectives for CER integration and optimisation in the NEM, and
- CER implementation program of work and how this rule change fits in.

This rule change is one of the many reforms which all need to work together to achieve the intended consumer outcomes and successful market integration.

2.1 CER is part of the future power system

'Consumer energy resources' (CER) such as solar panels, batteries, home and businesses energy management systems, and electric vehicles, as well as 'smart devices' such as hot water systems and traditional controlled hot water, represent a growing proportion of the Australian energy sector. AEMO forecasts that consumers' rooftop solar will increase by 65 per cent by 2050 with many of these systems complemented by battery energy storage. There is also expected to be a surge in electric vehicles in Australia, with 92-99 per cent of all vehicles expected to be electric by 2050.[12]

Businesses are also increasingly moving to CER in an effort to reduce energy costs and emissions. A survey completed by Energy Consumers Australia (ECA) in 2022 highlights that small businesses are more likely to have batteries than residential consumers, and more small businesses will consider installing these in the coming years.[13]

Given its increasing prevalence, CER will have an increasingly important role in how the energy system performs and transforms. This is because CER has the ability to change how energy in households, businesses, communities, and the wider system is generated, stored, and consumed. Ensuring that consumers can benefit from their CER assets and if they choose to make them available, those resources can contribute to and operate within system requirements, will be key to achieving an affordable, reliable, and secure, low emissions energy supply for all consumers in the future.

2.2 A successful energy market transition includes CER

Over the coming decades, the electricity market is expected to see a substantial increase in electricity consumption due to the electrification of the economy. With more weather-dependent renewable generation in the market, CER and DER will, if managed effectively, play a crucial role in helping balance fluctuations in energy demand and supply. It will also help manage existing network infrastructure.

12 AEMO 2022 Integrated System Plan (ISP).

13 ECA Sentiment and Behaviour Consumer Survey June 2022.

AEMO's Electricity Statement of Opportunities (ESOO) 2022 indicates that coordinated CER can support reliability by meeting energy system needs and reducing the incidence of 'unserved energy' events where supply cannot keep up with demand.

A range of studies have estimated the net benefit of effective integration and coordination of CER to be between $1 billion[14] and $6.3 billion[15] by 2030-2040. Energeia's ongoing study (as noted in Chapter one) will provide further estimates of the net system benefit of load flexibility from CER.

If integrated well, there would be positive outcomes for all market participants, with flow-on benefits such as cost-efficiency and reliability for consumers, including to those who have limited or no access to CER technology.

2.3 What does the successful integration of CER mean?

There are two fundamental requirements for the successful integration of CER. It requires consumers to be able to use their CER for the purposes they bought it (for example, by using their CER for air-conditioning, hot water, transport, or running their business). This provides benefits for the consumers with CER, in terms of functionality and potentially also as a way to reduce their energy costs.

The second key requirement is the ability for flexible CER, where the consumer chooses, to be used for both grid support and power system operation. If CER can be used to augment other grid resources and thereby avoid higher generation, network, or intervention costs this can reduce costs for all consumers, whether or not they have CER.

When we can clearly demonstrate both direct and indirect benefits to consumers, then their trust and confidence in the market will grow. It will be important for market bodies and industry participants to work hand in hand with consumers to achieve this level of trust.

2.4 This rule change request from AEMO is one of many CER reforms underway

This rule change request is one of a number of CER reforms underway across the market bodies. Together as the Energy Security Board, the market bodies developed the CER implementation plan that was part of the post-2025 NEM reform recommendations package.[16] The program of work recognised the importance of successfully integrating CER into market and system processes. While a final report from the ESB on CER achievements, work underway and gaps is being prepared, a new body has been created to track and coordinate progress on energy market reform including work to integrate CER. The Energy Advisory Panel (EAP) consists of the Chairs of the three market bodies and an ACCC Energy Commissioner as an observer.

14 CSIRO, Baringa consulting, 2019

15 Australian Renewable Energy Agency study (ARENA), NERA consulting, 2022).

16 The CER Implementation Plan was published in July 2021. Further information can be found here: https://www.datocms-assets.com/32572/1629954551-esb-final-report-explainer-clean-and-smart-power-der-pathway.pdf.

In the consultation paper for this rule change, we indicated that we would consider the needs of consumers and other segments of the supply chain in regard to capturing the value of CER flexibility.

To do so, we undertook a mapping exercise to provide stakeholders with a reference of where this rule change fits in, particularly given the range of CER priorities and reforms that are being progressed. We considered each segment of the supply chain, that is consumers (households and businesses), the retail market, networks, the wholesale market, and broader power system, and had regard to the different requirements that are needed to underpin the successful integration of CER.

Understanding the different requirements for each segment of the supply chain helped us identify the barriers and gaps for optimising CER flexibility and integration today. These included, for example, consumer needs and benefits (including incentives and protections), market and system needs (including market processes and interactions, technical, data, and interoperability requirements), and market benefits (competition and innovation). Appendix B provides a map of the existing CER reforms addressing the key needs of different parts of the supply chain.

This analysis provided a basis for what this rule change needed to cover and what changes might be needed. As noted, there is a suite of issues being addressed by the other CER reforms, and this rule change is just one of these. Continued coordination and implementation of all the CER reforms will be necessary if we are to achieve the successful integration of CER in the NEM.

2.4.1 Interaction with other CER implementation plan reforms

There are a number of key reforms being progressed that are relevant to or intersect with this rule change. There is also a range of trials underway to consider what changes may be necessary from a consumer and market perspective. The reforms that specifically intersect with this rule change include:

Integrating price-responsive resources into the NEM

Many types of CER respond, or could respond, to wholesale and network price signals but are not currently scheduled in the wholesale electricity market. If these resources remain invisible to AEMO and the market, then they could negatively impact the efficiency of the NEM. Furthermore, not integrating these resources into the wholesale electricity market reduce the value that these resources can create.

The participation of these resources in central dispatch is being considered through a separate rule change request submitted to the Commission from AEMO. The Commission will be considering whether and how to better integrate these resources in the NEM.[17]

17 AEMC, Integrating price-responsive resources into the NEM. Available at www.aemc.gov.au/rule changes.

AEMC metering review

Smart meters are foundational to a more connected, modern, and efficient energy system that supports future technologies, services, and innovation. A faster replacement of legacy meters will enable consumers to access the benefits that smart meters can provide. The AEMC is considering options to accelerate the deployment of smart meters in the NEM. It is also considering access and provision of energy and metering data for its customers and agents and the provision of power quality data for distribution network businesses. A draft report was published in November 2022 and a final is expected in August 2023.[18]

AEMC Review into CER Technical Standards

The AEMC is undertaking a review of CER technical standards in the NER. It is considering:

- compliance with and enforcement of CER technical standards in the NER
- the interpretation of standards by national electricity market (NEM) participants and other relevant stakeholders, and
- interactions between the NER and other regulatory regimes that require compliance with CER technical standards.

A draft report was published in April 2023 and a final is expected second half of 2023.[19]

Former ESB customer collaboration work

As part of the CER implementation plan, the ESB sought to obtain consumer input to test assumptions and understand how customers might want to engage with different service providers or products. The Consumer Insights Collaboration work conducted a series of workshops to generate insights that could help policymakers, regulators, energy retailers, and service providers, identify barriers that prevent customers from taking up DER services or realising their full value. Some of the barriers identified through the collaboration include:

- *Misalignment with motivation:* Expectations embedded in products or services may not be not aligned with consumer expectations and aspirations.
- *Ineffective communication:* Information can be too complex or confusing or too generic, and may be oriented to English-speaking consumers using exclusionary language via an in accessible media channel.
- *Complexity:* Flexible CER involves the use of complex technology, automation, and energy use, creating a more complex energy system.
- *Lack of trust*: Consumers have low levels of trust in energy market institutions and organisations, and in CER products and services.
- *Lack of Skills Knowledge, Experience and Opportunity.* Most consumers start from a low level of interest and understanding of energy system issues. Some are not comfortable with technology, and some cannot access some CER products and services (e.g. renters).

18 AEMC, Review of the regulatory framework for metering services, draft report, 3 November 2022, available at: https://www.aemc.gov.au/market-reviews-advice/review-regulatory-framework-metering-services.

19 Further information is available on the project page for this review, https://www.aemc.gov.au/market-reviews-advice/review-consumer-energy-resources-technical-standards.

- *Lack of Perceived Value***:** Consumers generally prefer the status quo, and do not want to change unless there is a clear benefit in doing so.
- *High Perceived Costs:* The upfront costs of flexible CER and energy use may be seen as too expensive, and out of reach without incentives such as rebates.

In our consultation paper, we noted some findings of this work in regard to consumer perceptions and behaviour for uptake and use of their CER. The Commission will continue to use these findings and those from other work (e.g. by the ECA and existing trials) for this rule change and other CER reforms.

Interoperability

The former ESB's interoperability reforms workstream aims to enable CER interoperability to enhance access and utilisation of various CER products and services by consumers, reduce complexity and time involved in managing equipment, provide greater flexibility to the energy system, and result in reduced costs and improved energy security for all consumers.

The workstream's priority was to develop a NEM-consistent approach to the implementation of an inverter communication protocol (the Common Smart Inverter Profile Australia or CSIP-Aus) that would support the use of flexible export connections for small customers and lay the foundation for the broader integration of CER, including behind-the-meter interoperability and trader use-cases.[20]

The former ESB has identified a number of recommendations that would support a more efficient and consistent implementation of CSIP-Aus. The report for this workstream is expected to be published in late 2023.

While interoperability may be relevant and important to consider for this rule change, considering the overarching interoperability policy for successful integration of CER In the NEM is outside of the scope of the rule change request.

Data work program

The ESB also had a data work-stream to consider the data and communications capabilities required to support the emerging market and system.

The data strategy implementation reforms had two work streams:

- *Energy data access and sharing*: This stream aims to reduce barriers to data access to inform policy, planning, and research. Implementation of the initial data reforms is dependent on legislation passing the South Australian parliament. They will then be progressed by AEMO.[21]
- *Priority data gaps:* This stream considered emerging data needs for the energy transition, and had a strong focus on CER.[22] Priority projects include:

20 https://esb-post2025-market-design.aemc.gov.au/integration-of-distributed-energy-resources-der-and-flexible-demand#development-of-interoperability-policy.

21 https://esb-post2025-market-design.aemc.gov.au/data-strategy

22 ESB, Data Strategy, https://esb-post2025-market-design.aemc.gov.au/data-strategy.

- *Electric Vehicle Supply Equipment visibility:* The ESB recommended new processes to capture data on the installation of EV chargers to support the effective planning and management of growing EV electricity demand. AEMO will now propose rule changes and work with officials on supporting arrangements for this work.[23]
- *Network visibility for market planning:* The Network Visibility project is considering the critical information needed by stakeholders to make CER planning decisions and to manage network-related risks. A consultation paper was published for Phase 1 of the Network Visibility project in July 2023.[24] The AER is now leading this work and will consider stakeholder input and undertake trials to inform options to deliver the data[25].
- *Billing transparency:* The ESB released a consultation paper in July 2023 setting out its views on:
  - The need for government decision-makers to have greater access to electricity billing data,
  - What data would be required, and
  - Options to gather the data more efficiently and effectively.

  The AEMC will now lead this work and consider stakeholder input and views and make recommendations on whether and potentially how to achieve billing transparency.[26]

Dynamic Operating Envelopes (DOEs)

Most distributors currently rely on static operating envelopes to limit import from and export to the electricity grid. DOEs are an emerging network capacity management tool that can allow distributors to dynamically vary the network connection export (and import) limits of consumers on their network. DOEs are an emerging network capacity management tool that can allow distributors to dynamically vary the network connection export and import limits of consumer connections. In short, 'flexible export limits' (FELs) offer an alternative to the use of static export limits. Allowing these limits to vary over time and by location through 'dynamic' operating envelopes could improve network efficiency and help manage congestion at different points within the distribution grid.[27]

The AER is undertaking a review of the regulatory framework to evaluate whether or how DNSPs can implement FELs. The objective is to establish guidelines that strike a balance between consumer welfare and the effective implementation of FELs. An issues paper was published in October 2022.[28]

AER Review of consumer protections for future energy services - options for reform of the

23 https://www.datocms-assets.com/32572/1670367035-esb-electric-vehicle-supply-equipment-standing-data-consultation-paper-december-2022.pdf

24 https://www.aer.gov.au/system/files/ESB%20-%20Network%20Visibility%20-%20July%202023.pdf

25 https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/network-visibility

26 https://www.datocms-assets.com/32572/1688619055-esb-billing-transparency-consultation-paper-final-july-2023.pdf

27 https://esb-post2025-market-design.aemc.gov.au/integration-of-distributed-energy-resources-der-and-flexible-demand#delivering-the-cer-implementation-plan.

28 www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/review-of-regulatory-framework-for-flexible-export-limit-implementation.

NECF

The AER is undertaking a review of consumer protections for future energy services and considering the options for reform of the National Energy Customer Framework (NECF).[29] The purpose of this review is to assess whether the current energy consumer protection framework remains fit for purpose in a transitioning energy market. AER released an issues paper for their review in April 2023.[30]

2.4.2 Opportunities to improve consumer incentives for CER flexibility - the role of network and retail pricing

CER is dramatically changing how Australians interact with the energy market. Australian households are world leaders in exporting energy, and we are increasingly using devices that can respond to prices in real time. We are seeing progress from networks, retailers and third-party aggregators on innovative pricing and consumer offers that enhance the consumer experience and unlock greater value from CER's untapped flexibility.

Network businesses are increasingly exploring how they can best serve customers. Distribution businesses are exploring the opportunities to be distribution system operators that actively incentivise flexibility through dynamic operating envelopes, dynamic prices and other incentives. Important arrangements and developments in this space include:

- AusNet Services' critical peak demand tariffs for large business customers
- SA Power Networks implementation of dynamic operating envelopes
- Project Edge's marketplace for CER participation, and
- Ausgrid's Project Edith trial of dynamic, locational, short-run marginal cost pricing[31]

It is essential that networks are empowered to send effective incentives to retailers, aggregators, and customers that keep pace with customers' ability to respond and minimise network costs in the longer term. With the NER network pricing principles introduced 10-years ago, we consider it is a good time to review the opportunities for networks to influence and manage energy flows.

Similarly, retailers and third-party aggregators are introducing offers to customers that unlock the greater value from CER flexibility. Today customers can choose:

- from at least 18 virtual power plant programs FN
- direct exposure to wholesale prices through retailers like Amber Electric, and
- time of use solar feed-in payments.

To support this work the Commission is looking at how we can accelerate and provide further opportunities for networks, retailers and third-party aggregators to incentivise CER flexibility through prices and other means as part of its forward-thinking initiatives and CER priorities.

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29 https://www.aer.gov.au/system/files/AER%20-%20Retailer%20authorisation%20and%20exemption%20review%20-%20Issues%20paper%20-%20April%202022.pdf.

30 https://www.aer.gov.au/retail-markets/guidelines-reviews/review-of-consumer-protections-for-future-energy-services.

31 https://www.ausgrid.com.au/About-Us/Future-Grid/Project-Edith.

3 OPTIMISING THE VALUE OF CER FLEXIBILITY – SEPARATELY IDENTIFYING AND MANAGING RESPONSIVE CER

This chapter outlines:

- AEMO's stated issues and proposed solution for separately identifying and managing CER. It also sets out stakeholders' views relating to this aspect of the rule change.
- The opportunities and considerations needed to separately identify and manage flexible CER, and
- The existing and proposed options we will progress with the associated considerations we will take into account for the draft determination.

3.1 AEMO has proposed another option for separating and managing flexible CER

As noted in Chapter one, AEMO considers that the current NER framework does not support consumers easily accessing products and services that maximise the value of CER. This is because the existing arrangements require a consumer (or their agent) to establish a second connection point to the distribution network and in most cases this is costly and difficult.

For example, AEMO notes that some existing requirements for meters can create limitations for CER because of the "physical size, complexity of installation and maintenance". This may prevent or limit consumers and market participants from separately identifying and managing CER assets.[32]

AEMO proposed that the NER should allow for different arrangements for flexible CER that are separate from other inflexible or passive loads. AEMO highlighted that this would be a means to unlock additional CER flexibility and value for consumers and the market.[33] AEMO note that this proposal could be also used for other minor energy flows as we outline in Chapter five.

AEMO has proposed the option of:

- Introducing 'secondary settlement points' within a consumer's premises. These secondary settlement points would be behind the direct and existing connection to the distribution network and primary connection point.[34] Under the NER, all market connection points must be metered and each metering installation is to be assigned a NMI.[35]
- Allowing these secondary settlement points to have a different metering installation arrangement for measuring CER flows. AEMO notes that the minimum service

32 AEMO, Rule change request, Appendix B, p 15 and Energeia, Expert advice on the cost of establishing a second connection point, October 2020.

33 AEMO rule change, Appendix B: HLD p. 11.

34 Note that Section 2 of AEMO's National Metering Identifier procedure regulates National Metering Identifier (NMI) allocation, which determines settlement points.

35 NER clause 7.8.2.

specifications could be different for these installations. For example, the display capability may not be necessary for such an arrangement, but remote communication capability would remain essential. AEMO notes this is similar to their proposal for a 'Minor Flow Energy Meter" for street lighting as discussed in Chapter five.[36]

AEMO considers that its proposal for allowing separate identification and measurement of CER would enable metering technologies that are approved for use under the National Measurement Act 1960 (**NMA**) to be adopted via a review and approval process run by AEMO, rather than requiring bespoke rule or procedure change processes to enable use. For example, an electric vehicle charging "unit" might also be capable of being a secondary connection point and metering installation.

AEMO's rule change request does not limit consumers or other parties from using existing options available and does not seek to prevent the use of metering installations that are compliant with the NMA and the Rules at a secondary settlement point.

3.1.1 Stakeholder submissions to the consultation paper

The consultation paper noted that there were different ways to separately identify and manage consumers' CER. A number of stakeholder submissions supported the benefits of enabling greater CER integration and value recognition,[37] however, most stakeholder submissions focused on the flexible trading with multiple service providers aspects of AEMO's proposal.

The majority of stakeholder submissions did not support AEMO's flexible trading model, allowing multiple service providers at a consumer's premises, especially for households. These views are specifically outlined in Chapter four.

Given stakeholder submissions focus on the flexible trading aspect, not many stakeholders commented on the proposed changes to AEMO's procedures and roles and responsibilities needed to support establishing a second settlement point at the same customer's premises. A few stakeholders raised some concerns that the creation of NMI and metering roles at additional settlement points will create costs when the value may be potentially low.[38]

Most stakeholder submissions were in agreement that establishing second or multiple connection points to the distribution network is hard and costly to establish under the current framework.[39]

Some stakeholder submissions commented on the various business models that have emerged trying to bypass issues related to existing approaches but noted they are reliant on the consent of the customer's retailer and/or DNSP and may not be practical in all circumstances. [40]

36 AEMO rule change request p. 11.

37 Sonnen, p. 2, PIAC, p. 5, ECA, 2, Simply Energy, p. 1., BSGIP, p. 1 and Master Electricians, 2. ENA p. 4, TasNetworks p. 2, Momentum Energy p. 1. Enel X p. 1, Quinbrook, p. 2.

38 Energy Australia, p. 7. Plus-ES, p. 4. Vector, p. 7.

39 Vector, p. 6 and Metropolis, p. 2.

40 AEMO submission to the consultation paper, p. 8, Tesla, p 6, Plus-ES, p. 4 - 5.

3.2 Opportunities and considerations for separately identifying and managing CER

The Commission considers there are opportunities to optimise the value of CER flexibility by reducing the barriers and costs for consumers to separately identify and manage their CER.

The first step towards unlocking greater value and integration of flexible CER is for the consumer's CER to be separately identified and measured. This is separate from whether there should be flexible trading with multiple energy service providers for that CER. Separately identifying and managing CER would enable specific products and services to be developed and offered. For example, improving arrangements may allow or enable:

- consumers to have different network and retail pricing offers for their CER assets based on their individual preferences from their passive load, or they may be offered direct payments for the use of their assets.
- energy service providers may be able to better participate in wholesale energy market scheduling processes. As noted in Chapter two, these resources are only able to participate in the scheduling and dispatch process of the wholesale electricity market if they are separately identified and metered. We are considering this issue as part of the AEMC's rule change on integrating price-responsive resources in the NEM.[41]
- networks to procure services from these resources, helping to reduce the need for network augmentation. They also may be able to potentially apply dynamic operating envelopes specifically to responsive CER load (e.g. EV chargers) rather than the full load at a connection point.
- an aggregated resource that the market operator (AEMO) could use to deliver secure, reliable, and low emissions energy at lower cost.

While the next chapter looks at the commercial and market arrangements for how CER could be used by different parties, this Chapter explores the options (including metering configuration and procedure requirements) to achieve separation.

We cover some common considerations or factors for separately identifying and managing CER below irrespective of the approach or option used. Section 3.3 outlines the different options we will consider further and the associated considerations for each.

3.2.1 There are a number of common factors for separately identifying and managing flexible CER irrespective of the approach taken

There are a number of important factors or characteristics that need to be considered to separately identify CER, irrespective of the different approaches that may be used. These include the:

- Profile from the CER must be able to be separately identified (e.g. isolated from other load or generation) and measured at premises. CER profile refers to changes or variations in how the CER device is being utilised over the day (i.e. net consumption and export).

41 See AEMC rule change *Integrating price-responsive resources into the NEM.*

- Regulatory arrangements for measuring the CER profile are fit for purpose, for example, maintaining data quality, accuracy, and verification.
- CER offer can be distinguished from the retail offer for the whole premises, including potentially being subject to different retailer terms and conditions.

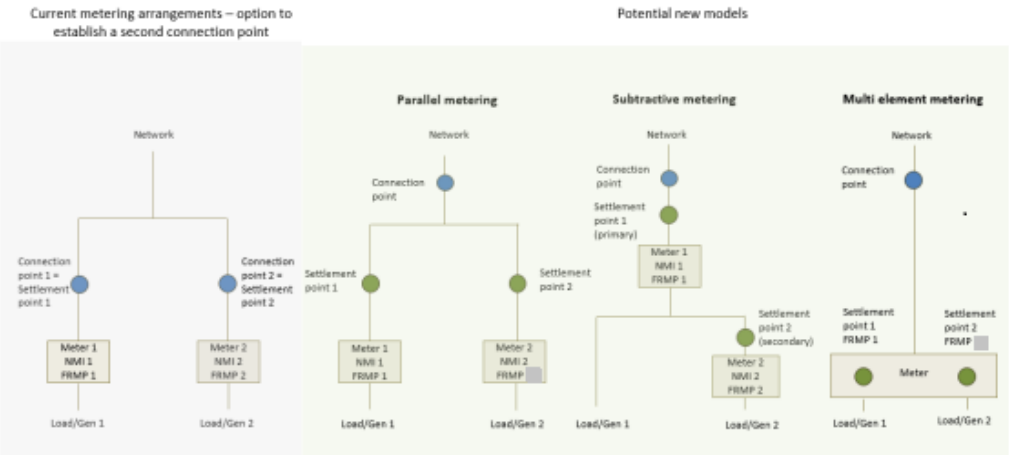
The first two factors : separation of the CER profile; and separation of the CER data stream and any associated requirements are covered below. The third consideration is canvassed in the next Chapter as it relates to flexible trading with multiple service providers at a premises.

3.2.2 Separation of CER from other loads or sources of generation

There are different ways a consumer's CER profile can or could be identified and measured as shown in Figure 3.1. These include:

1. The CER profile is measured through a meter that complies with the NMA and the Rules, with a separate connection point (as noted this option exists today).
2. The metering installation at the premises enables separate measurement through either:
   - dual/multi element measuring capability (for example, controlled hot water - this option exists today)
   - subtractive metering (for example, parent and child metering used in embedded networks - this option exists today), or
   - parallel metering at a single connection point (currently not permitted under the Rules).
3. The Rules are amended to allow a secondary measuring device (not of the same specification/standards as current NEM meters) to be used and classified as a second settlement point (ie., AEMO's proposed model). A number of CER devices already contain measuring capability but cannot be used for NEM settlement as they are not compliant with the NMA and the Rules.

Figure 3.1: Separately identifying and measuring CER - existing and proposed options



Source: AEMC Unlocking CER benefits through flexible trading consultation paper

An issue for consideration across all these approaches is whether the electrical wiring at the premises would support separation between the passive load and the responsive CER, and if so, whether the separation would be hard-wired or whether both settlement points could supply the same loads and CER assets.

Stakeholders raised concerns about the potential for consumers to "game" between two different retail offers at the respective settlement points, which may result in retailers being reluctant to provide (or allow secondary retailers to provide) innovative offers.[42] We note this potential issue and consider if the NER are amended to enable two settlement points, we also need to have regard to whether restrictions/requirements should be placed on the wiring to support separation between passive load and controllable load.

We will explore these issues further for each of the approaches.

3.2.3 Regulatory arrangements for separate CER profiles

As part of the rule change, we will need to consider the various regulatory arrangements required for consumers and to facilitate the effective integration of the CER into the NEM. As noted by stakeholder submissions, a number of commercial trial schemes already exist, but the activities are not recognised in the NEM metering and settlement framework.[43]

We consider that the key regulatory issues that need to be solved in the NER and NERR include:

- metering requirements and procedures
- network visibility and network tariffs
- consumer billing arrangements
- settlement procedures (including roles and responsibilities of AEMO and Metering Coordinators)
- data requirements, data sharing, and interoperability issues.

These different considerations are canvased in the next section across each of the options we will further consider and progress.

Solving these issues would broaden the potential value streams available to consumers and increase the benefits of CER to the energy system. Currently, CER can provide value through:

1. contingency FCAS, if the participant meets the technical requirements defined in the AEMO's Market Ancillary Services Specification (MASS)
2. network support through direct contracting, network support and control ancillary services (NSCAS), and
3. non-market benefits, where industry participants use CER to manage their wholesale spot market purchases through shifting load and exports across the day.

42 SAPN p.4, AEC p. 27.

43 AusNet p. 1 - 2, Plus-ES. p. 8, Vector p. 6

With a clearer regulatory framework, CER could also participate in the wholesale energy market. As noted, currently flexible CER are unable to participate in the scheduling and dispatch process of the wholesale electricity market unless they are separately metered.

Non-market arrangements which are becoming prevalent do not require the establishment of a second settlement point, nor changes to AEMO procedures, but they are not visible to the market and so do not contribute to the broader CER integration objectives.

Important and related to these issues are the data-sharing arrangements and the interoperability of multiple devices at the same premises. These are important reforms being considered in the broader CER work program. We will consider the outcomes of these as required for this rule change.

QUESTION 2: KEY CONSIDERATIONS FOR SEPARATELY IDENTIFYING AND MANAGING FLEXIBLE CER

1. What benefits can be gained through separately identifying CER irrespective of whether there is a single FRMP or multiple FRMPs at the customer premises?

2. Are there additional implementation issues that we should consider for the draft determination (and draft rule if needed)?

3.3 We will consider the existing arrangements and AEMO's proposed option for secondary settlement points

We are proposing to further investigate the following existing arrangements and AEMO's proposed option for separately identifying and measuring flexible CER and the changes that may be needed to implement or improve each of these options.

Our considerations will include the following having regard to the different metering configurations noted in section 3.2.2:

1. Enabling flexible CER to be market connected through the establishment of a second settlement point at a single connection point. The options that will be assessed include:
   - existing metering configurations that could be used to support a second settlement point (i.e. multi-element, parallel, or parent-child metering), and
   - AEMO's proposal for a new type of metering installation which could also be used at a second settlement point
2. Using other measuring devices for CER identification under an off-market arrangement, and
3. Making it easier to establish two connection points at the same premises.

While stakeholder submissions commented on different options, there was not any consensus on which of these options would be preferable for enabling more CER flexibility and hence market integration. There was however agreement that the framework needs to make more use of the embedded capability within appliances and CER devices, such as measurement

and communications, to enable more demand flexibility. This will enable greater choice and allow customers to better capture the value of their investment in CER.[44]

For the consumer, both the cost implications and the value proposition for their CER will vary under each option. Further, there may be technical, wiring, and space constraints at the premises that limit a consumer's ability to use some of these approaches. Therefore, a combination of different options is likely to be employed in the market and the regulatory frameworks should provide flexibility for customers and market participants to use the most appropriate and efficient solution for the relevant circumstances.

A range of solutions would also be more accommodating to different consumer preferences, different CER value streams, different technology types and different electrical configurations at a premise. Different CER technologies and business models are also likely to need different configurations to measure and manage responsive CER. Further, given the speed of technology development and the increasing use of smart-enabled appliances, it is important that the Rules are robust for the long term and will enable innovation and choice.

We step through each of the above issues having regard to our assessment criteria that includes consumer needs and benefits, market competition and innovation, technical feasibility, and market functionality requirements.

3.3.1 Enabling a second settlement point at a single connection point (market connected)

We consider that there is merit in further exploring barriers to the establishment of a second settlement point at the same premises to facilitate flexible CER to be recognised and valued in wholesale markets and for the provision of network support services.

Adding extra settlement points at premises may incentivise retailers to offer CER management and aggregation services. Extra settlement points would lower barriers for specialised CER aggregators to operate in the energy market, encouraging retailers to develop competing offerings or partner with these providers to provide services.

As outlined in the consultation paper, recent reforms in California and the UK have enabled CER to be separated at the premises for particular market services and targeted network signals.[45]

This section looks at the technical and market functionality requirements (including the market and settlement procedures) needed to enable two or more settlement points at the same premises. We consider:

- Multi-element metering capability
- Parallel metering
- Subtractive metering through a parent and child metering relationship, and/or
- Secondary settlement points (and potentially subtractive metering) with a different energy flow meter.

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44 SAPN p. 5, Sonnen p. 2, Wattwatchers p. 5.

45 CPUC, Decision adopting plug-in electric vehicle sub-metering protocol and electric vehicle supply equipment communication protocols, p. 22-23 Available at: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M496/K405/496405751.PDF

Stakeholder submissions noted there is merit in considering all these options noting that there are challenges associated with each.[46] Some parties suggested subtractive or parallel metering are better options than AEMO's proposal.[47]Networks raised concerns about the applicability of network tariffs.[48] Other stakeholders raised concerns about the re-wiring costs for customers under some configurations.[49]

At this stage, the Commission is aware of the limitations in selecting one technical configuration for the measurement of two or more settlement points given different consumer segments, circumstances, and preferences. As long as measurement options do not place undue risk or costs onto consumers, participants, and the system, then they should be considered under the regulatory framework. Further, as the AER noted, customer trust and confidence in any solution will be a key enabler for CER flexibility and hence the customer will need to agree that the metering solution is right for them.[50]

We are seeking stakeholder feedback on the options and considerations which will also be informed by Energeia's cost-benefit analysis.

Technical and market functionality

There are a number of technical and market functionality issues to be resolved before establishing a second settlement point at the same premises. These include the:

- changes required to the roles and responsibilities of metering coordinators, metering providers and metering data providers (this includes where there are two metering providers at the same premises). To facilitate the second settlement point, AEMO proposed amendments to the responsibilities and registration requirements for Metering Coordinators, Metering Providers, and Meter Data Providers. We will investigate what changes may be needed to these current roles.
- integration of the second settlement point data into AEMO's wholesale energy settlement processes as outlined below.

These two issues are likely to arise with any of the metering configuration options considered for the second settlement points. In relation to particular metering configurations, we will further investigate:

- the technical specification requirements for the CER measuring device, and
- should there be limitations on how the CER measuring device could be used for market interactions?

Integration of the second settlement point data into AEMO's settlement processes

A second settlement point would have to be assigned its own NMI in order to be used in market processes. While a few stakeholders commented that the creation of a NMI and metering roles at additional settlement points would create costs where the value could be

46 PIAC p.5, Tesla p. 6, Evergen p.1, Landis+Gyr p.1 - 2, Plus-ES p. 4 - 6.
47 Rheem CET p.8, Sonnen p.4.
48 AusNet p. 1, ENA p. 1, Jemena p. 2 Energy Queensland p. 3
49 Ausgrid p.7, Evergen p.1
50 AER p. 6.

relatively low[51], the majority of stakeholders considered that the assignment of a NMI would be a relatively easy process for a second settlement point.[52]

AEMO's proposal for linking NMIs within AEMO's procedures involves creating a new field within MSATS. According to AEMO, this field could be populated by the NMI service providers, would require no new or amended processes to be adopted by the distributor.

We are seeking stakeholder feedback on AEMO's proposal any other issues that would need to be addressed.

The specification requirements for the CER measuring device

AEMO's rule change request proposes using a new kind of metering installation for CER at the second settlement point. These would need to meet specific requirements, but AEMO proposes a lower level specification should apply, as compared to the specifications for residential smart meters at the primary connection point.

On balance, stakeholders were open to the introduction of this type of metering installation and agreed with the lower level of metering functionality and standards proposed by AEMO. However, there were differences in views related to accuracy and data requirements, display, remote communications and the application of minimum service specifications.

In relation to market-connected CER, we are interested in stakeholders' views on whether there is any distinction that needs to be made between the appropriate functionality for CER integration into AEMO market systems compared to the requirements for a distributor to purchase CER services for network support.

Although the integration of CER into AEMO's market and settlement processes could have implications for all market participants, whereas a distributor's use of CER services may have more limited impacts, we note CER will be most effectively integrated if CER can be used either for wholesale or network services (in response to price signals).

TasNetworks commented that a meter with remote energisation/de-energisation capability could be used as a universal demand management enablement device, opening the door for demand management of all types of loads. It did not see the need for provisions in the rules regarding explicit information or communication requirements for secondary settlement points.[53]

Limitations on how the CER measuring device could be used to participate in wholesale markets

We are seeking further views on whether CER measuring devices should only be permitted to participate in wholesale markets in certain circumstances. We note that the approaches

51 [insert submission reference]
52 PIAC p. 13 [add others].
53 TasNetworks submission p. 2.

employed in California and the UK are to allow the use of such devices in defined circumstances where a number of criteria can be met.[54] One potential eligibility criterion is the configuration of the electrical wiring at the customer premises and whether this is sufficient to support measurement separation.

One stakeholder, AusNet, did not support the introduction of a new sub-class of metering without stronger evidence of the benefits. It agreed that it will be difficult to define the criteria for using this metering arrangement.[55]

The current application of the SGA and embedded network arrangements to achieve CER separation

AEMO noted that some FRMPs and consumers have sought to establish second connection points for their CER using methods that, while possible under the NER, were not intended to be used for that purpose. In some cases, an end user's electrical installation has been deemed to be an embedded network, with "child" connection points used to separate the CER circuitry within. AEMO guidelines note this arrangement can be used to facilitate the SGA participating in the market.[56] AEMO raised concerns about this use of the embedded network framework and pointed to the risks and impacts on settlement integrity and customer protections.[57] We discuss the use of the embedded network framework by different energy market participants in Chapter four.

QUESTION 3: ENABLING A SECOND SETTLEMENT POINT AT A SINGLE CONNECTION POINT

1. Do stakeholders agree the technical and market considerations outlined above are the key considerations we should address in relation to establishing a second settlement point, irrespective of the metering configuration options available and proposed for separating and measuring CER?
2. Should a second settlement point at a single connection point be restricted to defined situations and conditions (e.g. EV charging)? What criteria and governance processes need to be applied when allowing second settlement points at customer premises?
3. What would be the appropriate framework for approving and verifying alternative measuring devices permitted to be used at the second settlement point?
4. What would the implementation costs be for creating second settlement points with associated metering configuration options?

54 California Public Utilities Commission, CPUC Decision Makes California First State in the Nation To Allow Submetering electric Vehicles, 4 August 2022. https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-decision-makes-california-first-state-inthe-nation-to-allow-submetering-of-electric-vehicles 2)

55 AusNet submission p. 3.

56 AEMO fact sheet, Small generation aggregators in the NEM, available at: https://aemo.com.au/-/media/files/electricity/nem/participant_information/registration/small-generation-aggregator/small-generator-aggregator-fact-sheet.pdf?la=en

57 AEMO, rule change request, p. 13 - 15

3.3.2 Using non-market devices for CER measurement and reward

Some households and businesses are managing CER behind the meter. They use measuring devices that measure the CER but these are not approved under the NMA, not permitted by AEMO (ie MASS for providing FCAS), or not permitted by the Rules and are therefore not recognised by AEMO market systems.

The measuring kit can either be part of the CER device or a separate piece of equipment but there is still only one connection point with a single FRMP and NMI. Given this, the appropriate standards and functionality of the measuring kit is a matter for the relevant parties to consider in that circumstance.

The benefit of this option is that consumers have visibility on their CER profile (for e.g. through an app) and could be offered some payment/incentive by the retailer for the CER flexibility. The retailer could also offer bundled products, differentiating offers for responsive CER and other inflexible or passive load.

While such flexibility is not visible to the market (i.e. these approaches are "off market" in that they are not connected to the wholesale electricity market), the retailer can still benefit from the value of CER flexibility by managing the net load at the meter at the connection point. This also enables the retailer to orchestrate flexibility behind the meter consistent with how it views the value of demand flexibility given its hedging strategy or its exposure to high wholesale prices.

Market competition and innovation

We understand retailers and aggregators are developing and providing products under this approach. While the extent of CER integration and competition for the CER value is lower under this approach than under market-connected approaches, there is some merit in such approaches. It provides more visibility and value to the customer in a simple way and should help to encourage increased uptake of CER and greater participation in retailer or network demand response programs.

A potential limitation of this approach however is that the retailer cannot bill the CER separately nor can there be a different network signal applicable to the CER.[58]

Networks can only apply tariffs to the outputs of NMI registered meters. The outputs have two suffixes, the:

1. first suffix identifies what is measured including "B" for energy imported to the grid, "E" for energy exported from the grid and "K" for reactive power imported to the grid, and
2. second suffix identifies the associated metering element. [59]

Networks can apply tariffs to individual NMI outputs or aggregates of suffixes (e.g. a network export tariff may apply to the B register or all meter elements). Similar constraints apply to retail bills.[60]

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58 If measurement data is used for billing it would need to meet the NMA and the Rules.

59 See AEMO, National Metering Identifier Procedure, V5.1, August 2009, pp 48-49.

60 The bill can include different lines for different data streams such as solar feed-in which corresponds with export data streams and controlled load which corresponds with specific metering elements.

We are interested in exploring whether a distributor could set different tariffs for CER and inflexible or passive load based on non-market measuring devices and retailers could then make differentiated offers to their customers. Doing so could enable a better network signal for the CER leading to greater participation and reward for customers.

There are variations of the above approach that are being used today. This is where a third party installs a measuring device that is permitted by AEMO for providing some services. For example, if CER is operated by an aggregator as part of an Aggregated Ancillary Service Facility it can participate in FCAS markets.[61]

> QUESTION 4: USING OTHER DEVICES FOR CER MEASUREMENT AND REWARD
>
> What changes to the rules, if any, should be assessed in relation to these non-market-related devices for CER products and services to consumers?

3.3.3 Establishing two connection points at a single premises

As noted establishing two connection points is possible and used in limited circumstances today. Most current users are medium to large businesses. The advantage of a second connection point for a sub-load such as a plug-in electric vehicle charger or behind-the-meter generation is that they are directly connected to the grid and this allows a consumer to access a range of different service options. For example, providing wholesale or other grid services directly, or using a more advantageous retail plan for a sub-load or gross generation. This option circumvents the issues that need resolution if multiple FRMPs are allowed at a premises behind a single connection point.

An October 2020 report by Energeia for the ESB[62] on the cost of establishing a second connection point identified several practical barriers and additional costs for the customers, which are noted in AEMO's rule change request. We discuss some of these issues below.

Technical and market requirements

Process for establishing second connection points

Generally, distributors are reluctant to allow the installation of a second connection point at a small customer's premises (ie in a single or multiple occupancy dwelling) for the purpose of sub-loads or embedded generation, even though the rules do not disallow this. Second connections are mainly used for facilitating granny flats or duplexes and not typically for CER. Even if distributors do approve it, installing a second connection at the same premises is a multi-step process that is costly and can be time-consuming.

Distributors have noted that the reasons for the current policy include significant IT costs to amend existing NMI allocation methods. They also note some safety risks related to multiple

61 AEMO, Market Ancillary Service Specification, V7.0, 1 February 2022. p. 14.

62 https://esb-post2025-market-design.aemc.gov.au/32572/1608712682-enegeia-expert-advice-on-the-cost-of-establishing-a-second-connection-point.pdf

ways to energise a site and de-energising multiple meters. In its 2022 assessment report, Energeia stated that it was very hard to estimate actual costs without understanding each distributor's systems and processes.[63]

The distributor connections processes are also governed by each jurisdiction's Service and Installation Rules.[64] In some states, the relevant Department is responsible for these, while in others the distributors maintain these procedures. While these procedures don't explicitly prohibit second connection points, they are often silent on arrangements and guidance for distributor staff for enabling second connection points when requested by customers (or their agents).

Some of these challenges might be resolved through other processes and reforms. There are a few drivers for updating these processes:

1. Distributors are now required to update their connection policies to align with the AER's updated connection charges guidelines for Export services and Standalone power systems
2. Distributors must submit any new policies as part of their five-yearly regulatory proposals, and
3. Jurisdictions may need to review and amend their Service and Installation Rules as a result of the CER technical standards reforms and AEMC metering review. The AEMC is continuing to engage with jurisdictions and other market bodies on governance arrangements to promote CER's technical integration in the power system.

Multiple distribution network tariffs at the same premises

Networks typically apply at least one network access charge to each NMI,[65] meaning a consumer with two connection points to the grid would normally have to pay the distributor's fixed access charge twice. Energeia estimated in 2022 that small customers face up to $371 per year extra due to the duplication in network and retailer charges.[66]

We are interested in stakeholder views on whether to further evaluate the benefits of considering changes to the rules/AER guidelines on network charges. For example, should there be an option to apply none or a low proportion of the fixed charge to a second connection point at the same premises, or tariffs for connections that meet certain criteria, or a network charge that reflects the marginal cost of ongoing billing of the second meter (similar to controlled load fixed charges)?

It is important that the structure of network tariffs provides an efficient signal to consumers to manage their consumption, storage and generation, especially at peak times. This can help to reduce the cost of maintaining and augmenting the network. Variable charges based on usage are the most common form of price signal to incentivise efficient decisions. Fixed charges then recover any remaining costs. The NER pricing principles do not require

63 Enegeia, Expert advice on the cost of establishing a second-connection point, October 2020.

64 For example, https://www.energy.nsw.gov.au/nsw-plans-and-progress/regulation-and-policy/service-and-installation-rules

65 We are aware of two instances where a NMI can have no network access charge; SA Power Networks controlled load tariff has no fixed charge and can apply to a separate meter for pre-2014 controlled load connections; and Ausgrid's trial flexible load (primary) tariff has no network access charge.

66 Energeia, 2020. *Expert advice on the cost of establishing a second connection point.* Available at https://esb-post2025-market-design.aemc.gov.au/32572/1608712682-enegeia-expert-advice-on-the-cost-of-establishing-a-second-connection-point.pdf

networks to include a fixed charge and require that residual cost recovery minimises distortions to efficient network use.[67] A second connection charge could potentially be based on the incremental costs of establishing and maintaining that connection, and then charges for use of the network could potentially relate to the cost of value of CER on the network.

Lowering the fixed network charge at the second connection point would not necessarily impact on the efficiency of network price signals and may represent a path to increased use of cost-reflective network tariffs. Low fixed charges for flexible devices, where separation would not otherwise occur, is cost-reflective tariff design and consistent with the NER pricing principles.

QUESTION 5: ESTABLISHING TWO CONNECTION POINTS AT A SINGLE PREMISES

1. Are there any changes we could make to the NER and NERR to assist in overcoming the current barriers to the second connection point?
2. What issues need to be considered in evaluating whether there should be changes to the fixed network tariff for second connection points at the same premises? How (if at all) should this issue be addressed in the NER?

67 NER clause 6.18.5.

4 FLEXIBLE TRADING WITH MULTIPLE SERVICE PROVIDERS AT A CONSUMER'S PREMISES

This chapter sets out:

- AEMO's rule change request for introducing flexible trading with multiple FRMPs at a consumer's premises, and stakeholder feedback on this in response to the consultation paper.
- The Commission's initial views on introducing flexible trading with multiple service providers for small and large customers.[68]
- The options the Commission will consider and further progress for this area of the rule change.

In this Chapter, we use the term *energy service providers* to mean:

1. Retailers or Market Customers — a market participant that buys electricity on the wholesale electricity market, and sells it to end users under a retailer authorisation or exemption granted by the AER. These are FRMPs.
2. Small Generation Aggregators — a market participant that sells electricity from customer-owned small generating units in the wholesale electricity market. These are also FRMPs.[69]
3. Third-party aggregators — typically an entity that is not an authorised retailer, that engages with groups of customers and their retailers to form virtual power plants that participate in ancillary service markets, such as FCAS. These do not have to be FRMPs.[70]

The Commission is considering the additional opportunities created by flexible trading with multiple energy service providers at a consumer's premise. We separate our considerations for small customers (households and small businesses) and large customers (commercial and industrial businesses), as the customer use cases, regulatory frameworks and typical metering and wiring arrangements differ between these two groups.

4.1 AEMO's model proposes allowing multiple FRMPs at consumer premises

As we outlined in Chapter one, AEMO has put forward a specific model and high level design for enabling multiple FRMPs at a consumer's premises, referred to as FTM2 (see Figure 4.1). The model enables consumers to have a private metering arrangement for their flexible or responsive CER within their electrical installation and have these resources managed by a separate FRMP, if desired.

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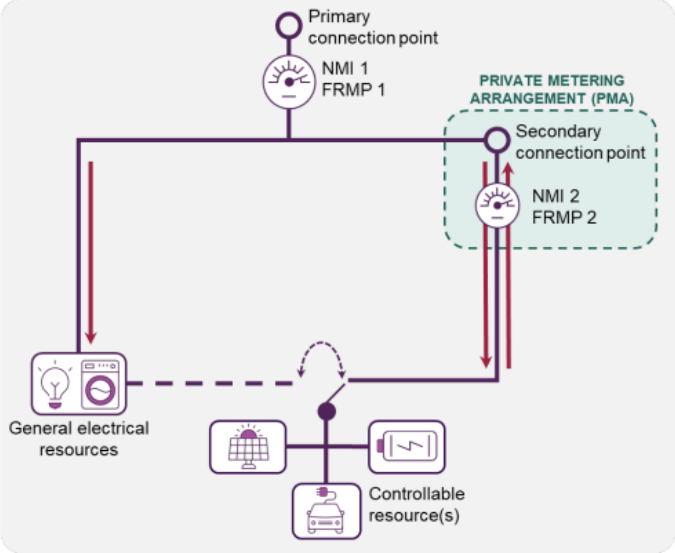
68 Under the NERR, small customers include residential and small business consumers. Small business consumers are defined in each jurisdiction as: South Australia - Electricity 160MWh, Australian Capital Territory - Electricity 100MWh, New South Wales - Electricity 100MWh, Victoria - Electricity 40MWh, Tasmania - Electricity 150MWh, Queensland - Electricity 100MWh.

69 Small Generation Aggregator Framework rule change, Final rule, https://www.aemc.gov.au/rule-changes/small-generation-aggregator-framework. From next year, these will be known as Small Resource Aggregators and may sell electricity from small batteries as well as small generating units.

70 AEMO, *AEMO NEM Virtual power plant demonstrations: knowledge sharing report #4*, September 2021, p. 34.

Figure 4.1: AEMO's proposed Model (FTM2)



Source: AEMO rule change proposal, p 6

4.1.1 Stakeholder submissions to the consultation paper

A few stakeholder submissions to the consultation paper supported AEMO's specific model for enabling flexible trading with multiple FRMPs at a consumer's premises.[71]

Retailers largely did not support allowing a secondary FRMP to operate via sub-metering on a single connection point and stated that the CER market already existed.[72] Some retailers described aspects of AEMO's proposal as leading to an uneven allocation of risk and compliance responsibilities.[73]

Red Lumo highlighted that many of the benefits were already available to large customers without any legislative change required.[74] Further, a few stakeholder submissions noted that small customers value lowering their reliance on the grid through self-consumption and the case for flexible trading in the small customer segment is yet to be made.[75]

Several submissions indicated that the market would evolve without the need for a rule change.[76] Vector, a metering provider, also stated that "consumers who wish to take advantage of new services enabled by their CER are most likely to find a retailer that provides those services and will switch their entire loads to that retailer."[77]

71 Sonnen p. 2, Master Electricians pp. 5-6, Quinbrook p. 4.
72 Origin, p. 1; Simply Energy, p. 1; AGL, p. 6; Energy Australia p. 2; and AEC, p.20.
73 Energy Australia, p. 12; Shell Energy p. 6.
74 Red Lumo, p. 1.
75 Citipower Powercor UE, p. 1, Simply Energy, p. 2.
76 AEC, p. 1; Red Lumo, p. 3; Tesla, p. 2; Citipower Powercor UE, p. 8.
77 Vector, p. 6.

Some emerging service providers and consumer representatives were supportive of the general idea of allowing multiple energy service providers to operate at a single site, but were not necessarily supportive of AEMO's specific FTM2 model.[78]

4.2 Opportunities and considerations for flexible trading arrangements with multiple energy service providers

This section sets out the Commission's views on the opportunities and considerations for enabling flexible trading with multiple energy service providers for all consumers and its position on AEMO's specific FTM2 proposal.

There are existing arrangements that enable consumers to contract with multiple FRMPS. For example, consumers use:

- Multiple FRMPs where they have two connection points to the distribution network and hence two NMIs. The SGA framework notes the need for two connection points to be an SGA.[79]
- Multiple FRMPs within an embedded network. AEMO's submission highlights that some SGAs use the embedded network framework for access to the wholesale electricity market.[80]
- Third party aggregators at their site. AEMO's Market Ancillary Service Specifications allow participants enrolled in a VPP demonstration projects (a VPP trial) to participate in ancillary services, including FCAS using monitoring equipment behind the meter.[81] However, third-party entities that are not registered with AEMO as FRMPs cannot participate in the wholesale electricity market. In this situation, there is only one FRMP with a single network connection and NMI.

AEMO has proposed a new arrangement that could also be used to allow multiple FRMPs for all consumers (i.e. households, small businesses, commercial and large businesses) without establishing a second connection point. While there may be market and consumer benefits from improving flexible trading with multiple service providers to both small and large customers, introducing multiple service providers for small customers faces a broader set of policy and implementation challenges.

Multiple energy service providers at a single property may deliver some benefits via increased competition, innovation and choice. Many of these benefits are available today if small customers add a second connection, use multiple element metering or participate in VPPs. However, we consider that the implementation challenges and related costs for introducing AEMO's specific FTM2 arrangements with provision for multiple energy providers are likely to be significant for this segment of consumers.

78 Sonnen, p. 11, PIAC, p. 5, Wattwatchers, p. 3.

79 AEMC, National Electricity Amendment (Small Generation Aggregator Framework) Rule 2012, 29 November 2012.

80 AEMO, p. 16.

81 AEMO, *Market ancillary service specification and FCAS verification tool*, available at: https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/system-operations/ancillary-services/market-ancillary-services-specification-and-fcas-verification-tool

We have considered the opportunities and challenges for each consumer segment, taking into account our assessment criteria:

- differing consumer needs and benefits
- supporting or contributing to competition and innovation
- market functionality, including supporting requirements and responsibilities that would enable each option, and
- technical feasibility, including system needs. This is primarily dealt with in Chapter three.

We step through each of the key considerations informing the Commission's view below.

4.2.1 We do not plan to progress AEMO's FTM2 proposal for small customers at this time

The Commission does not plan to progress with AEMO's specific FTM2 model that seeks to introduce flexible trading with multiple energy service providers for small customers at this time. Our reasoning for not progressing is given below, but relates to the implementation and cost challenges associated with applying consumer protections, technical and market operational considerations and also competition issues, all of which are quite substantial. Addressing these considerations may impose significant costs on all households and small businesses, without corresponding benefits.

The Commission considers that there may be an opportunity to progress a trial of AEMO's FTM2 model for small consumers via the industry sandboxing arrangements. This would allow for small customer outcomes, market functions, and costs to be better understood.

Consumer needs and benefits including consumer protections

We note that flexible trading with multiple service providers could introduce new service providers which offer different or more targeted retail products or services to households and small businesses. In turn, this would give those consumers more choice and agency in the management of their flexible CER. This might be particularly beneficial for consumers who want to participate in the energy markets.

However, the introduction of AEMO's specific FTM2 for small customers would require significant changes to the NECF in the energy laws and rules, and supporting market compliance arrangements, which together are likely to impose costs on consumers and market participants.[82] NECF requirements, changes to internal systems, and supporting market compliance arrangements among FRMPs and DNSPs are not expected to be small and thus the costs of the change would be borne by all consumers, although it is likely that only a proportion of consumers would benefit from more direct CER participation at this time.

Consumer protection obligations

The NECF is a suite of legal instruments that regulate the sale and supply of electricity and gas to retail customers. The NECF also includes regulation of the interactions between parties

82 The NECF applies in each participating jurisdiction through state and territory laws, to different degrees. The Commission also notes that the NECF does not apply in Victoria; separate protections apply in that jurisdiction. For further information please see:https://www.aemc.gov.au/regulation/energy-rules/national-energy-retail-rules/regulation.

involved in the sale of energy to small customers and outlines protections specific to the sale of energy.

In the rule change proposal and our consultation paper, it was noted that if we progress AEMO's FTM2 for small customers, we would need to consider how its implementation would impact the following:

- obligations for the service provider and consumer including the move-in and move-out provisions
- re-energisation and de-energisation requirements
- life support provisions
- Retailer of Last Resort (ROLR) arrangements
- the types of contracts consumers would enter into if they adopt this model
- non-NECF consumer protections, such as the default market offer, and
- interactions between the parties and obligations on different service providers.

Specific considerations would include for example if some CER services could be provided by parties that are not authorised retailers, which may be a way to enable market innovation, then new consumer protections would need to be designed for the services provided by those secondary energy service providers. The level of protection would likely need to vary depending on the type of service being offered and the potential consumer harms that could occur. This would also include how responsibilities such as life support, disconnections, and hardship are split between the primary retailer and the second energy service provider.

The Uniting Church noted in its submission to the consultation paper that "creating a market for CER would need to be designed for simplicity and transparency" but that "strong safeguards" needed to be maintained.[83]

AEMO's FTM2 proposes that consumers could switch their energy use between their energy service providers. Some stakeholders were concerned this would lead to shifting the responsibility for consumer protections and uncertainty for consumers seeking recourse.[84]

The AER noted such an arrangement would rely on consumers to "navigate a more complex market" and "engage and maintain relationships with multiple service providers to ensure their energy systems work in unison".[85]

We consider that the proposal to separately identify and manage CER, while retaining a single FRMP, could provide a more incremental way to unlock the value of CER for small customers and integrate it in the NEM. A single FRMP means that challenges with the AEMO proposal such as customer protections and splitting network tariff issues do not need to be resolved at this time as these continue to apply to the single FRMP at the connection point.

83 Uniting Church, p. .2
84 Uniting Church, p. 2; Powershop, p. 3.
85 AER, p. .

Current opportunities for flexible trading with a single retailer (i.e. one FRMP) are limited to controlled load offerings and retailer demand response programs. As outlined in Chapter three, we are investigating whether this approach could be expanded to other flexible CER.

Market competition, technical and operational issues

As noted, flexible trading with multiple service providers could increase market competition and innovation in products and services for small customers.

However, the introduction of AEMO's model for flexible trading may lead to higher compliance costs as energy service providers respond to the rule change. The Commission notes that aiming to maintain competitively neutral arrangements, the relative service and revenue opportunity compared to the cost of providing consumer protections required for service providers and retailers would be one key dimension to consider.

Stakeholders highlighted the following key areas that could lead to increased costs and hence higher prices for residential and small business consumers:

- If different consumer protections are applied to different service providers, it could lead to higher costs for the primary retailer and, as a result, increase the cost of electricity for all consumers. The ECA also stated that the proposed model "increases risk to the primary retailer[...] and mean CER is no longer being optimised against network price signals."[86] Submissions stated that if this responsibility was applied to primary energy service providers to inform secondary service providers, it could lead to an "additional compliance burden and cost."[87]
- Particular aspects of the model were raised as leading to costs or risks for retailers, notably allowing consumers to engage in tariff arbitrage by actively switching between their primary and secondary service providers. While some stakeholders considered this competition risk to be limited, noting "[s]uch an outcome could only occur if the commercial offers to the consumer created the arbitrage incentive",[88] others cited "hollowing out" of revenues for primary retailers as a significant concern.[89]
- The allocation of existing market costs, such as network tariffs, between the primary and other energy service providers would need resolution. Existing and developing market signals, including network tariffs and DoEs, would require clear and timely communication to and from the primary to the secondary service provider if they are to be efficient and would likely need to be determined rather than left to commercial negotiation.

QUESTION 6: AEMO'S SPECIFIC FTM2 FOR SMALL CUSTOMERS

Do you agree with the Commission's view and its initial position to not progress further with

86 ECA, p. 1

87 EnergyAustralia, p. 10; also noted by: Citipower, Powercor UE, p. 2; AEC:Oakley Greenwood, p. 27; Momentum, p. 2; Powershop, p. 2; Red Lumo, p. 4

88 Quinbrook, p. 9

89 Energy Australia, p. 9

AEMO's specific FTM2 for small customers?

4.2.2 We will progress options for flexible trading with multiple service providers for large customers

The Commission considers that there is merit in considering options to improve flexible trading with multiple service providers for large customers.

The challenges and costs of implementation (both absolute and relative to total costs for customers) are lower for large customers compared to residential and small business consumers, in part due to large customers not being included in many of the key consumer protections in the NECF but also due to having different technical and operational requirements.

We have had limited stakeholder feedback on the introduction of flexible trading with multiple service providers for large customers.

As noted, some large customers and energy service providers are currently managing large consumers' energy resources separately from arrangements the large customer has with their retailer. For example, some service providers use these resources in the FCAS markets and are also using the embedded networks framework to obtain a second connection point and national metering identifier allowing consumer resources to participate in the wholesale market as a SGA.

Market competition and innovation

Increasing the opportunities and reducing the costs of having flexible trading through multiple service providers for large customers is likely to increase the range of new services and tariffs available to these businesses. We consider this would have particular benefits for businesses:

- who want more bill predictability and simpler retail tariffs for their essential inflexible electricity use but want to optimise the value of their flexible loads and generation assets by participating in energy markets.
- seeking greater reliability from co-located generators or batteries by providing additional value streams that could reduce the payback period (or reduce upfront costs where there are ongoing relationships and value sharing with a third-party operator).

QUESTION 7: AEMO'S FTM2 PROPOSAL FOR LARGE CUSTOMERS

Do you agree that introducing AEMO's FTM2 (or variations to it) for large customers would create an additional or better option for large customers to engage with multiple service providers?

4.3 We are considering the existing options and AEMO's FTM2 model for flexible trading for large customers

We are progressing the following options for improving arrangements for flexible trading with multiple service providers for large customers:

- Status Quo: utilising two connection points (this is outlined in Chapter three)
- Status Quo: continued use of embedded networks to obtain a separate connection/settlement point and hence NMI, and
- AEMO's FTM2 model.

There are a range of considerations that we will need to take into account to determine if we adopt AEMO's proposed solution, make a more preferable rule, or make no rule. As noted, there are arrangements today that facilitate flexible trading with multiple energy service providers. AEMO's FTM2 model would be voluntary for those consumers who chose to take up the option based on their business model and preferences. We outline our considerations for each option below.

4.3.1 Option 1: Status quo - utilising two connection points

Chapter three outlines the current arrangements for obtaining two connection points. We noted that most network tariffs apply fixed charges to recover residual costs, and that multiple network charges usually apply to premises with multiple connections. However, some networks are beginning to update tariffs to encourage more efficient network use.[90]

While some networks are looking to encourage more network efficient use through their tariffs, and this may result in lower costs for second connection points to a premise, we are seeking stakeholder feedback on the need to further investigate network charging to premises with two separate network connections.

4.3.2 Option 2: Status quo - continued use of the embedded networks framework for obtaining a second connection point and a second NMI

As noted, we are aware that a range of businesses are using the embedded network framework to enable them to become, or engage, an SGA. The embedded network framework (outlined below) is an easier and cheaper option, compared to obtaining two separate connections to the distribution network. AEMO also noted in its rule change request, that SGAs are using the embedded network framework to enable multiple FRMPs to operate at a single site.[91]

An embedded network is a small distribution system which is owned, controlled or operated by an entity other than a regulated network, and which is connected to a regulated distribution or transmission network.[92] The embedded network's connection to the distribution or transmission network is known as the parent connection. Any connections

90 For example grid connected battery tariff proposals by Ausgrid, Endeavour Energy, Essential Energy and Evoenergy in their 2024-29 Tariff Structure Statements.

91 AEMO rule change proposal, Appendix B: High Level Design, pp. 13-15.

92 NER, ch 10.

behind the parent connection are termed child connection points. The embedded network regulatory framework covers a wide range of situations and configurations.[93] The most common forms are retirement villages, shopping centres, and apartment complexes.

Within embedded networks, customers connect to wiring owned, controlled and operated by the embedded networks. The embedded network operator owns, controls and operates network infrastructure between the parent and child connections. Embedded networks require a network service provider exemption (in some instances deemed exemptions are available).[94]

Child connections can be either:

- Off-market - These connections are invisible to the wholesale market system (MSATS) and all energy purchased or sold is attributed to the parent connection. Typically, the owner of the parent connection is also the party that on-sells electricity to individual customers supplied by child connections.[95]
- On-market- These connections are registered in the wholesale market system, and the customer can engage any retailer operating in the customer's area. Energy imported and exported at the child connection is settled on the wholesale market.[96]

Where an embedded network contains off-market child connections, the embedded network also requires a retail selling exemption. The AER has a guideline for exempt sellers that set outs the types of exemptions and authorisations and the compliance conditions that are designed to protect the consumers.[97]

All parent connection points and on-market child connection points are assigned NMI. On-market child connection points allow multiple FRMPs to operate at a single site. Figure 1.2 provides an illustrative view of current arrangements where an embedded network is used to establish an SGA.

93 AER, Electricity Network Service Provider - Registration Exemption Guideline, March 2018, pp 29-35; and AER, Retail Exempt Selling Guideline, July 2022, pp. 30-35.

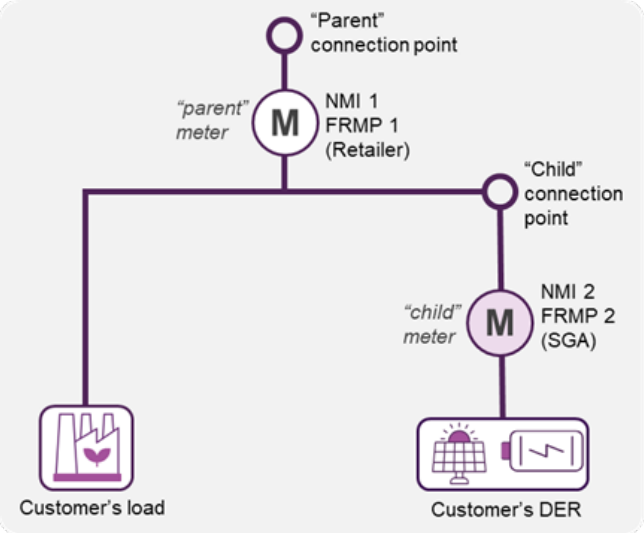
94 AER, Retail Exempt Selling Guideline, July 2022, p. 16.

95 Ibid., p. 7.

96 Further information on embedded networks is available in the final determination for the Embedded Networks rule change, 17 December 2015, available at: https://www.aemc.gov.au/rule-changes/embedded-networks.

97 AER, Retail Exempt Selling Guideline, July 2022.

Figure 4.2: Status Quo: Use of embedded network framework to get a connection point for SGAs



Source: Provided by AEMO

Current issues associated with the use of the embedded network framework

The Commission notes that the embedded network framework was not originally intended for the purposes of SGAs. AEMO has also stated that the embedded network framework is being used to become an SGA and this may be problematic because "it can create the potential for uncontrolled energy settlement anomalies to occur and is not transparent to all market participants, potentially inhibiting market processes from operating".[98] We note that some of the issues stated by AEMO in its rule change request are related to existing market settlement procedures than the embedded network framework itself.[99]

The arrangements for embedded networks are being reviewed and reformed, with some jurisdictions reconsidering embedded network frameworks.[100] Further, some DNSPs are proposing changes to their network tariffs that would charge embedded networks more than standard tariffs for large business customers.[101]

Such changes may impact on the current use of these arrangements for CER integration. We will further investigate this issue and consider whether there is an opportunity to provide a framework for CER in the NER that is more appropriate than the embedded network

98 AEMO rule change proposal, Appendix A: Summary table of issues and proposal, 'Ensure the correct framework is used once available.'

99 AEMO rule change proposal, Appendix B: High Level Design, p 10-15.

100 Jurisdictions, like New South Wales, have completed inquiries into embedded networks that have resulted in the NSW Embedded Network Action Plan, more information can be found at:https://www.energy.nsw.gov.au/nsw-plans-and-progress/regulation-and-policy/nsw-embedded-network-action-plan

101 Ausgrid, *Our TSS Explanatory Statement for 2024-29,* pp 21-25; Endeavour Energy, *Tariff Structure Statement 2024-29 Regulatory Control Period,* pp 47-48; TasNetworks, *Combined Proposal 2024-29 Attachment 22 Tariff structure statement explanatory statement,* pp 53-58

framework. We note that any changes should not undermine the application of parent-child metering configurations where appropriate. Reforms to improve the use of other metering solutions might reduce the current application and dependency on this approach.

> QUESTION 8: MULTIPLE FRMPS: EMBEDDED NETWORKS MODEL
>
> Other than metering and network connection costs, are there other reasons SGAs use the embedded network framework?
>
> Would the proposed changes to network tariffs in NSW and Tasmania drive SGAs in those states to adopt different models?
>
> Do stakeholders consider that the existing embedded network framework should continue to be used to facilitate flexible trading and market participation or should the Commission consider alternative models/framework?
>
> Are there any additional issues with the use of the embedded networks framework to facilitate flexible trading not already discussed above?

4.3.3 AEMO's FTM2 proposal

AEMO's FTM2 model:

- provides for a private metering arrangement where the service provider installs a secondary settlement point behind the primary connection point with a NMI assigned to it.
- allows customers or agents to switch controllable resources between connection points to enable arbitrage or to supply completely separated energy loads and resources.
- allows sub-meter installation without involvement from distribution network businesses.
- would create a connection exposed to wholesale and ancillary markets without network charges as network charges would only apply to the primary connection point.

Further details on AEMO's proposed model can be found in its High-Level Design.[102]

Issues for consideration

We outlined some of the issues to consider for AEMO's FTM2 model in section 4.2. These included:

- how secondary connection points would respond to network signals such as DOEs
- whether there is a significant risk of hollowing out the revenue of the primary service provider (noting that this is, to an extent, an existing issue arising from the SGA framework), and
- the cost of implementing the sub-metering, including installation costs as well as regulatory costs.

102 AEMO rule change proposal, Appendix B: High Level Design can be found here:https://www.aemc.gov.au/sites/default/files/2022-05/ERC0346%20Rule%20change%20request%20pending.pdf.

If the AEMC progresses with this option for large customers in the draft rule, we will consider these issues and those outlined below in accordance with our assessment criteria. Specifically, we will consider:

- Consumer benefits and needs: that is whether the introduction of a new model would create another and lower cost option for large customers and their agents.
- Market functionality: that is, the relationship between the primary and secondary energy service provider and how will that impacts other participants (e.g. metering providers, distributors, etc.). In AEMO's FTM2 the primary FRMP would maintain most of its existing responsibilities with network providers.[103] The rule change request recommended that MDPs at the second connection point have a relationship with both the primary and secondary FRMP to facilitate the reconciliation of settlement.[104] Other market functionality issues were not fully addressed in the rule change request and require further exploration.
- Market competition: in particular, impacts on the primary energy service provider, including the risk of hollowing out the revenues of the primary FRMP. AEMO acknowledged that it would be possible "in an extreme case" for the primary FRMP to be "hollowed-out",[105] however they suggested the risk could be lowered through specific drafting that would limit what could be linked to a second connection point. [106]
- Technical feasibility: this includes network issues relating to flexible export limits, DoEs, duplication of processes, and whether the model enables efficient market signals for all FRMPs. We will also look at broader technical requirements such as standards, metering requirements, and data sharing requirements as required. AEMO's proposal recommended that many of the existing requirements and processes for connection points would apply to the secondary settlement point.[107] AEMO suggested that FTM2 would could readily accommodate CER reforms such as DOE's as the design is similar to other existing designs being considered as part of those reforms.[108]

The Commission will need to consider if AEMO's FTM2 is introduced should it preclude the use of the existing embedded networks framework, as described above. We are also considering implementation requirements and potential transitional rules. As outlined in Chapter One, we are undertaking a cost-benefit analysis that will assess the benefits and costs of the draft rule compared to other policy options.

QUESTION 9: MULTIPLE FRMPS: AEMO'S FTM2 PROPOSAL

If the Commission introduced FTM2, how would (or should) it affect the existing

103 AEMO rule change request, Attachment B, p. 35
104 Ibid., p. 33
105 Ibid., p. 21
106 Ibid., p. 33
107 AEMO submission to the consultation paper, p. 13.
108 AEMO rule change request, p. 21.

arrangements that allow forms of flexible trading, such as SGA, embedded networks, and wholesale demand response?

Would introducing AEMO's FTM2 model for multiple energy service providers significantly impact the business model or costs of the primary energy service provider?

Would FTM2 encourage distributors to test and implement new tariffs (e.g. dynamic) for sizable and responsive loads more readily than they have to date? Would FTM2 affect the way in which energy service providers (such as aggregators) provide network services?

Are there any costs or benefits that we have not considered in relation to AEMO's FTM2 proposal?

5 MEASURING ENERGY FLOWS FROM STREET LIGHTING AND OTHER STREET FURNITURE

This chapter sets out:

- AEMO's stated issues with current metering arrangements for street lighting and other street furniture.
- the opportunities and considerations associated with implementing AEMO's proposed minor energy flow meter (MEFM) framework for street lighting and public furniture.
- technological advancements which could improve energy flows for street lighting and public furniture.

5.1 AEMO proposes to capture energy flows from street lighting and public furniture

Residential, street, and pathway lights, public BBQs, sports ground lighting, telecommunications boxes, and other small furniture items that need energy are often not physically metered. Instead, their energy flows are estimated as a constant load or through an agreed-upon algorithm for energy settlement.[109] Across the NEM there are millions of these connections. AEMO notes that miscalculations caused by operational inaccuracies and the variability of loads create errors in the energy settlement process and the allocation of unaccounted for energy (UFE). These errors create distortions in energy cost allocation between customers.[110]

AEMO proposes that the NER include a new framework for the measurement of street lighting and other public furniture. This is because there has been innovation in how energy flows for street lighting can be measured (i.e. streetlights are being built with measurement and communications capabilities built into them). AEMO believes that including a new framework in the NER offers a more efficient alternative to current arrangements for all street furniture calculated under current type 7 and non-contestable unmetered load provisions[111]. This change could allow for further innovation (e.g. EV public charging), improved energy settlements, and improved energy efficiency in the NEM.[112]

5.1.1 Stakeholders see value in capturing the energy flows of street lighting and public furniture through a new metering framework

Stakeholder submissions to our consultation paper agreed with AEMO that current arrangements create inefficiencies in the energy settlement process.[113] IPWEA and a number of city councils generally supported AEMO's proposal, noting that any framework should not

109 AEMO rule change request, p. 16.
110 AEMO rule change request, p. 15 - 16.
111 NER clause 7.6.4
112 AEMO rule change request, p 15 - 16.
113 IPWEA p. 8, PIAC pp 16 - 17, Lighting Council Australia p 4.

impose costly, complex, or unreasonable requirements that would discourage widespread adoption.[114]

Issues related to market functions and obligations as well as technical requirements were raised, however, the majority of stakeholders who made submissions about street furniture were generally supportive of a new framework.[115] A few stakeholders raised concerns about AEMO's proposed arrangements for Metering Coordinators, Metering Providers, and Meter Data Providers,[116] the Minimum Service Specifications,[117] and inspection and testing requirements. For example, where energy flows are not minor (ie EV public charging stations) the arrangements proposed might need to be reconsidered.[118] We note that these considerations would be similar to those outlined in Chapter three.

Overall, stakeholders see value in capturing the energy flows of street lighting and public furniture through a new physical meter framework, with a stakeholder noting a trial implementation may be practical before any rule changes take effect.[119]

5.2 Opportunities and benefits of improving existing arrangements

We consider that there are opportunities to improve existing arrangements for the measurement of street lighting and public furniture. Some benefits of a new approach are outlined below.

Reducing barriers to enable innovation and competition

Enabling a new approach to measuring energy flows could allow more flexibility in the type of meter required for connections where energy flows are minor. The framework may also facilitate the introduction of metering technology developed for smart street lighting (discussed in section 5.3.1) and for existing non-contestable unmetered infrastructure such as telecommunications boxes and public bus shelters. This would enable non-contestable items to become contestable and access retail competition.

Improving cost allocation and energy settlement

AEMO considers that if the current arrangements are improved this can address issues with energy settlement, allocation of UFE and reduce distortions to energy cost allocation between customers.

For example, if lower energy volumes are allocated to a street lighting portfolio than is consumed (due to a day burner), the effect will be to understate the volume of "Accounted for Energy" and increase the volume of UFE. Consequently, non-street lighting customers will be subsidising the energy used by street furniture. Similarly, if greater energy volumes are

114 IPWEA p. 2. For a full list of these stakeholder submissions visit https://www.aemc.gov.au/rule-changes/unlocking-CER-benefits-through-flexible-trading.
115 Wattwatchers, IPWEA, PIAC, Lighting Council Australia, Ironbark Sustainability, Local Government NSW, Schreder, SSROC.
116 TasNetworks p. 2.
117 AusNet p. 3.
118 Lighting Council Australia p. 7.
119 Citipower p. 9.

allocated to a street lighting portfolio than is consumed, the effect will be to overstate the volume of "Accounted for Energy" and reduce the volume of UFE.

Street furniture customers (predominantly local councils, and ultimately local residents, via their council rates) would then be subsidising other consumers in that local area. In either instance, there is a misallocation of usage and costs creating inefficiencies in the energy settlement process.

AEMO note in their rule change request that "Any reduction in the volume of calculated energy flows resulting from a movement to a metered value will improve the accuracy of settlement including allocation of unaccounted for energy in the NEM.[120]

Energy efficiency and emissions reduction

AEMO outlined how current type 7 metering arrangements do not necessarily account for features of smart LED street lighting like dimming, trimming and smart city sensors. Because the efficiency benefits of these features are not rewarded in energy costs, there is reduced incentive for investment in energy-efficient street lighting. AEMO's proposed approach may enable local councils to improve the functionality of street lighting and reduce their energy bills, which would benefit residents through lowering or reducing pressures to increase rates.

We note that the IPWEA has estimated that street lights in the NEM, with a mix of legacy and LED street lights, currently use 825,000 MWh of electricity a year.[121] IPWEA suggests that the estimated energy volume if all street lights were LED and have smart controls would drop to around 380,000 MWh/yr, a reduction of 54 per cent or 445,000 MWh/yr. This would have multiple benefits for a number of stakeholders including increased energy efficiency and reduced costs for councils as well as a reduction in emissions in the NEM.

IPWEA notes that the first direct benefit of this drop in consumption is a material cost reduction for councils and their ratepayers. For example, IPEWA note that a 10-year Net Present Value of a 100W LED streetlight with dimming, trimming, and smart city sensors is between $170 - $442. Ironbark Sustainability suggests that IPWEA has understated the potential energy and cost savings of a full deployment of smart street lighting. Further, Ironbark also identified additional savings related to road safety improvements that would accrue to $1,000 - $4,000 over 20 years per smart controlled street light. [122]

IPWEA noted that a second direct benefit would be a reduction in emissions. It indicated that street lights currently account for 875,000 tonnes of C02 per year (based on the emissions associated with generating the electricity they use). IPWEA notes that a full deployment of smart street lights and LED lighting would reduce this number to 405,000 tonnes of C02 per year, more than halving the amount of greenhouse gas emissions that can be attributed to street lights.[123]

Improved upkeep of street lighting services

120 AEMO rule change request, p.16.
121 IPWEA, p 4.
122 Ironbark Sustainability, p 1 - 2.
123 IPWEA , p. 4.

We note that capturing the energy flows from street lights with smart street lighting controls operating as meters may also significantly improve the maintenance and upkeep of street lighting services.

This is because having a metered device with remote communications capabilities and a central management system (CMS) provides asset management benefits. These features enable devices to do automated fault and performance reporting by signalling when the lights are consuming at different levels than normal (i.e. if they are faulty).[124] This could improve the experience of consumers who benefit from and depend on reliable street lighting while reducing costs by offsetting night patrol costs,[125] reducing repair times, and improving overall maintenance optimisation.

We are aware that large operators of smart street lighting controls have cited a variety of maintenance optimisation benefits including minimising incorrect location visits, minimising repeat visits, and being able to more optimally plan maintenance routing by knowing all faults in a given area rather than having fault reports come in over time.[126]

QUESTION 10: OPPORTUNITIES AND BENEFITS OF IMPROVING EXISTING ARRANGEMENTS

- Do stakeholders consider there are other matters that the Commission should consider in terms of the opportunities, benefits, and costs for improving existing arrangements for the measurement of street lighting and public furniture?

5.3 Advancements in how energy flows are measured for street lights and other public furniture

Box 5.1 (below) describes how the energy usage for street furniture is currently estimated, with section 5.3.1 outlining the technological advancement for measuring energy for street lighting that may improve the way these lights and other street furniture are measured.

BOX 1: CURRENT ARRANGEMENTS FOR ESTIMATING THE ENERGY USAGE OF STREET LIGHTING AND OTHER STREET FURNITURE

Unmetered contestable loads (Type 7):

- These are calculated based on the assumption of a constant load (the device's wattage and hours of use); for example, that an LED streetlight averaging 80-150W will be operating between sunset and sunrise. This assumption method is used for street lights across all NEM jurisdictions and traffic lights in New South Wales and South Australia.

124 IPWEA, p 18 - 19.
125 DNSPs perform routine inspections to identify street lights that require repairs
126 IPWEA, p. 19.

- Estimation issues occur with this method because the energy consumption of light fixtures changes over their lifetime. Light fixtures and photocells (photocells detect and measure light, they are used by streetlights for switching purposes at sunrise and sunset) experience faults at typically 5 to 15 per cent per year that can leave them off or on 24 hours a day until repaired. Likewise, photocell switching times drift as dirt accumulates on their optical windows. These estimation errors limit the accuracy of energy settlement for AEMO and increase the variability of unaccounted-for energy (UFE) in the NEM.

Non-contestable unmetered loads (NCONUML):

- These are loads that are settled in the market using algorithms developed and agreed between the customer, the distributor, and the retailer. Examples include public BBQs, cable TV hubs, NBN cabinets, bus shelters and CCTV cameras.
- Non-contestable loads are less predictable than type 7 installations. The variability of their energy consumption means that it is difficult to formulate an exact calculation for their energy usage. As a result, the energy volumes for each trading interval for these devices are distorted by the inaccuracy of NCONUML calculations. These calculation errors limit the accuracy of energy settlement for AEMO and increase the variability of UFE in the NEM.

Note: NER clause S7.4.3(a) and NER clause 7.16.3(c)(6A), IPWEA p, 8. For more information see AEMC, Global settlement and market reconciliation rule change, final determination, 6 December 2018, pp. 48-56. Available at: https://www.aemc.gov.au/sites/default/files/2018-12/Global%20Settlement%20and%20Market%20Reconciliation%20-%20For%20publication.pdf.

5.3.1 Technological advancements allow energy flows to be measured more effectively

Currently, requirements for metering mean that installation of a meter on a street light or other street furniture is likely to be impractical and costly due to size and access issues. Under clause 7.8.2 of the NER, the physical requirements for a metering installation (other than type 7 and NONCUML metering installations) include:

- **Display:** the device must have either a visible or an equivalently accessible display of the cumulative total energy measured by that metering installation.
- **Communications device:** the device must include a communications interface to meet the requirements of clause 7.3.2(e)(4) and enable remote communication.
- **Measurement Element:** the device records energy data in a manner that enables metering data to be collated in accordance with the accuracy requirements for settlement purposes under clause 7.8.2 (a)(8) and Schedule 7.4.
- **Clock:** the device accurately assigns flows of energy to periods of time.
- **Energy data storage facility:** the device includes facilities for storing interval energy data for a period of at least 35 days if the metering installation is registered as a type 1, 2, 3 or 4 metering installation.

A conventional smart meter might comprise one or more sealed plastic boxes that contain the above components of the metering installation. These boxes are too large and costly to be appropriate for use on street lighting or various other street furniture.

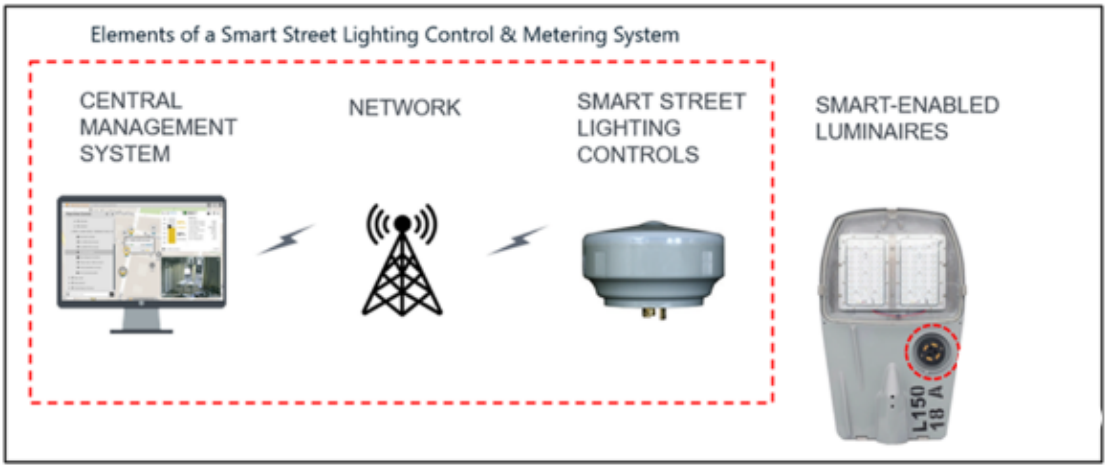
There have been advancements in street lighting and metering technology that are likely to offer a more efficient alternative for the measurement of energy flows for street furniture. This technology includes features like built-in measurement elements and clocks and an externally located energy data storage facility and display. IPWEA[127] provided an example of such technology available for street lighting in its submission to the consultation paper. Figure [5.1], taken from the IPWEA submission, provides an example of:

1. a smart street lighting control device
2. a communications network, and
3. a central management system.

With reference to the physical requirements for a metering installation in clause 7.2.8 of the NER, the device functions as a meter using the above three components. Using the smart street lighting control (acting as the measurement device and clock), the device measures voltage, wattage, current, and power factor. This information is then relayed by the communications network (acting as the communication device) to the central management system (acting as the equivalent energy data storage facility and display), where the energy data is stored and displayed.

We note that AEMO's framework is not prescriptive to one form of device and would also allow for the commissioning of similar devices for different street furniture assets (i.e. bus shelters and telecommunications boxes).

Figure 5.1: IPWEA example of Smart Street Lighting Metering System



Source: IPWEA submission to consultation paper, p4

127 IPWEA is the peak association for infrastructure asset management and professionals who deliver public works and engineering services.

5.4 We will continue considering AEMO's proposed framework for street lighting and other street furniture as we prepare the draft rule

In preparing the draft rule, we will further investigate the following key considerations in relation to AEMO's proposed framework:

- Market functions and obligations.
- Minimum service specifications.
- Inspection and testing requirements .
- Retrofitting costs for existing non-contestable infrastructure.
- Implementation and transitional issues.

We discuss each of these below.

5.4.1 Market functions and obligations

Roles of metering parties

AEMO's proposal for a new framework in the rules will require consideration of the different operational requirements and market arrangements. Under the rules, there are certain requirements for the types of entities who accredited to provide metering services: Metering Coordinators, Metering Providers, and Metering Data Providers.[128]

AEMO has proposed that an additional category of MP accreditation be established (Category 4T) "to ensure Metering Providers have the capability and competency specific to the installation and maintenance of minor energy flow metering installations".[129] We are seeking stakeholder feedback on roles and requirements for metering services, and whether an additional category is required to progress this proposal.

For street lighting and other distributor-managed minor energy flow connections, the rule change request proposes that there is value in allowing distributors to act in the role of MC, MP and MDP under the new model.

- Distributors are the metering coordinators for street lighting and other street furniture.[130] We note for households and businesses, there are competitive arrangements for MCs, MPs and MDPs. AEMO notes that allowing for competitive arrangements for minor energy flows may introduce further complexity around the location, authorisation and safety requirements that might apply to street furniture.[131]

We are aware that there are other aspects to smart street lighting systems (e.g. smart city data acquisition) that will be relevant to parties other than distributors, and are exploring potential solutions through the AEMC's metering review.

128 NER, Chapter 7, Part B.
129 AEMO rule change request, p 11.
130 NER clause 7.6.4.
131 AEMO, rule change request, Appendix A, table 1.4.

We also note that not all street furniture is managed by distributors, and are exploring who would best act in the role of MC, MP and MDP for these connections if they were to be metered under the MEFM framework.

QUESTION 11: MARKET FUNCTIONS AND OBLIGATIONS - METERING ROLES

- Should there be another level of accreditation for Meter Providers in the NER?
- What are stakeholders' views on distributors performing the functions of the MC, MP and MDP for the street lighting and other street furniture they manage, if MEFM is introduced?
- For street furniture not managed by distributors, should the existing competitive framework for metering parties apply if MEFM is introduced?

5.4.2 Technical requirements for minor energy flow meters

Minimum Service Specifications (MSS)

AEMO proposes that minor energy flow meters should be exempt from requirements to meet the minimum services specification in NER schedule 7.5. Stakeholder submissions generally agreed with AEMO.[132] However, AusNet noted that "there is no justification for removing the requirement to comply with the minimum service specification or testing standards for meters that measure significant loads (i.e. meters for EVs and telecommunications equipment)."[133]

Inspection and testing requirements:[134]

AEMO proposes that the application of a new framework is "reliant on clarifications and minor amendments to NER schedule 7.6 (Inspection and testing requirements) presented previously by AEMO for the AEMC's consideration in AEMO submissions to the metering framework review."[135]

Stakeholder submissions noted that it would be impractical and costly to require the physical inspection and testing of MEFMs with remote communication technology.[136] However, we agree with AEMO that the integrity of metering data should not be compromised.

The AEMC's metering review is currently considering amendments to NER schedule 7.6 to provide clarity for MCs to propose arrangements for the testing and inspection of existing, new, and emerging metering devices, technologies, and systems. An option could include MCs proposing remote inspection and testing capabilities within their asset management plans.

132 Lighting city council p 6 - 7, Wattwatchers p. 6, PIAC p. 15.
133 AusNet p. 3.
134 NER S7.6
135 AEMO, rule change request, HLD section 4.5.
136 IPWEA p 10, Glen Eira City Council p 9, Lighting council Australia p 7.

Retrofitting existing non-contestable infrastructure

Stakeholder feedback to the consultation paper raised the issue of retrofitting existing NONCUML infrastructure (typically, street furniture other than street lights) and the potential costs of any upgrade. NBN Co noted that in a trial of 110 MEFM in its telecommunications cabinets, installation costs were high for both the physical meter and its retrofit into existing cabinets.[137]

We understand that current technology for street furniture other than street lighting has not been developed at the same rate as street lighting and that existing NONCUML provisions may be more suitable at this time. AEMO's proposal recommended that the new arrangements would be opt-in based on specific business cases.

QUESTION 12: TECHNICAL REQUIREMENTS

- Do stakeholders have views on the removal or amendment of minimum service specifications for minor energy flow meters?
- Do stakeholders have views on inspection and testing requirements for minor energy flow meters?

5.4.3 Implementation and transition

The proposed MEFM framework is forward-looking only, we do not consider it would be appropriate to mandate that all councils and owners of street lights switch existing infrastructure to smart lighting with MEFMs. However, we are interested in stakeholder views on the most practical implementation and transitional arrangements if needed.

QUESTION 13: IMPLEMENTATION AND TRANSITION

- Are there any other implementation or transitional issues we should consider for this aspect of the rule change?

137 NBN Co, p. 4.

ABBREVIATIONS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
Commission	See AEMC
NEL	National Electricity Law
NEM	National Electricity Market
NEO	National Electricity Objective
NER	National Electricity Rules
NERL	National Energy Retail Law
NERO	National Energy Retail Objective
NERR	National Energy Retail Rules
NGL	National Gas Law
NGO	National Gas Objective
NGR	National Gas Rules
Proponent	The proponent of the rule change request
FRMP	Financially responsible market participant
FTM2	Flexible trader model 2
MEFM	Minor energy flow meter
NECF	National Energy Customer Framework
ESB	Energy Security Board
EAP	Energy Advisory Panel

A FULL LIST OF QUESTIONS

QUESTION 1: ENERGEIA COST AND BENEFIT ANALYSIS APPROACH AND METHODOLOGY

Are there any other considerations or issues you consider should be included in Energeia's assessment approach and proposed methodology?

QUESTION 2: KEY CONSIDERATIONS FOR SEPARATELY IDENTIFYING AND MANAGING FLEXIBLE CER

1. What benefits can be gained through separately identifying CER irrespective of whether there is a single FRMP or multiple FRMPs at the customer premises?

2. Are there additional implementation issues that we should consider for the draft determination (and draft rule if needed)?

QUESTION 3: ENABLING A SECOND SETTLEMENT POINT AT A SINGLE CONNECTION POINT

1. Do stakeholders agree the technical and market considerations outlined above are the key considerations we should address in relation to establishing a second settlement point, irrespective of the metering configuration options available and proposed for separating and measuring CER?
2. Should a second settlement point at a single connection point be restricted to defined situations and conditions (e.g. EV charging)? What criteria and governance processes need to be applied when allowing second settlement points at customer premises?
3. What would be the appropriate framework for approving and verifying alternative measuring devices permitted to be used at the second settlement point?
4. What would the implementation costs be for creating second settlement points with associated metering configuration options?

QUESTION 4: USING OTHER DEVICES FOR CER MEASUREMENT AND REWARD

What changes to the rules, if any, should be assessed in relation to these non-market-related devices for CER products and services to consumers?

QUESTION 5: ESTABLISHING TWO CONNECTION POINTS AT A SINGLE PREMISES

1. Are there any changes we could make to the NER and NERR to assist in overcoming the current barriers to the second connection point?
2. What issues need to be considered in evaluating whether there should be changes to the fixed network tariff for second connection points at the same premises? How (if at all) should this issue be addressed in the NER?

QUESTION 6: AEMO'S SPECIFIC FTM2 FOR SMALL CUSTOMERS

Do you agree with the Commission's view and its initial position to not progress further with AEMO's specific FTM2 for small customers?

QUESTION 7: AEMO'S FTM2 PROPOSAL FOR LARGE CUSTOMERS

Do you agree that introducing AEMO's FTM2 (or variations to it) for large customers would create an additional or better option for large customers to engage with multiple service providers?

QUESTION 8: MULTIPLE FRMPS: EMBEDDED NETWORKS MODEL

Other than metering and network connection costs, are there other reasons SGAs use the embedded network framework?

Would the proposed changes to network tariffs in NSW and Tasmania drive SGAs in those states to adopt different models?

Do stakeholders consider that the existing embedded network framework should continue to be used to facilitate flexible trading and market participation or should the Commission consider alternative models/framework?

Are there any additional issues with the use of the embedded networks framework to facilitate flexible trading not already discussed above?

QUESTION 9: MULTIPLE FRMPS: AEMO'S FTM2 PROPOSAL

If the Commission introduced FTM2, how would (or should) it affect the existing

arrangements that allow forms of flexible trading, such as SGA, embedded networks, and wholesale demand response?

Would introducing AEMO's FTM2 model for multiple energy service providers significantly impact the business model or costs of the primary energy service provider?

Would FTM2 encourage distributors to test and implement new tariffs (e.g. dynamic) for sizable and responsive loads more readily than they have to date? Would FTM2 affect the way in which energy service providers (such as aggregators) provide network services?

Are there any costs or benefits that we have not considered in relation to AEMO's FTM2 proposal?

QUESTION 10: OPPORTUNITIES AND BENEFITS OF IMPROVING EXISTING ARRANGEMENTS

- Do stakeholders consider there are other matters that the Commission should consider in terms of the opportunities, benefits, and costs for improving existing arrangements for the measurement of street lighting and public furniture?

QUESTION 11: MARKET FUNCTIONS AND OBLIGATIONS - METERING ROLES

- Should there be another level of accreditation for Meter Providers in the NER?
- What are stakeholders' views on distributors performing the functions of the MC, MP and MDP for the street lighting and other street furniture they manage, if MEFM is introduced?
- For street furniture not managed by distributors, should the existing competitive framework for metering parties apply if MEFM is introduced?

QUESTION 12: TECHNICAL REQUIREMENTS

- Do stakeholders have views on the removal or amendment of minimum service specifications for minor energy flow meters?
- Do stakeholders have views on inspection and testing requirements for minor energy flow meters?

QUESTION 13: IMPLEMENTATION AND TRANSITION

- Are there any other implementation or transitional issues we should consider for this aspect of the rule change?

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CER implementation plan reforms across the supply chain