

**RULE**

Australian Energy Market Commission

**CONSULTATION PAPER**

**NATIONAL ELECTRICITY AMENDMENT  
(TECHNICAL STANDARDS FOR  
DISTRIBUTED ENERGY RESOURCES)  
RULE 2020**

**NATIONAL ENERGY RETAIL  
AMENDMENT (TECHNICAL  
STANDARDS FOR DISTRIBUTED  
ENERGY RESOURCES) RULE 2020**

**PROPONENT**

AEMO

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## INQUIRIES

Australian Energy Market Commission  
GPO Box 2603  
Sydney NSW 2000

E [aemc@aemc.gov.au](mailto:aemc@aemc.gov.au)  
T (02) 8296 7800

Reference: ERC0301

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## ABOUT THE AEMC

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

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# 1 INTRODUCTION

On 5 May 2020, the Australian Energy Market Operator (AEMO) submitted a rule change request to the Australian Energy Market Commission (AEMC or Commission) seeking to create an obligation on AEMO to create a subordinate instrument for a minimum technical standard for distributed energy resources (DER) and a definition of DER in the National Electricity Rules (NER).

The rule change request has also proposed that distribution network service providers (DNSPs) be required to ensure that connected DER meet the DER minimum technical standards through their relevant connection agreements. In doing so, AEMO has anticipated that the standards will "bind the manufacturers and installers of DER and DER devices".<sup>1</sup>

Assessing this rule change request does not require the Commission to consider the detailed content of the DER minimum technical standards. Instead, this rule change process is concerned with assessing the proposed creation of a subordinate instrument that specifies minimum technical standards (as initially determined by AEMO) and what those standards will apply to.

AEMO will undertake its own consultation process concurrent with this rule change process in order to have a first set of minimum technical standards completed and ready for implementation by the time this rule change process is finalised. It is proposed that these standards will be amended, if necessary, over time by AEMO.<sup>2</sup>

This consultation paper has been prepared to facilitate public consultation on the rule change request and to seek stakeholder submissions.

This paper:

- sets out a summary of, and the background to, the rule change request
- identifies a number of questions and issues to facilitate the consultation on this rule change request
- outlines the process for making submissions.

The timetable for this rule change process is shown in Table 1.1 below.

**Table 1.1: Key milestones**

MILESTONE	DATE
Submissions on consultation paper due	23 July 2020
Release draft determination	1 October 2020
Submissions on draft determination due	12 November 2020
Release final determination	December 2020

<sup>1</sup> AEMO, Rule change request, p. 16.

<sup>2</sup> AEMO, Rule change request, pp. 15-16.

## 2 CONTEXT AND BACKGROUND

This chapter outlines the broader context to AEMO's rule change request and the background relevant to the introduction of a DER minimum technical standard (the standard).

First, the chapter describes how this rule change request fits into the broader context of creating a regulatory framework for a DER minimum technical standard. This includes the work concurrently undertaken by the Energy Security Board (ESB) on a longer-term governance framework for the standard and AEMO's consultation on the initial standard.

Secondly, this chapter includes relevant background of DER in the national electricity market (NEM) and how its growth is impacting on system security. In short, the growth of DER has been substantial, yet the standards which specify minimum performance or operation of these assets remained fragmented. The background information provided is relevant to the rule change request, which has argued that a lack of consistent national technical standards inhibits the ability of the market operator to securely manage the system.

### 2.1 Context

This rule change request is one part of three concurrent work streams that are being undertaken by the AEMC, AEMO and the ESB aimed at improving the use and management of DER.

The rule change request seeks to address some imminent system security issues caused by DER connections. The concurrent longer-term governance review to be undertaken by the ESB is to deliver a framework that will maintain and update the minimum capabilities for DER hardware, data and communications standards in a manner that achieves efficient outcomes while supporting broader, national alignment to DER integration.

Table 2.1 summarises the work that is currently under way to create an immediate initial technical standard for DER and a longer-term governance framework for the standard. Depending on the progress of the ESB's governance review, any rule that is made as a result of this rule change process may include transitional arrangements, recognising that the outcomes of the ESB governance review are likely to require amendments to the NER (and potentially the NERR) that may supersede rules made in this process.

**Table 2.1: Current work on technical standards**

	<b>RULE CHANGE REQUEST</b>	<b>INITIAL STANDARD</b>	<b>GOVERNANCE</b>
Who?	AEMC	AEMO	ESB
What?	AEMO submitted a rule change request to oblige it to create a subordinate instrument for a DER minimum technical standard and to also create	AEMO is currently undertaking consultation to set an initial DER technical standard to be implemented if a rule is made.	The COAG Energy Council has tasked the ESB with preparing a proposal for a longer-term DER technical standards governance

	<b>RULE CHANGE REQUEST</b>	<b>INITIAL STANDARD</b>	<b>GOVERNANCE</b>
	a definition of DER relevant to the standard.		regime.
Why?	Due to increasing rooftop solar energy, when combined with periods of low demand, limitations have begun to be reached in distribution systems related to managing voltages, thermal capacity and protection coordination. AEMO has stated that it currently has limited scope to manage these risks.	If a rule is made through this process, AEMO must set an initial DER minimum technical standard to address the purported critical areas of high DER penetration and risk.	The ESB is developing a long-term governance framework for DER technical standards to involve industry participants in maintaining and amending the standards.
How?	The new rule, if made, will oblige AEMO to make a subordinate instrument to establish DER minimum technical standards.	If made, the new standard will be given effect by the new rule.	A longer-term governance framework could potentially replace this rule, if made, in the future.
When?	Under the current schedule for this rule change process, a draft rule is scheduled to be published in October and a final rule in December 2020.	AEMO's first stage issues paper for consultation is expected to be released by early July 2020. The draft initial standard and second stage notice are expected in September 2020.	The ESB's governance consultation paper is expected to be released early July 2020. A proposed framework is due to COAG Energy Council by October 2020.

In addition to these 3 reviews:

- The South Australian Government is undertaking consultation<sup>3</sup> on addressing power system events caused by distributed solar photovoltaics (PV). In addition, in June 2020 AEMO published a test procedure for public consultation with the aim of supporting South Australia to reinforce inverter short duration undervoltage disturbance ride-through capabilities.<sup>4</sup>
- The Commission understands that AEMO is also working with Western Australian regulatory bodies on an equivalent DER minimum technical standard to apply in Western Australia.<sup>5</sup>

<sup>3</sup> Department for Energy and Mining, *Consultation on regulatory changes for smarter homes*, 22 June 2020.

<sup>4</sup> AEMO, *Short duration undervoltage disturbance ride-through: Inverter conformance test procedure for South Australia*, 2020.

<sup>5</sup> Energy Transformation Taskforce, *Distributed Energy Resources Roadmap*, December 2019, p. 54.

## 2.2

### 2.2.1

## Background

### Growth in DER

As outlined in AEMO's rule change proposal, growth in DER in Australia, particularly household and business PV, has reached among the highest levels in the world. In 2019, distributed solar generation reached a total of over nine gigawatts (GW) in the NEM, with an additional 1.16 GW connected in the Western Australia Wholesale Electricity Market (WEM).<sup>6</sup> Small-scale solar PV generated an estimated 12,455 GWh in 2019, which maintained strong year-on-year growth over almost a decade.<sup>7</sup> Aside from solar PV, Australia's DER market is made up of millions of consumer loads: air conditioners, hot water systems, pool pumps, batteries, and other behind-the-meter assets that are otherwise located within distribution network service providers (DNSPs) networks or microgrids.

As outlined in the Integrated System Plan's (ISP) 2025 forecasts, growth in DER is expected to continue strongly, led by a central projection of solar PV reaching 14.64 GW in total — an amount that could meet upwards of 40 per cent of underlying demand.<sup>8</sup> The growth in consumer-led DER, from rooftop solar PV and smart meters to the uptake of batteries and electric vehicles, will continue to shape the market as these assets become less costly. For example, behind-the-meter battery storage uptake could contribute upwards of 2,500 MWh of capacity by 2025 under a neutral projection, potentially easing peak demand and absorbing excess solar PV generation.<sup>9</sup>

The proponent has argued in the request that improving technical standards and standardising performance capabilities of DER in the market may allow for a higher penetration and better integration of these assets, stating that:<sup>11</sup>

By improving the performance of DER and the predictability of DER behaviour, standardisation of minimum DER capabilities across the NEM will allow more consumers to connect DER to the grid in the future and increase the avenues available for consumers to optimise their investments in DER. For non-DER households it will improve the efficient operation of the power system by system managers, leading to more affordable power supply.

AEMO maintain that in order to manage the impacts of DER on the NEM, as explained below, applying minimum technical standards could improve both integrative efficiencies and optimise system security management.<sup>12</sup>

6 AEMO, Rule change request, p. 2.

7 Department of the Industry, Science, Energy and Resources, *Australian Energy Statistics*, Table O, May 2020.

8 Combined estimates of 12.34 GW rooftop solar PV in the NEM and 2.3 GW in the WEM. AEMO, Rule change request, p. 2.

9 Graham et al. *Projections for small scale embedded energy technologies*, CSIRO, June 2019, pp. 49;

11 AEMO, Rule change request, p. 4.

12 AEMO, Rule change request, pp. 4-5.

## 2.2.2 Impacts of DER on the NEM

Operating the NEM with large penetrations of DER has major implications on the maintenance of system security and the ability for the system to return to a steady state following a contingency event.<sup>13</sup> Even though there are benefits from the growth of DER in the NEM, AEMO has stated that DER's current performance in the aggregate can pose considerable risk to AEMO's ability to maintain key operational limits in the market, like voltage and inertia.<sup>14</sup>

In particular, the AEMO has argued that it can be increasingly difficult to balance generation across dispatch intervals in order to cater for uncertain DER performance, which can cause network reliability and security issues. Examples of such are discussed below.

### Managing the system load profile

AEMO has stated that the size of DER in aggregate can create critical and particular challenges, including increasing variability and uncertainty in the daytime system load profile (See Figure 2.1).<sup>15</sup> Commonly referred to as 'the duck curve', aggregate solar PV tends to reduce the day-to-day operational demand load — particularly in the middle of the day when demand is low and solar PV exports are high at the sun's peak. One key effect of this is a heightened risk of underestimation of the impacts of DER from the midday trough through to the evening ramp peak.<sup>16</sup>

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13 A contingency event is an event that affects the power system in a way which would likely involve the failure or sudden and unexpected removal from operational service of a generating unit or transmission element.

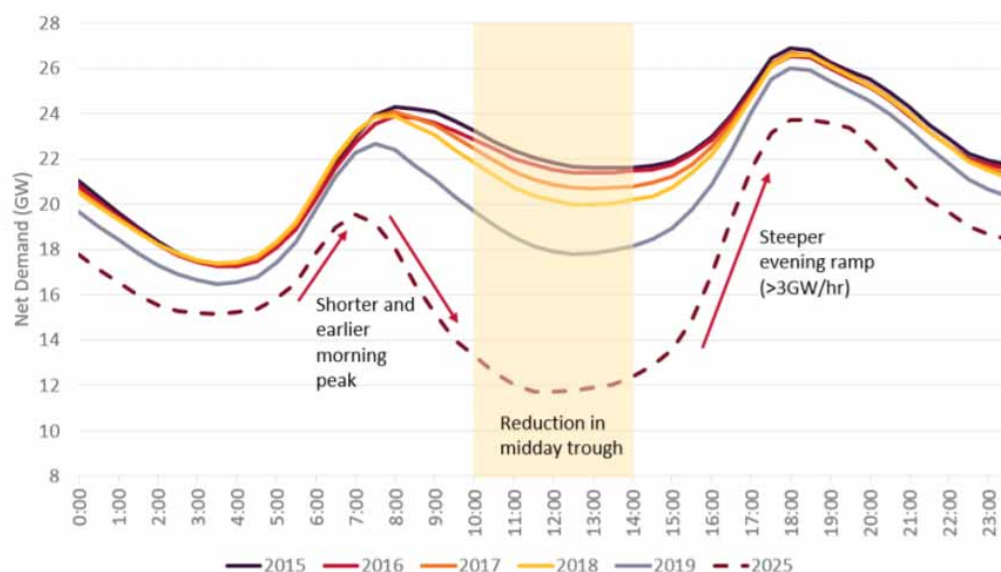
14 AEMO, Rule change request, pp. 6-7.

15 AEMO, Rule change request, p. 8.

16 AEMO, Rule change request, p. 8.



**Figure 2.1:** The NEM 'duck curve' annualised



Source: AEMO, *Renewable Integration Study: Stage 1 report*, 2020, p. 58.

The duck curve in Figure 2.1 shows how operational demand decreases as distributed solar PV generation increases and sends more reverse power flows through the local distribution interface irrespective of demand loads. AEMO anticipate that scenarios of high system risk could become more frequent. For example, days of low demand and high DER generation can increase the risk to system security and AEMO might not be able to respond to such a scenario efficiently. If this over-generation scenario were then followed by a credible contingency event, like an outage along the local distribution network, critical ripple effects would be experienced across the system.<sup>17</sup>

#### Minimum operational demand and system strength support

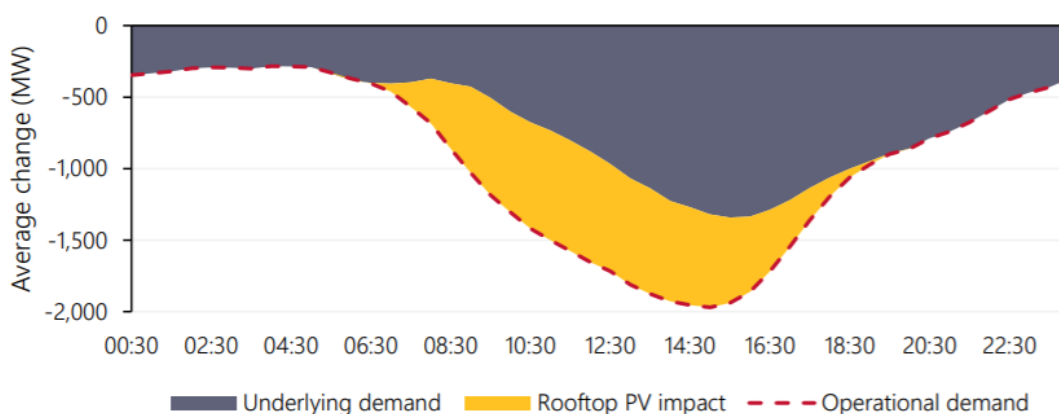
AEMO submitted that current levels of DER, in aggregate, can render demand for scheduled and semi-scheduled synchronous generation insufficient, either not operating or operating below its robust level.<sup>18</sup> As a result, these generators will not deliver necessary system strength and inertia. These system strength services are critical for ensuring the NEM is resilient and able to return to a steady operating state if disturbances to the system occur.

<sup>17</sup> In the request, AEMO point to "the potential for moderate disturbances to escalate into severe disturbances and affect large geographical areas, decreasing the robustness of the power system" as critical ripple effects, AEMO, Rule change request, p. 8.

<sup>18</sup> AEMO, Rule change request, pp. 2, 8.

Figure 2.2 shows the change in NEM-average operational demand<sup>19</sup> by region and time of day (Q1 2020 versus Q1 2019). This change is separated into underlying demand<sup>20</sup> and rooftop solar generation. The yellow area represents a change in PV from one year to the next. This gap compresses operational demand down to a minimum level, proportionate to the uptake of DER and solar PV. AEMO has stated that such an outcome has major impacts on whole-of-system operations, particularly on the effectiveness of emergency control mechanisms available to it as the system operator.<sup>21</sup>

**Figure 2.2:** Solar PV DER impact on NEM operational demand



Source: AEMO, Quarterly Energy Dynamics Q1 2020, 2020, p. 8.

In addition, AEMO has stated that operating a market at minimum operational demand more often can impose significant impacts on secure system operations.<sup>22</sup> In some situations, this can result in passive and involuntary trips of consumers' DER, effectively compounding risks during a disturbance or contingency event.<sup>23</sup>

### Frequency disturbance events

One key system parameter in the NEM is frequency. The normal frequency is 50 Hertz (Hz) and is allowed to vary in accordance with the requirements of the Frequency Operating Standard (FOS). To do this, AEMO must balance supply and demand: if there is more supply than demand in the market, frequency will rise across the power system. The reverse is also true: undersupply for a level of operational demand will lower frequency across the power system. The supply and demand is balanced every dispatch interval (of five minutes) through

<sup>19</sup> Operational demand can be defined as consumption met via local scheduled, semi-scheduled, and large non-scheduled generating units and imports.

<sup>20</sup> Underlying demand can be defined as the real demand by residential customers and business customers which contributions to operational demand.

<sup>21</sup> AEMO, *Renewable Integration Study: Stage 1 report*, 2020, pp. 27-28.

<sup>22</sup> AEMO, Rule change request, p. 2.

<sup>23</sup> AEMO, Rule change request, pp. 4-5, 8.

the AEMO dispatch process. Frequency can also be managed by ancillary service market arrangements, namely frequency control ancillary services (FCAS), which settles 'raise' or 'lower' bids to meet the FOS across dispatch intervals.

Through its ISP and renewable integration study (RIS) work, AEMO has argued that due to the size and aggregate behaviour of DER, more interventions and emergency control mechanisms are required to manage system frequency. In rare cases, these events can become unmanageable because a frequency disturbance can disconnect a large amount of DER in unison from the grid, significantly decreasing the ability to respond efficiently (See Box 1 below). In particular, according to AEMO, a lack of consistent standards setting in voltage ride through or withstand performance capabilities can compound these risks and contingency events in areas of high DER penetration.<sup>24</sup>

#### **BOX 1: FREQUENCY DISTURBANCE EVENTS**

AEMO has found that there have been events in the NEM where DER inverters have responded in unison to frequency disturbances, sometimes disconnecting from the local distribution interface. For instance, in Tasmania on 13 August 2018, a mainland NEM generation trip transferred a frequency disturbance to Tasmania through Basslink.

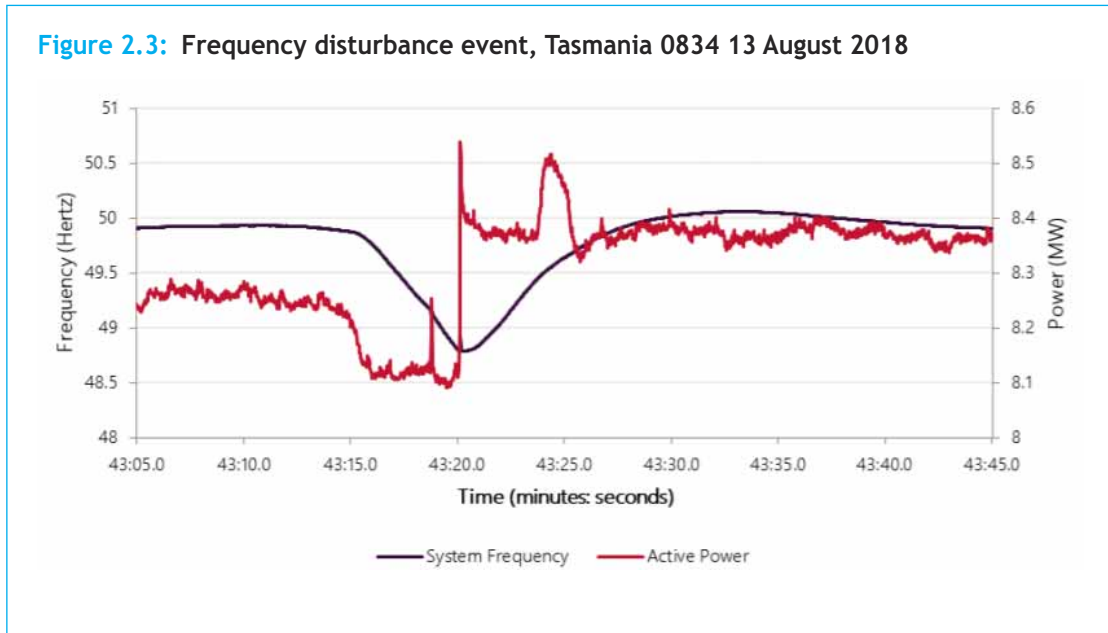
During this event, a change of the frequency on the mainland caused the Tasmanian frequency to fall from 49.95 Hz to 48.73 Hz over a five-second period (See the Figure 2.3 below).

Active power south of Hobart, at Kingston, fell from 8.25 megawatts (MW) to 8.1 MW, and then jumped to 8.4 MW within seconds. This suggests that the under-frequency disturbance event in the NEM resulted in some local Tasmanian solar PV output unwillingly disconnecting from the grid.

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<sup>24</sup> AEMO, Rule change request, pp. 2, 7-8.

**Figure 2.3:** Frequency disturbance event, Tasmania 0834 13 August 2018



Following this chapter on context and background relevant to this rule change request, this consultation paper will outline the request lodged by AEMO, including how, if the NEO was satisfied, an obligation on AEMO to set minimum technical standards through a subordinate instrument in the rules may be accomplished.

## 3 OVERVIEW OF THE RULE CHANGE REQUEST

The rule change request lodged by AEMO proposes amendments to the National Electricity Rules (NER), and the National Energy Retail Rules (NERR) if required, to oblige AEMO to create a subordinate instrument under the rules that will set out minimum technical standards for DER. This chapter sets out:

- the rationale and outcomes for the rule change request
- an overview of the solution proposed by AEMO.

Details and copies of the rule change request may be found on the AEMC website at [www.aemc.gov.au](http://www.aemc.gov.au).

### 3.1 Reasons for the rule change request

AEMO submitted the rule change request to the AEMC on 5 May 2020. The rule change request was prepared in co-operation with the ESB as requested by the COAG Energy Council. In the rule change request, AEMO stated that:

- There are gaps in current technical standards for DER, which are increasingly driving system risks to unmanageable sizes across the NEM.
- Without establishing minimum technical standards, especially given the exponential growth in DER, NEM system operation may be suboptimal; increasing the reliance on inefficient interventions to manage waning system security parameters such as voltage, thermal capacity, or inertia.
- Particular capabilities in DER minimum standards are critical and need to be brought in line with network connection frameworks, to more efficiently integrate DER into the grid.

According to AEMO, following the rapid growth in DER, particular system impacts at the distribution level are becoming increasingly complex and difficult to manage. Nevertheless, it recognises that DER does offer critical consumer benefits, both private and for the whole system, yielding rapid change in the generation of electricity toward a two-sided market.

However, AEMO has also asserted that higher penetration of DER, particularly rooftop solar PV, can create critical system events like over-generation during the midday load profile.

In particular, AEMO has argued that the current arrangements of DER technical standards setting, through Standards Australia, has lagged in response to DER's uptake.<sup>25</sup> AEMO has suggested that the minimum technical standard should cover three technical performance capabilities:

- inverter performance and grid responsiveness
- interoperability and communication interfaces
- cyber security measures.

AEMO has argued that its proposed rule change, if made, could provide scope for addressing system operations issues such as minimum operational demand support for systems services

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<sup>25</sup> AEMO, Rule change request, pp. 6, 11.

through the key performance capabilities noted above. In addition, AEMO has argued that the creation of a subordinate instrument to establish minimum technical standards could address the gaps in current standards setting:<sup>26</sup>

The current 'patchwork' approach to standards of DER connected to the NEM is not capable of delivering the consumer outcomes needed in the context of the rapid uptake of DER by consumers. It fails to deliver adequate support for power systems at a technical level and will inhibit the future development of markets and services in the NEM to provide benefit to consumers.

In AEMO's view, if the ability to set DER minimum technical standards is not incorporated into the NER, then growth in DER would necessarily be restrained, daily generation would be inefficiently curtailed, and risks of larger passive shut-downs — and in quite rare cases system black events — would be raised.<sup>27</sup>

In order to manage system impacts and integrate higher penetrations of DER in the NEM, AEMO has suggested that the NER could give it authority to set minimum technical standards, capabilities, and performance of emerging DER units through a subordinate instrument. In its view, a rule change to this effect could create a capability for AEMO to monitor and control DER loads, particularly solar PV, in order to minimise system impacts to the transmission-distribution interface and maximise efficient integration.<sup>28</sup>

## 3.2 Outcomes of the proposal

AEMO has argued that its proposed solution could produce the following outcomes:

- Being able to set minimum technical standards will eventually produce smoother NEM and distribution network operations, which could ultimately lower consumer costs.
- A more consistent performance baseline and predictability of DER could be established, leading to more efficient management of system security. This could include reducing the risk of over-generation in the middle of the day, providing certainty for minimum system service support, fewer disconnections from voltage disturbances, improving reliability, and mitigating the financial losses of consumers.
- Enabling competition by reducing potential consumer or manufacturing barriers to choice, while setting a common baseline of certainty for today's market participants and future integrative grid developments, such as virtual power plants.

In its view, AEMO's proposed solution would align DER performance with NEM system needs to maintain system security, balance supply and demand, keep consumer-led DER connected, and optimise the power system.<sup>29</sup>

Importantly, AEMO has stated that any technical standards established as a result of rules made under this rule change process will not apply retrospectively to current DER. Instead,

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<sup>26</sup> AEMO, Rule change request, p. 11.

<sup>27</sup> AEMO, Rule change request, pp. 7-8.

<sup>28</sup> AEMO, Rule change request, p. 19.

<sup>29</sup> AEMO, Rule change request, p. 18.

any new requirements will only be applicable to assets that are newly connected, or DER within a distribution system that is newly augmented, upgraded, extended or replaced.<sup>30</sup>

AEMO has also suggested that amendments to the NER, if any, could create a device-level baseline of performance/capability through which market participants, such as DER manufacturers or aggregation services, could derive value from and develop on, essentially setting a consistent technical floor across the market.

As well, by creating a subordinate instrument — as opposed to outlining minimum technical standards in the NER itself — such standards could promptly, directly, and efficiently be set and updated to respond to technological and operational necessities of DER, in a more effective and consultative way.<sup>31</sup>

### 3.3 Solution proposed in the rule change request

AEMO has offered two key items toward a potential solution:

- an obligation on AEMO to make, publish and, if necessary, amend DER minimum technical standards that will be contained in a new subordinate instrument
- establishing a high-level definition of DER in the rules.

As explained below, AEMO has suggested that the new rules should enable key principles of uniformity, adaptivity, and complementarity in technical standards setting in order to minimise DER's negative impacts on system security. In part, this will be achieved by obligating DNSPs to include the DER minimum technical standards into the terms and conditions of relevant connection agreements with retail customers. It is anticipated this obligation would have the flow-on effect of binding manufacturers and installers of DER and DER devices to the minimum technical standards.<sup>32</sup>

While no proposed rule has been included with the rule change request, AEMO has identified some rules that it considered could be amended to implement its proposal. It also included a high-level description of the proposed changes. In brief, the rule change request:

- Identifies inserting a new rule 3.7G of the NER as the potential location for a rule titled "DER minimum technical standards", which would set out AEMO's obligation to make minimum technical standards. AEMO has proposed that this rule also specify the purpose of the standards, the requirements of the standards, and the considerations that AEMO must have regard to when making the DER minimum technical standards.<sup>33</sup>
- Proposes that new rule 3.7G of the NER also include definitions of relevant terms such as "DER device", "connected DER" and "DER minimum technical standards".<sup>34</sup>

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30 AEMO, Rule change request, p. 15.

31 AEMO, Rule change request, p. 16.

32 AEMO, Rule change request, p. 16.

33 AEMO, Rule change request, pp. 22-23.

34 AEMO, Rule change request, p. 24.

- Notes that consequential amendments to Chapters 5 and 5A of the NER may be required so that connection contracts entered into under these chapters incorporate the DER minimum technical standards set out in the subordinate instrument.<sup>35</sup>
- Suggests that the AEMC considers if changes to the "model terms and conditions for deemed standard connection contracts" set out in Schedule 2 of the NERR are also required.<sup>36</sup>

### 3.3.1 Creation of a subordinate instrument

The rule change request seeks to amend the NER to require AEMO to establish and maintain DER minimum technical standards through an instrument subordinate to the NER. That is, an obligation on AEMO to create, publish, and amend DER minimum technical standards on an ongoing basis, building on existing state regulatory frameworks in standards and connection setting. AEMO has argued that the development of a subordinate instrument would allow for a direct and efficient process for setting standards.<sup>37</sup>

AEMO has proposed that the NER should also require DNSPs to ensure compliance of "connected DER" with the standards on an ongoing basis, claiming that monitoring compliance at a local network would create operational efficiencies.

In addition, AEMO has proposed that if the instrument were created, the new framework should also require the Australian Energy Regulator (AER) to develop a light-touch monitoring and compliance framework, primarily for the purpose of transparency.<sup>38</sup>

Consequently, AEMO suggested that a standard created under a subordinate instrument might also affect sections of the NER (and possibly the NERR) that relate to connection contracts, negotiation frameworks, model standing offers and model standing terms and conditions for deemed standard connection contracts.<sup>39</sup> In this way, standards created under the instrument could bind consumers with, as well as obligate manufacturers and installers of, DER assets through contract arrangements in a nationally consistent way.

AEMO proposed that the amending rules and the creation of a subordinate instrument would allow it to:

- develop and publish an initial technical standard to be available with the new rules, if made.<sup>40</sup>
- introduce other minimum technical standards for DER over time, including the scope to incorporate relevant Australian and International Standards, where applicable
- review and update the standards on a 'needs basis' to allow response by AEMO to technological developments or critical system events, such as a cyber threat.

35 AEMO, Rule change request, p. 25.

36 No further details were provided by AEMO on this issue. AEMO, Rule change request, p. 22.

37 AEMO, Rule change request, pp. 16, 18.

38 AEMO suggested that this could be inserted into Chapter 3 of the NER. AEMO, Rule change request, p. 16.

39 AEMO, Rule change request, p. 25.

40 AEMO noted in the request that it will undertake concurrent consultation with stakeholders to develop an initial standard focused on adverse under-voltage disconnections. AEMO, Rule change request, p. 17.



### 3.3.2 Definition of DER and connected DER

AEMO has proposed that a high-level definition of DER, including its scope, could be included in the NER in order to determine the coverage of the minimum technical standards. It suggested the following definition:<sup>41</sup>

The types of resources/assets including small and medium scale distributed generation (such as solar PV), energy storage (such as small and medium-scale batteries and electric vehicles that can deliver energy from the vehicle to the power system) and controllable loads (such as air conditioners, electric storage hot water systems, pool pumps, and electric vehicle supply equipment) that connect to the distribution system.

AEMO proposed that the definition of DER be general enough to not preclude emerging technologies while providing enough technical detail so the definition can capture current complexities. Then, DER's definition would be included in connection agreement terms and conditions to establish compliance,<sup>42</sup> stating that:<sup>43</sup>

In order to avoid overreach (i.e. inadvertently covering small 'behind the meter' appliances etc), AEMO should be required in the standard itself to specify the particular DER being covered

Such DER must also be newly connected or to be connected within a distribution network, and DER within a distribution network that has recently been upgraded, replaced or otherwise augmented, in order to be "connected-DER" to which the standard will apply.<sup>44</sup>

## 3.4 Interactions with concurrent work

As outlined in Table 2.2, AEMO's rule change request is being considered alongside two other related tasks: an initial set of minimum technical standards to be developed by AEMO and a long-term governance framework for technical standards undertaken by the ESB. If a proposed subordinate instrument and definition of DER were to be established in the NER, the potential for a transitional arrangement to provide a deadline for these tasks to be completed and fully implemented in the NER and NERR will also be considered.

Cognisant of this, AEMO suggested that any new rules arising from this rule change process to implement the initial policy objective could establish immediate technical performance standards in areas of the system where negative DER impacts are already prevalent.<sup>45</sup> AEMO noted that it is committed to working on further reforms to the governance of DER technical standards that result from the ESB review.<sup>46</sup>

<sup>41</sup> AEMO, Rule change request, p. 22.

<sup>42</sup> AEMO, Rule change request, p. 16.

<sup>43</sup> AEMO, Rule change request, p. 23.

<sup>44</sup> AEMO, Rule change request, p.15.

<sup>45</sup> On implementing rules in different locations on different dates, the Commission notes that this may not be consistent with the stated policy objective of implementing a national approach to the issues arising from DER penetration. In addition, the Commission notes the usual approach for jurisdictional-specific rules is for a jurisdictional derogation to be submitted by the relevant minister.

<sup>46</sup> AEMO, Rule change request, p. 4.

## 4 ASSESSMENT FRAMEWORK

This chapter sets out the requirements under the National Electricity Law (NEL) and National Energy Retail Law (NERL) that the AEMC must satisfy in considering the rule change request, and provides detail of the proposed approach for assessing the rule change request. This framework may be refined during the rule change process.

### 4.1 Achieving the NEO and the NERO

Under the NEL, the Commission may only make a rule if it is satisfied that the rule will, or is likely to, contribute to the achievement of the national electricity objective (NEO).<sup>47</sup>

The NEO is:<sup>48</sup>

To promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to

- (a) price, quality, safety, reliability and security of supply of electricity; and
- (b) the reliability, safety and security of the national electricity system.

In addition, the Commission may only make a rule if it is satisfied that the rule will, or is likely to, contribute to the achievement of the national energy retail objective (NERO).<sup>49</sup>

The NERO is:<sup>50</sup>

to promote efficient investment in, and efficient operation and use of, energy services for the long term interests of consumers of energy with respect to price, quality, safety, reliability and security of supply of energy.

The Commission must also, where relevant, satisfy itself that the rule is "compatible with the development and application of consumer protections for small customers, including (but not limited to) protections relating to hardship customers" (the "consumer protections test").<sup>51</sup>

Where the consumer protections test is relevant in the making of a rule, the Commission must be satisfied that both the NERO test and the consumer protections test have been met.<sup>52</sup> If the Commission is satisfied that one test, but not the other, has been met, the rule cannot be made.

There may be some overlap in the application of the two tests. For example, a rule that provides a new protection for small customers may also, but will not necessarily, promote the NERO.

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47 Section 88 of the NEL.

48 Section 7 of the NEL.

49 Section 236(1) of the NERL.

50 Section 13 of the NERL.

51 Section 236(2)(b) of the NERL.

52 That is, the legal tests set out in s. 236(1) and (2)(b) of the NERL.

Based on a preliminary assessment of the rule change request, the Commission considers that the relevant aspects of the NEO and NERO are the efficient investment in, and operation of, electricity services with respect to the price, quality and security of supply of electricity.

The Commission also considers that this rule change request may potentially require the application of the consumer protection test.

At this stage, the Commission is seeking stakeholder views on its proposed assessment framework which includes the following criteria to assess whether the proposed solution is likely to promote the NEO and the NERO. That is, the impact the rule change request would have on:

- efficient operation of the electricity system, considering if the proposed solution would reduce the probability of system security issues arising from the growing number of DER connections
- efficient risk allocation, taking account of who is best placed to manage system security and reliability risk arising from an increasing number of DER connections
- regulatory burden, assessing the proposed additional regulatory burden directly imposed on consumers as well as that on device manufacturers, DNSPs and the AER related to the introduction of a minimum technical standard for DER which may have consequential costs for consumers
- governance, examining if appropriate governance structures are or can be put in place to support AEMO's proposed role in setting an interim minimum technical standard for DER.

#### QUESTION 1: ASSESSMENT FRAMEWORK

Do you agree with the proposed assessment framework? Should the assessment framework include any additional considerations, and if so, what are they and why?

## 4.2 Making a more preferable rule

Under ss. 91A of the NEL and 244 of NERL, the Commission may make a rule that is different (including materially different) to a proposed rule (a more preferable rule) if it is satisfied that, having regard to the issue or issues raised in the rule change request, the more preferable rule will or is likely to better contribute to the achievement of the NEO and the NERO.

## 4.3 Making a differential rule

Under the Northern Territory legislation adopting the NEL, the Commission may make a differential rule if, having regard to any relevant MCE statement of policy principles, a differential rule will, or is likely to, better contribute to the achievement of the NEO than a uniform rule. A differential rule is a rule that:

- varies in its term as between:

- the national electricity system, and
  - one or more, or all, of the local electricity systems, or
  - does not have effect with respect to one or more of those systems
- but is not a jurisdictional derogation, participant derogation or rule that has effect with respect to an adoptive jurisdiction for the purpose of s. 91(8) of the NEL.

## 5 ISSUES FOR CONSIDERATION

Taking into consideration the assessment framework, a number of issues have been identified for initial consultation. Stakeholders are encouraged to comment on these issues as well as any other aspect of the rule change request or this consultation paper, including the proposed assessment framework.

This chapter provides a discussion of the proposed solution, its practical implications and, where applicable, additional issues relevant to the request:

- Is the creation of a subordinate instrument for AEMO to set the initial minimum technical standard the most efficient way to address emerging system security issues?
- In the absence of a long-term governance framework, should AEMO's power to set the initial minimum technical standard be limited to addressing immediate concerns of voltage ride through and provision of an emergency backstop?
- Should the life of the initial subordinate instrument be limited until such a time when a broader governance framework for the DER minimum technical standard comes into place?
- Where and how should the standards be applied and who will monitor compliance?
- Who should bear the costs of implementing and complying with these new standards?

### 5.1 Setting an initial minimum technical standard

As outlined in Chapter 3, AEMO's rule change request proposed:

- establishing an obligation on AEMO to make, publish and, if necessary, amend DER minimum technical standards through a new subordinate instrument to the NER
- establishing a high-level definition of DER.

#### 5.1.1 Proposed legal framework

AEMO submitted that by creating a subordinate instrument, as opposed to including minimum technical standards in the NER itself, "such standards could be promptly, directly, and efficiently set and updated to respond to technological and operational necessities of DER, in a more effective and consultative way."<sup>53</sup>

It proposed that the initial minimum technical standard could be referred to in sections of the NER and NERR that relate to connection contracts, negotiation frameworks, and model standing offers of model standing terms and conditions for deemed standard connection contracts.<sup>54</sup> The proposed legal framework to create the subordinate instrument is summarised in Box 3.

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<sup>53</sup> AEMO, Rule change request, p. 16.

<sup>54</sup> AEMO, Rule change request, p. 25.

### **BOX 2: AEMO'S PROPOSED LEGAL FRAMEWORK**

AEMO's rule change request did not include a proposed rule but set out a framework on how minimum technical standards could be introduced.

It proposed that a new rule be inserted into Chapter 3 of the NER that sets two key obligations. Firstly, an obligation on AEMO to make, publish and, if necessary, amend DER minimum technical standards. Secondly, an obligation on DNSPs to ensure that connected DER, either by its own means or by way of a DER device, meet the DER minimum technical standards (including without limitation, through the inclusion of appropriate provisions in connection agreements).

AEMO has proposed that the DER minimum technical standards be inserted into the minimum content requirements of connection contracts, negotiation frameworks and model standing offers, and into the model standing terms under Chapters 5 and 5A of the NER. It also suggested that the standard could be recognised in the deemed standard connection contracts prescribed in Schedule 2 to the NERR.

The structures put in place in the rules should allow for:

- the introduction of an initial standard to be published alongside the proposed new rule
- the introduction of subsequent standards over time
- the ability to call up in the standards any relevant Australian and international Standards, or parts thereof
- review, and update of the standards to occur, on an as needs basis in response to developments in technology or, for example, new cyber threats.

Source: AEMO, Rule change request, pp. 16-17.

#### **5.1.2**

##### **Initial standard**

Assessing this rule change request does not require the Commission to consider the detailed content of the minimum technical standards. Instead, the request is concerned with the proposed creation of a subordinate instrument that specifies minimum technical standards (as initially determined by AEMO) and what the standards will apply to. AEMO will undertake its own consultation process concurrent with this rule change process in order to have a first set of minimum technical standards completed and ready for implementation by the time this rule change process is finalised.<sup>55</sup>

#### **5.1.3**

##### **Governance**

The Commission notes that the rule change request does not propose a governance framework. The ESB is currently undertaking a review to establish a long-term governance framework for the DER minimum technical standards.

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<sup>55</sup> AEMO, Rule change request, pp. 15-16.

However, it is important to consider whether AEMO may be well-placed to set the initial standard in a timely manner to address any imminent power system security issues related to DER connections. This is what is proposed by the rule change request.

It is possible that the outcome of the ESB review on governance may recommend different arrangements than AEMO setting the standard through a subordinate instrument. Accordingly, the Commission is interested in stakeholders' views on whether the proposed subordinate instrument, and providing AEMO with the ability to set the initial minimum technical standard for DER, is the most efficient way to address any imminent power system security issues caused by DER connections.

#### 5.1.4

#### Definition of DER

AEMO has proposed to apply the minimum technical standards to newly connected DER devices (and replacements) for which the DNSP has visibility. It provided a draft definition of DER that covers:<sup>56</sup>

...resources and assets including small and medium scale distributed generation (such as solar PV), energy storage (such as small and medium-scale batteries and electric vehicles that can deliver energy from the vehicle to the power system) and controllable loads (such as air conditioners, electric storage hot water systems, pool pumps, and electric vehicle supply equipment) that connect to the distribution system.

Including a list of DER devices as a definition in the NER for the purpose of setting minimum technical standards is one way of designing the new framework. It would also be possible to include a definition that focuses on the services provided by DER devices. This could have the advantage that the definition does not have to be updated when technology changes as it focuses on the activity causing the impact and not the device enabling the service. For example, in a report to ARENA for its project on developing a framework and maturity assessment of the breadth and nature of key ARENA and non-ARENA DER projects, Farrier Swier proposed a different definition of DER, focusing more on the nature of the service rather than the devices:<sup>57</sup>

Distributed Energy Resources (DER) are non-registered resources connected to the distribution system that generate electricity or manage electricity demand

Further, the Commission notes that in relation to the Register of distributed energy resources rule change, the question of defining DER was also considered. Stakeholders participating in that rule change process expressed a variety of views. Nevertheless, it did not create a definition of DER to be included in the NER.<sup>58</sup>

The Commission has previously defined DER as "an integrated system of energy equipment co-located with consumer load".<sup>59</sup>

<sup>56</sup> AEMO, Rule change request, p. 15.

<sup>57</sup> Farrier Swier, *DER technology integration draft functional framework*, May 2020, p. 8.

<sup>58</sup> AEMC, *Register of distributed energy resources*, rule determination, 13 September 2018, pp. 23, 26-27, 30.

<sup>59</sup> AEMC, *Distribution market model*, final report, August 2017, pp. 4-5.

In light of these different approaches, the Commission is interested in stakeholder views on whether AEMO's proposed definition is appropriate, or even, if a definition is needed at all.

#### **QUESTION 2: SETTING THE INITIAL STANDARD AND DEFINITION OF DER**

1. Should the initial DER technical standard be set by AEMO?
2. Should the minimum standards be inserted into the minimum content requirements of connection contracts, negotiation frameworks and model standing offers or terms?
3. What should the standard apply to and is a DER definition needed in the NER?
4. Do stakeholders agree that the standard should only apply to new and replacement devices? Will this meet the objectives of the desired policy outcome of this rule change request?

## **5.2 Scope of the initial standard**

As noted in the section above, the rule change request does not propose a governance framework for the initial standard other than that AEMO will set the initial standard in accordance with the rules' consultation procedures.<sup>60</sup> Also, it should be noted that the ESB is conducting a review on longer-term governance arrangements for the DER minimum technical standard. This raises the question whether there should be any limitations on the initial standard, for example, on the content of the standard or the duration.

### **5.2.1 Content of the initial standard**

The COAG Energy Council requires the publication of an initial DER minimum technical standard (initial standard) on matters covered in AS/NZ 4777.2, to coincide with any rule change.<sup>61</sup>

AEMO is expected to release an issues paper on the initial DER minimum technical standard by early July 2020. It is expected that AEMO's consultation will result in an initial DER minimum technical standard that will set "technical performance capabilities to integrate and support the power system ". Other aspects such as cyber security are expected to be incorporated into the standard in the future.<sup>62</sup>

Further, as indicated in AEMO's rule change request the standards may include other minimum requirements over time.<sup>63</sup> For this rule change request, the Commission seeks stakeholders' views on the appropriate scope of the content of the initial standards that AEMO seeks to develop this year.

<sup>60</sup> AEMO, Rule change request, p. 3.

<sup>61</sup> AEMO, Rule change request, p. 17.

<sup>62</sup> AEMO, Rule change request, p. 15.

<sup>63</sup> AEMO, Rule change request, pp. 11-13.



### 5.2.2 Duration of the initial standard

In addition to limiting the scope of the initial standard, the Commission is also intending to consider whether there should be a transitional arrangement for the role of AEMO in determining the content of the standard until such a time when a longer-term governance framework, as currently under development by the ESB, has been established.

#### **QUESTION 3: CONTENT AND DURATION OF THE INITIAL MINIMUM TECHNICAL STANDARD**

1. Should the scope of the initial technical standard be limited by the NER?
2. If so, should there be arrangements to allow for a review of the scope at a future date?
3. Should the role of AEMO in setting DER minimum technical standards (the subordinate instrument) be limited in time, with the ESB's governance review outcomes to be introduced into the framework at a later date?

### 5.2.3 Applying the initial standard

As noted in AEMO's rule change request, the ESB has been considering the need for developing nationally consistent minimum technical standards for DER.<sup>64</sup> This rule change process is one route to achieve this objective.

However, rules made as a result of this current rule change process will only apply to all the jurisdictions which are part of the NEM.<sup>65</sup> The ESB and AEMO are working with the relevant Western Australian authorities to address the concerns arising from growing DER penetration in that state with a solution similar to that proposed for the NEM.<sup>66</sup>

In addition, it is noted that the Northern Territory is not part of the NEM. The Commission understands that it may need to consider making a differential rule for the Northern Territory, given that the changes proposed to Chapter 5 of the NER may also apply in the Northern Territory if a rule is made.

## 5.3 Implementation and compliance monitoring

If a rule requiring AEMO to create an initial standard is made, the standard needs to be implemented and compliance monitored and enforced by someone.

### 5.3.1 Implementation time frame

AEMO is undertaking its own consultation on the initial technical standard, the final content of which is not known at this time. Nor may it be known at the conclusion of this process. It is possible that the individual requirements of the initial minimum standard could have

<sup>64</sup> AEMO, Rule change request, p. 3.

<sup>65</sup> To the extent that this rule change process results in amending the NER or the NERR, such rules will not apply to Victoria as it has not adopted certain aspects of the National Energy Customer Framework (NECF). If this is the case, other jurisdictional-based solutions may be required in Victoria. AEMO, Rule change request, p. 16.

<sup>66</sup> AEMO, Rule change request, p. 3.

different implementation dates. This could be achieved by specifying the dates in the amending rules to the NER (and NERR if required) or the standard itself.

Providing different implementation dates would allow some flexibility for parties affected by the new standard to become compliant. It could also recognise that implementation time frames to become compliant will depend on the individual requirements that will be set out in the standard. Such an approach may also enable an initial focus on implementing the most critical requirements first, ahead of other requirements.

The Commission is seeking stakeholder views on these timing options.

### 5.3.2

#### Compliance

In its rule change request, AEMO proposed that the AER develop a light-touch monitoring and compliance framework, primarily for the purpose of transparency. It considered that this could be achieved through a minimalist periodic reporting framework (possibly a light touch version of the AER's Electricity Distribution Ring Fencing reporting framework).<sup>67</sup>

The Commission is interested in stakeholder views on who should monitor compliance and whether the proposed light-touch monitoring compliance regime is appropriate for the effective implementation of the initial standard. It is also interested in views on whether such a compliance monitoring regime could be implemented in a timely manner.

While AEMO has suggested that the AER monitor compliance with the new technical standards, it has not suggested that the standards be enforced through penalties (by civil penalty or conduct provisions in the NER or NERR).

#### QUESTION 4: APPLYING THE STANDARD AND MONITORING COMPLIANCE

1. How can the proposed solution be applied in Western Australia, Victoria and the Northern Territory?
2. Is it sufficient to specify a commencement date for the DER minimum technical standard only and have the implementation dates for the individual standard components set out in the standard itself?
3. What level of compliance monitoring is needed?
4. Who should monitor compliance with the technical standards?
5. How can compliance be enforced?

## 5.4

### Considering the costs and benefits of the initial standard

The rule change request does not provide information on the expected costs of the initial DER minimum technical standard and how consumers will be affected. Setting minimum technical standards is not a costless exercise. For example, there may be costs associated with upgrading technology on physical assets, improving infrastructure necessary to

<sup>67</sup> AEMO, Rule change request, p. 25.

implement the standard and compliance and monitoring costs. AEMO and industry participants will also incur some costs in creating the initial DER minimum standard as well as in maintaining and amending those standards into the future.

When assessing whether a rule change request meets the NEO, the Commission must consider any potential consumer benefits against the additional costs consumers are likely to incur. Therefore, the Commission invites stakeholders to provide information on what they expect the costs and benefits of the initial standard might be, how consumers will be affected, and if there are any other risks that have not yet been identified.

However, it is equally important to consider who will pay for the costs associated with implementing an initial minimum standard for DER. There may be costs associated with implementing additional capabilities attached to devices, and there may be costs associated with additional investment at the DNSP level, for example in communications infrastructure. It is also relevant to consider the potential impact the new regime may have on consumers as well as competition in the market to provide DER assets and installation.

#### **QUESTION 5: COST OF THE INITIAL STANDARD**

1. Considering AEMO's proposed initial standard in section 5.2, Box 1, what are the expected costs and benefits of implementing the initial standard for consumers, other affected parties and DNSPs?

## 6 LODGING A SUBMISSION

Written submissions on the rule change request must be lodged with Commission by 23 July 2020 online via the Commission's website, [www.aemc.gov.au](http://www.aemc.gov.au), using the "lodge a submission" function and selecting the project reference code ERC0301.

The submission must be on letterhead (if submitted on behalf of an organisation), signed and dated.

Where practicable, submissions should be prepared in accordance with the Commission's guidelines for making written submissions on rule change requests.<sup>68</sup> The Commission publishes all submissions on its website, subject to a claim of confidentiality.

All enquiries on this project should be addressed to Alex Oeser on (02) 8296 7800 or [alex.oeser@aemc.gov.au](mailto:alex.oeser@aemc.gov.au).

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<sup>68</sup> This guideline is available on the Commission's website [www.aemc.gov.au](http://www.aemc.gov.au).

## ABBREVIATIONS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
DER	Distributed Energy Resources
DNSP	Distribution network service provider
ESB	Energy Security Board
MCE	Ministerial Council on Energy
NEL	National Electricity Law
NEO	National electricity objective
NERL	National Energy Retail Law
NERO	National energy retail objective