AEMC

RULE

Australian Energy Market Commission

## CONSULTATION PAPER

# TRANSPARENCY OF UNSERVED ENERGY CALCULATION

**PROPONENT**
Reliability Panel

24 SEPTEMBER 2020

## INQUIRIES

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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 1 August 2019, the Reliability Panel (the Panel or proponent) submitted a rule change request to the Australian Energy Market Commission (AEMC or Commission) identifying several improvements that could be made to the definition of unserved energy, including the transparency of the unserved energy calculation and the clarity of the framework that underpins the calculation. The rule change aims to achieve two outcomes:

1. clarify what counts towards unserved energy for the purposes of the reliability standard, and
2. promote transparency with regard to how unserved energy is calculated after involuntary load shedding[1] has occurred.

The rule change was a recommendation made by the Reliability Panel in the *Review of the definition of unserved energy,* for which a final report was published on 1 August 2019.[2] During the review the Panel consulted with stakeholders on whether the current definition of unserved energy for the purposes of the reliability standard established under Chapter 3 of the National Electricity Rules (NER) was still fit for purpose.

The AEMC proposes to expedite this rule change on the basis of the rule being non-controversial, as we consider the proposed rule is unlikely to have a significant effect on the NEM.

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

- provide a summary of, and background to, the rule change request and current arrangements
- set out the proposed assessment framework to be used by the Commission in assessing the rule change request
- identify a number of questions and issues to facilitate consultation on this rule change request
- outline the process for making submissions.

## 1.1 Key dates

Given the nature of the issue is tightly defined, and the background information provided in the rule change request, this consultation paper is brief. Submissions are invited in relation to the matters identified above, and any other relevant issue. Stakeholders are also invited to read the Panel's review on this matter for further background.

The key dates for stakeholders in this process are as follows:

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1 Load shedding is the controlled reduction of electricity supply to parts of the power system servicing homes and businesses to protect system security and mitigate damage to infrastructure. When load is shed, it occurs in a controlled manner, by AEMO directing networks to reduce load by turning power off to some areas to maintain balance in the system. It is called rotational load shedding because the outages for consumers are typically kept to about 30-60 minutes, with load shedding rotated between suburbs within a region, based on a priority list set by each jurisdiction.

2 For more information, view the report at https://www.aemc.gov.au/market-reviews-advice/definition-unserved-energy

- Commencement of this rule change process: **24 September 2020**
- Objections to an expedited process to be received by: **8 October 2020**
- Submissions to the proposal to be received by: **22 October 2020**
- Final decision to be published under an expedited process by: **19 November 2020**.

# 2 BACKGROUND AND CURRENT ARRANGEMENTS

## 2.1 Review of the definition of unserved energy

On 4 April 2019 the Reliability Panel initiated the *Review of the definition of unserved energy*. Through the review process, the Panel consulted with stakeholders on whether the current definition of unserved energy for the purposes of the reliability standard in the NER was still fit for purpose.

The Panel explored opportunities to promote transparency through possible clarification and simplification of the definition of unserved energy for the purposes of the reliability standard, as well as considering how transparent the method for calculating unserved energy is to the broader market. The Panel concluded that the definition of unserved energy for the purposes of the reliability standard is largely fit for purpose for the existing national electricity market environment.

However, the Panel identified areas where there was room for improvement with respect to information provision, clarity and transparency around how unserved energy is calculated, particularly in respect to:

1. improving transparency of the unserved energy calculation
2. improving the clarity of the unserved energy framework.

In considering the appropriateness of the definition of unserved energy for the purposes of the reliability standard, the Panel was guided by the following principles:

- an event should only be included in the calculation if additional investment would have avoided the event from occurring or the market should have planned for such an event
- market participants are expected to meet the reliability standard without the need for interventions.

It is important to note that the scope of this review only encompassed the ex-post calculation of unserved energy.[3] The Panel did not consider if the reliability standard itself, and how it is defined, was appropriate, as it considered this to be an issue best dealt with as part of its reliability standard and settings review.

The Reliability Panel published the *Definition of Unserved Energy* final report on 1 August 2019.[4]

## 2.2 Current arrangements

### 2.2.1 Unserved energy

In the national electricity market (NEM), the concept of unserved energy is applied to measure any supply interruptions consumers experience from generation and interconnection inadequacy.

3 In other words, the review focused only on the framework that underpins how it is calculated after the end of the financial year.

4 More on this report can be found here: https://www.aemc.gov.au/market-reviews-advice/definition-unserved-energy

Under existing arrangements, clause 3.9.3C of the NER sets out the unserved energy framework. The clause provides guidance as to which incidents, primarily based on the concept of contingency events, should be included in, or excluded from, the calculation of unserved energy.[5]

Unserved energy measures the amount of customer demand that cannot be supplied within a region of the NEM due to a shortage of generation, demand-side participation, or interconnector capacity. It describes the amount of wholesale unserved energy — as opposed to interruptions from faults in the poles and wires in towns and suburbs' power networks — that is relevant for the purposes of reporting on the reliability standard.[6]

### 2.2.2 Unserved energy and reliability metrics

Unserved energy contributes as a factor towards two key metrics employed to deliver reliable outcomes in the NEM. These metrics are:

1. The Reliability Standard
2. The Interim Reliability Measure

Both of these metrics are forward-looking.

#### Reliability standard

The reliability standard has been in place since the start of the NEM and was designed to reflect generation and interconnection adequacy to supply electricity, and signals to the market when and where more generation is needed, based on a trade-off made on behalf of consumers as to the appropriate level of reliability. The reliability standard currently targets a maximum expected unserved energy in a region of 0.002 per cent of the total energy demanded in that region for a given financial year.[7]

The Australian Energy Market Operator (AEMO), through its forecasting processes, operationalises the reliability standard by modelling and projecting when the market is not going to meet the reliability standard in the lead-up to real-time.

#### Interim reliability measure

The interim reliability measure has been more recently introduced into the regulatory framework. The interim reliability measure for generation and inter- regional transmission elements in the national electricity market is a maximum expected unserved energy in a region of 0.0006% of the total energy demanded in that region for a given financial year.

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5 Contingency events are disturbances that pose a risk to, and uncertainty in, the stable and secure operation of the power system. Contingency events are defined in the NER as events affecting the power system which AEMO expects would likely involve the failure or removal from operational service of one or more generating units and/or transmission elements (as set out in Clause 4.2.3(a) of the NER).

6 While customers' experience of power supply interruptions is the same irrespective of the cause, they are classified based on what part of the power system caused the interruption. This is because different parts of the power system have differing regulatory frameworks, involving different bodies and so requiring different solutions. Unserved energy, for the purpose of the reliability standard, considers events emerging only from the wholesale part of the supply chain, namely shortages of generation, demand-side participation, or interconnector capacity. More information on reliability, the reliability standard and unserved energy can be found here: https://www.aemc.gov.au/news-centre/media-releases/new-resource-inform-discussion-reliability-standard

7 3.9.3C(a) of the National Electricity Rules. This implies that the power system expects to have enough supply to meet demand 99.998 per cent of the time, in every region every financial year.

To implement this, temporary amendments were made to both clauses 3.9.3C and 3.9.3D of the NER (the clauses in question in this rule change) that *added* a definition for, and references to, the 'interim reliability measure', rather than *replace* references to the reliability standard.

This was developed as part of the ESB's work to improve the reliability (resource adequacy) of the electricity system through interim measures.[8]

At its meeting on 20 March, the COAG Energy Council (Council) considered advice from the ESB aimed at improving the reliability (resource adequacy) of the electricity system.

The Council agreed to implement interim measures to deliver further reliability by establishing an out-of-market capacity reserve and amending triggering arrangements for the Retailer Reliability Obligation (RRO). Both measures will be triggered to keep unserved energy to no more than 0.0006% in any region in any year. Ministers agreed that these were interim steps needed to improve reliability in the immediate term while an enduring market design is developed and that they will be reviewed as part of an expanded RRO review required by 1 July 2023.

On 19 August 2020 the Energy Security Board (ESB) published a set of changes to the NER to establish an out of market capacity reserve (the Interim Reliability Reserve). The out of market capacity reserve will procure the volume of reserve capacity to ensure expected USE is no more than 0.0006% in any region in any year (the Interim Reliability Measure) as forecast in the Electricity Statement of Opportunities (ESOO) report or ESOO update.

The ESB will shortly release a consultation paper on the changes required to amend the triggering arrangements for the Retailer Reliability Obligation, so that this is based off the interim reliability measure as well.

### 2.2.3 Unserved energy and reporting

After real-time, AEMO also calculates how much demand went unmet due to a lack of generation, demand response or interconnection capacity. Unlike its projections of unserved energy, this calculation is a backward-looking exercise.

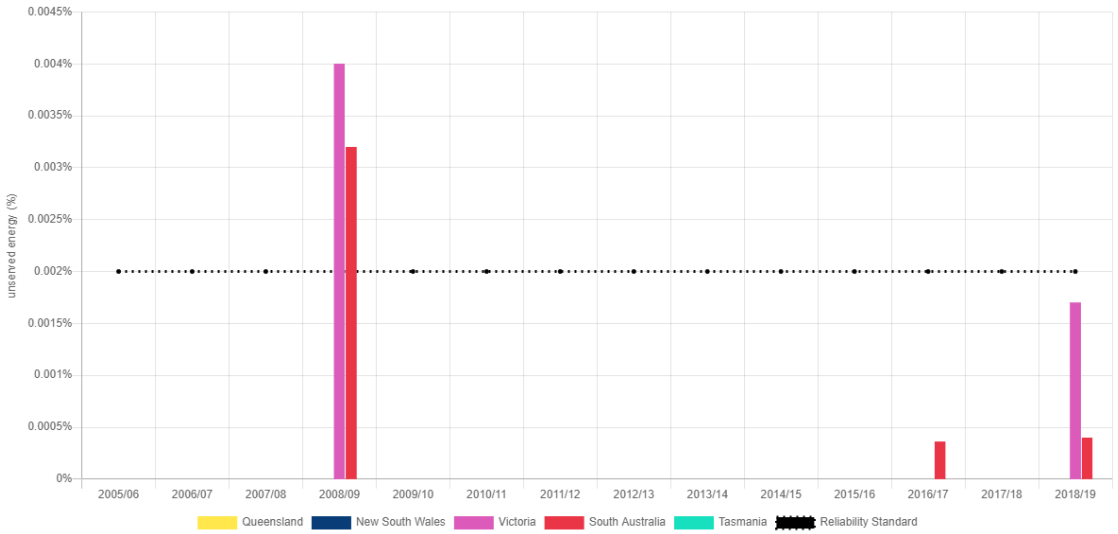
To do this, AEMO uses the definition of unserved energy to assess which types of events should be included or excluded (listed in the NER in a non-exhaustive manner), which then informs AEMO's calculation of unserved energy for the purposes of the reliability standard.

After each individual instance of unserved energy is published by AEMO in their *Power System Operating Incident Reports* (under clause 4.8.15 of the NER), the ex-post figure in aggregate is published each year in the Energy Security Board's *Health of the NEM report* and the Reliability Panel's *Annual Market Performance Review,* frequently in a format presented in Figure 2.1.[9]

8 See: http://www.coagenergycouncil.gov.au/publications/immediate-reliability-and-security-measures

9 It is important to note that figure 2.1 has been extracted from the *Annual Market Performance Review 2019*, published in March 2020, which reports on the 2018-2019 financial period. More information on this report can be found here: https://www.aemc.gov.au/market-reviews-advice/annual-market-performance-review-2019

**Figure 2.1: Unserved energy in the NEM**




Source: AEMO data, presented in the AEMC *Annual Market Performance Review*, 2019.

The backwards-looking calculation process for unserved is different to the forecasting process of unserved energy operationalised by AEMO in the Electricity Statement of Opportunities (ESOO). [10] The differences between the two are described in Box 1.

To be clear, this rule change request is focused on the transparency and clarity of the ex post assessment of unserved energy. It is not concerned with broader considerations, such as the matters relating to forward-looking metrics, discussed in this chapter.

10 The ESOO incorporates a reliability assessment against the reliability standard defined in the National Electricity Rules (NER) clause 3.9.3C and AEMO's Reliability Forecast under the Retailer Reliability Obligations (RRO). The 2020 ESOO can be found here: https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/nem-electricity-statement-of-opportunities-esoo

## BOX 1: RELATIONSHIP BETWEEN EXPECTED UNSERVED ENERGY AND ACTUAL UNSERVED ENERGY

In the NEM, unserved energy is presented and published through different processes which vary in regard to the time periods they cover; both in their length, and whether they are forward or backward looking. AEMO is required by the NER to publish various materials which provide information to market participants — and any other interested parties — on unserved energy. AEMO publishes these unserved energy materials in two formats:

1. forward-looking, or expected unserved energy: AEMO projects and publishes forecasts on whether the reliability standard will be met (through the Electricity Statement of Opportunities, AEMO's reliability forecast under the Retailer Reliability Obligations, MT PASA, ST PASA, Pre-dispatch, and Dispatch), and
2. backward-looking, or actual unserved energy: AEMO calculates ex-post the amount of wholesale unserved energy in a financial year, to be reported against the reliability standard (published first by each instance of unserved energy in AEMO's Power System Operating Incident Reports required under clause 4.8.15 of the NER, and then in aggregate in the ESB's *Health of the NEM* Report and the Reliability Panel's *Annual Market Performance Review.*[i])

The point of these measures is to signal to the market whether the reliability standard is likely to be breached. The reliability standard, which represents a trade-off between the prices paid for electricity and the cost of not having energy when it is needed, is said to be breached if expected unserved energy exceeds 0.002 percent of annual demand in a region in a given financial year. In simple and general terms, it can be said that a breach of the reliability standard is a signal to market participants that more investment may be needed in the affected region.

While *expected* unserved energy and *actual* unserved energy both signal resource adequacy, it is important to note that they are governed by different frameworks. Actual unserved energy is a reporting tool that helps market participants to track the performance of the NEM over time, and after the fact. It interacts only with the *expected* unserved energy frameworks as a check on forecasting accuracy, while acknowledging that:

1. forecasts will vary in accuracy depending on their horizon, and
2. the objective of expected unserved energy frameworks is to achieve an *actual* unserved energy outcome that is different to the *expected* outcome that was forecast, by signalling to the market a need for investment in generation or interconnection or demand-side participation.

Source: [i] The most recent version of the Annual Market Performance review can be found here: https://www.aemc.gov.au/market-reviews-advice/annual-market-performance-review-2019

# 3 DETAILS OF THE RULE CHANGE REQUEST

This chapter provides a brief overview of the issues and proposed solutions in the rule change request.

A copy of the rule change request and proposed rule can be found on the AEMC website at www.aemc.gov.au.

## 3.1 Issues identified by the Reliability Panel

The Reliability Panel raised three key issues in their rule change request with the current ex-post unserved energy framework that could be improved. The Panel considers there is:

1. limited transparency of the actual process AEMO undertakes when calculating unserved energy
2. a lack of clarity on how to interpret the unserved energy framework
3. some aspects of the definition of unserved energy are unclear.[11]

### 3.1.1 Limited transparency

To calculate unserved energy for the purposes of the reliability standard[12], AEMO divides, per region, the number of Megawatt hours (MWh) shed in a financial year due to reliability causes, as defined under clause 3.9.3C(b) of the NER, by the amount of energy demanded. The NER does not require AEMO to develop any particular methodology and is not prescriptive with regard to the calculation.

The Panel is concerned that there is a lack of transparency about the calculation. In particular, there is limited visibility as to the type of demand used in the process of this calculation and how AEMO interprets clause 3.9.3C(b) of the NER to determine the type of reliability events that contribute to the load shedding figure.[13]

The Panel considers these arrangements to be inconsistent with the rest of the information provision requirements relevant to how AEMO operationalises the reliability standard.

### 3.1.2 A lack of clarity

The Panel also considers that clause 3.9.3C of the NER, which sets out the unserved energy framework and provides guidance as to which incidents should be included in or excluded from the calculation, is ambiguous and unclear as to how it should be interpreted. Further, the clause provides examples, but is not exhaustive, of the events which must or must not be included in the calculation of unserved energy.[14]

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11 The rule change submitted by the Reliability Panel can be found here: https://www.aemc.gov.au/rule-changes/transparency-unserved-energy-calculation

12 It is important to note that this rule change was submitted prior to the development and implementation of the ESB's Interim Reliability Measure. As such, the Interim Reliability Measure was not considered by the Panel at the time the rule change was submitted, and therefore discussion cited in this consultation paper to the Panel's rule change request will not refer to the Interim Reliability Measure. However, throughout this consultation paper, the Commission has sought to put issues in context with the Interim Reliability Measure - given it is based on unserved energy - where it is important to do so.

13 Reliability Panel, *Transparency of unserved energy*, rule change request, , August 2019. p. 7.

14 Ibid, p. 9.

The Panel is concerned that clause 3.9.3C is prescriptive with respect to a series of events to be included and excluded, but is not exhaustive in terms of the types of events that are to be recognised in this way. The Panel is concerned that it may not be clear to all market participants that clause 3.9.3C(b) of the NER allows for some flexibility in terms of which events count towards unserved energy and how this flexibility should be interpreted. This could create confusion for market participants.[15]

### 3.1.3 Aspects that are unclear

Finally, clause 3.9.3C(b)(2)(i) includes definitional inconsistencies, stating that unserved energy for the purposes of the reliability standard excludes unserved energy associated with power system security incidents that result from multiple contingency events, protected events or non-credible contingency events on a generating unit or an inter-regional transmission element. The Panel notes that:

- protected events are in fact a subset of non-credible contingency events,
- the term 'multiple contingency events' already includes 'multiple credible contingency events' and 'multiple non-credible contingency events.'[16]

The Panel considers that some the these terms used in clause 3.9.3C(b)(2)(i) are redundant.

## 3.2 Proposed solution

In order to address the issues raised in the rule change request, the Panel has proposed some changes to clauses 3.9.3C and 3.9.3D of the NER.

Given the impact of unserved energy on investments that are passed through to energy consumers, and the level of public interest in the reliability standard and system reliability generally, the Panel considers that all unserved energy information and reports should be publicly available.

As such, the Panel proposes to amend clause 3.9.3D of the NER to require AEMO to set out, through the *Reliability Standard Implementation Guideline* (RSIG),[17] the method for calculating unserved energy in accordance with clause 3.9.3C, including how of the amount of energy demanded in the relevant region is determined.

In addition, the Panel proposes to include in the NER a purpose statement or principle for the definition of unserved energy, to assist stakeholders and AEMO with the definition's interpretation. The principle proposed by the Panel would aim to clarify that, for the purpose of the unserved energy calculation, only events which the market would be expected to plan for through investment in generation and inter-regional transmission elements should be included, while all other events should be excluded.

The Panel also proposes some minor drafting changes to clause 3.9.3C(b)(1) and clause3.9.3C(b)(2) to make it clearer that the intent of the clauses is to:

15 Ibid, p. 7.

16 Ibid, p. 10.

17 More information on the RSIG, and the guideline itself, can be found at https://www.aemo.com.au/Stakeholder-Consultation/Consultations/Reliability-Standard-Implementation-Guidelines

- *include* unserved energy that results from power system reliability incidents, including those caused by the examples of events provided in subclauses (1)(i) and (ii)
- *exclude* unserved energy that results from power system security incidents, including those caused by the examples of events provided in subclauses (2)(i) and (ii).

Finally, the Panel proposes deleting protected events from clause 3.9.3C(b)(2)(i) of the NER, as it is already captured by non-credible contingency events, clarifying that multiple 'contingency events' are in fact multiple 'credible contingency events', and clarifying that 'non-credible contingency events' include both single and multiple non-credible contingency events.

## 3.3 Expected costs, benefits and impacts of the proposed rule

The proponent considers that the benefits of the rule change request outweighs the costs involved, and that no market participant or end-user costs are expected to flow from the proposals.

The Panel suggested the rule change would bring the following benefits:

- help facilitate all unserved energy information and reports becoming publicly available
- improve the consistency of the information provided by AEMO on the reliability standard, by requiring AEMO to set out in the RSIG their method for calculating unserved energy, including the calculation of the amount of energy demanded per region
- provide more clarity around the intent of unserved energy calculation
- make it clearer that there is a distinction between a wholesale reliability (generation and inter-regional transmission element) issues and other types of interruptions.

The Panel expects the costs to be small and mainly associated with some minor additional regulatory burden from the extension of the *Reliability Standard Implementation Guideline* to incorporate how unserved energy is calculated ex-post.

In addition, according to the Panel, the proposed changes would likely contribute to the national electricity objective (NEO) by promoting more efficient investment in electricity services for the long term interest of consumers with respect to the price, quality and reliability of supply of electricity, and the reliability of the national electricity system.

The Panel considers that the proposed changes meet the NEO by improving:

- the clarity of the definition of unserved energy for the purposes of the reliability standard
- the transparency of the calculation of unserved energy, and
- the provision of information to the market in a manner useful to stakeholders.

# 4 ASSESSMENT FRAMEWORK

## 4.1 Achieving the national electricity objective

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.[18] This is the decision-making framework that the Commission must apply.

The NEO is:[19]

> 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.

## 4.2 Proposed assessment framework

The Commission will consider whether implementing the proposed rules promote the NEO. To determine whether the proposed rule would likely promote the NEO, the Commission will assess the rule change request against an assessment framework.

At this stage, the Commission is seeking stakeholder views on its proposed assessment framework which includes the following criteria:

**Efficient investment in, and operation of, energy resources**

- Do the proposed changes better inform the integrity of the reliability standard, and promote signals for efficient investment in generation and demand response infrastructure?
- Do they improve the efficiency of operation of the NEM, leading to improved reliability and lower prices?
- Does the rule change improve market signals that promote allocative efficiency by capturing unserved energy caused only by the wholesale generation and interconnection element of the electricity supply chain?

**Promoting transparency**

- Do the improvements to the transparency of unserved energy calculation inform market frameworks that inform investment and operational decisions in the way it intends?
- Are market participants and consumers set to benefit from the increase in transparency?

**Regulatory and administrative burden**

- Are the costs associated with the proposed changes and increased additional regulatory burden from the extension of the Reliability Standard Implementation Guidelines offset by the benefits of having increased clarity and transparency?

18 Section 88 of the NEL.
19 Section 7 of the NEL.

QUESTION 1: ASSESSMENT FRAMEWORK

1. Is the proposed assessment framework appropriate for considering the Panel's rule change request?
2. Are there other relevant considerations that should be included in the assessment framework?

## 4.3 Making a more preferable rule

Under s. 91A of the NEL, 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.

## 4.4 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 different 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.

As the proposed rule related to parts of the NER that currently do not apply in the Northern Territory, the Commission has not assessed the proposed rule against additional elements required by the Northern Territory legislation.[20]

20 From 1 July 2016, the NER, as amended from time to time, apply in the NT, subject to derogations set out in regulations made under the NT legislation adopting the NEL. Under those regulations, only certain parts of the NER have been adopted in the NT. (See the AEMC website for the NER that applies in the NT.) National Electricity (Northern Territory) (National Uniform Legislation) Act 2015.

# 5 ISSUES FOR CONSULTATION

This chapter discusses issues raised by the Reliability Panel and poses questions that seek feedback from stakeholders on the proposed changes to the NER. Stakeholders are encouraged to comment on these issues as well as any other aspect of the rule change request, this paper or any other issues they consider relevant to the rule change request.

This chapter addresses three issues for consultation, which can be broadly categorised as follows:

- section 5.1 discusses the transparency of the unserved energy calculation
- section 5.2 discusses the clarity of the unserved energy framework
- section 5.3 discusses the definitional inconsistencies identified in the existing rules and how to address them

## 5.1 Transparency of the unserved energy calculation

To calculate ex post unserved energy for the purposes of the reliability standard, AEMO divides the number of MWh that were demanded but not supplied in a financial year due to reliability causes (based on the definition of unserved energy in clause 3.9.3C(b) of the NER) by the total energy demanded from the grid.

The Reliability Panel notes there is limited visibility of the actual process AEMO undertakes when calculating unserved energy, or when satisfying clause 3.9.3C(b) of the NER. In particular, which demand is used in the calculation, how the load shedding figure in the numerator is estimated and what it is composed of. The Panel notes two main concerns with how AEMO currently calculates this ex post:

1. the lack of methodology for laying out the inputs into the unserved energy calculation is inconsistent with the rest of the information provision requirements that relate to how AEMO operationalises the reliability standard, and
2. the lack of visibility of the inputs into the unserved energy calculation can lead to confusion about exactly what the unserved energy value represents, and may lead to market participants making inappropriate decisions.

The ways that the inputs into the unserved energy calculation may vary is outlined further in Box 2.

## BOX 2: DIFFERENCES IN DEMAND AND UNSERVED ENERGY

In Chapter 10 of the NER, unserved energy is defined as:

> The amount of energy demanded, but not supplied, in a region determined in accordance with clause 3.9.3C(b), expressed as:
>
> (a) GWh; or
>
> (b) a percentage of the total energy demanded in that region over a specific period of time such as a financial year.

To calculate unserved energy, AEMO divides the number of MWh shed in a financial year due to reliability causes (based on the definition of unserved energy in clause 3.9.3C of the NER) by the total energy demanded from the grid. However, the NER does not prescribe *which type* of demand AEMO should use.

In its *Demand Terms in the EMMS Data Model* paper published in October 2019,[i] AEMO describes three broad categories of demand, which are distinguished from each other based on the location of measurement in the electricity network. Demand can be thought of as:

1. 'consumed' demand, measured at each customer's connection point[ii]
2. 'sent out' demand, measured at each generating unit's connection point[iii]
3. 'as generated' demand, measured at each generating unit's terminal point.[iv]

For the purpose of unserved energy, we focus on 'as generated' demand, of which there are three types:

1. Native demand, which is met by local scheduled, semi-scheduled, non-scheduled, and exempt generation[v], and by generation imports to the region, excluding the demand of local scheduled loads
2. Operational demand, which is demand that is met by local scheduled generation, semi-scheduled generation and non-scheduled wind/solar generation of aggregate capacity ≥30 MW, and by generation imports to the region, excluding the demand of local scheduled loads. Operational demand differs from native demand in that it generally excludes demand met by non-scheduled wind/solar generation of aggregate capacity <30 MW, non-scheduled non-wind/non-solar generation and exempt generation.
3. Scheduled demand, which is demand that is met by local scheduled and semi-scheduled generation and by generation imports to the region. Scheduled demand differs from the other key demands in that it excludes the demand met by non-scheduled (wind/solar and non-wind/non-solar) generation and exempt generation, and includes the demand of local scheduled loads.

While it is understood that AEMO uses actual annual operational demand to calculate ex post unserved energy, the possibility that different demand values are used risks the unserved

energy value representing something different to what stakeholders believe it to be, or possibly misrepresenting the state of the market, therefore blurring the investment signal the reliability standard is designed to project.

In submissions to the Panel's *Definition of unserved energy* consultation paper, stakeholders noted the need for clarity over whether distributed energy resources (DER) are included in the unserved energy calculation, and how using the incorrect value for the amount of energy supplied can provide a biased value to the market.[vi]

Source: [i] For more information, visit https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Dispatch/Policy_and_Process/Demand-terms-in-EMMS-Data-Model.pdf

[ii] This represent the net electrical power consumed at that point, or the electricity power supplied to all customers (transmission and distribution)excluding generating unit auxiliary loads.

[iii] This represents the net electrical power output from the generating unit excluding its auxiliary load, and comprises 'as consumed' demand and all transmission losses.

[iv] This represents the gross electrical power output from the generating unit, so it includes 'sent out' demand and electrical power supplied to all auxiliary loads required to operate the relevant generating unit

[v] Exempt generation refers to generation that is exempt from registration, under Chapter 2 of the NER and in accordance with the Guide to NEM generator classification and exemption issued by AEMO. Typically, this includes generation with a capacity less than 5 MW, or less than 30 MW provided it exports less than 20 GWh in any 12-month period.

Source: [vi] Major Energy Users, submission to the *Definition of Unserved Energy* consultation paper, p.1.

The Panel recommended amending clause 3.9.3D of the NER to require AEMO to clearly set out in the RSIG how it calculates unserved energy ex post, which respect to clause 3.9.3C. This would describe:

- how AEMO calculates wholesale unserved energy for the purposes of the reliability standard
- which type of demand it uses (native, operational, scheduled)
- the implication of using the chosen type of demand on the calculation

The purpose of the RSIG is to explain how AEMO operationalises the reliability standard, and the Panel consider that extending the RSIG to cover how this operationalisation works in an ex post manner improves consistency of the information on the reliability standard provided by AEMO.

The Panel is also proposing a transitional measure to be in place for the first update of the RSIG to incorporate the ex-post unserved calculation, which would allow AEMO to update the RSIG once without the need for consultation in order to set out how it currently calculates unserved energy. This would provide transparency in a timely manner and give AEMO the opportunity to explain its current practice.

After this, AEMO would then be required to update the RSIG by consulting with stakeholders through the rules' consultation procedures.

QUESTION 2: TRANSPARENCY OF THE EX POST UNSERVED ENERGY CALCULATION

1. Do stakeholders have views on the Panel's proposed solution?
2. Would the proposed solution provide adequate transparency for how the unserved energy value is calculated?
3. Would the proposed solution help to promote efficient investment in electricity services?
4. Are there other issues with the ex-post unserved energy calculation the Commission should consider?
5. Do stakeholders have views on the proposed transitional measure?
6. Are there any unintended consequences?

## 5.2 Clarity of the unserved energy framework

### 5.2.1 Clarity with references to contingency events

Clause 3.9.3C of the NER sets out the unserved energy framework, which is based on the concept of contingency events. The clause provides guidance as to which incidents, primarily based on the concept of contingency events, should be included in, or excluded from, the ex post calculation of unserved energy.

**Proponent's view**

The Panel considers that, as currently worded, clause 3.9.3C is somewhat ambiguous and it is not clear how the clause should be interpreted, particularly with respect to incidents or events that are not captured by examples provided in the clause itself. This can create confusion for market participants.

Further, clause 3.9.3C(b) is only prescriptive with respect to a series of events, which it states must or must not be included in the ex post calculation of unserved energy. However, the clause is not exhaustive in terms of the types of events which should or should not be excluded. The clause also refers to the inclusion of power system reliability incidents, and exclusion of power system security incidents.

The Panel considers it may not be clear to all market participants that clause 3.9.3C(b) of the NER allows for some flexibility in terms of which events count towards unserved energy and how this flexibility should be interpreted. As currently drafted, the Panel finds this clause ambiguous with respect to how prescriptive the clause is with respect to the inclusion of power system reliability incidents and exclusion of power system security incidents.

To address the issues above, the Panel proposed to include in clause 3.9.3C of the NER a purpose statement for the definition of unserved energy, to assist with its interpretation. To aid in allocating power system incidents in or out of the unserved energy calculation, the principle would read:

> For the purpose of paragraph (b), a power system reliability incident is to include only

> those incidents that AEMO considers would have been avoided through additional investment in generation and/or inter-regional transmission elements.

The Panel considered a principle statement to be more preferable to enumerating lists of single types of incidents, and suggested that this change, while retaining flexibility for AEMO to utilise their discretion, would provide more clarity around the intent of the unserved energy calculation.

To complement the principle statement, the Panel proposes making it clear, through minor drafting changes to clause 3.9.3C(b), that the intent of clause 3.9.3C is to:

- *include* unserved energy that results from power system reliability incidents caused by an event or events that include the examples of events at subclauses (1)(i) and (ii)
- *exclude* unserved energy that results from power system security incidents caused by an event or events that include the examples of events at subclauses (2)(i) and (ii).

These minor drafting changes are required because it is not uncommon for an interruption of energy supply to have a reliability event as a contributing factor, as well as a security event. It is important that the unserved energy calculation best reflects the unserved energy attributable to reliability shortfalls, rather than interruptions by security events, so that its value is representative of incidents that would have been avoided through additional investment in generation and/or inter-regional transmission elements.

To help explain this concept, the proposed changes would, for example:

- make it clearer that simply running out of generation on a hot day, even without any particular incident, would be included as it would be a power system reliability incident and consistent with the proposed principle discussed above
- make it clearer that the distinction is between a wholesale reliability (generation and inter-regional transmission element) issue and other types of interruptions (such as failure of other transmission and distribution network elements)
- make it clearer than events with multiple causes could be classified as both power system reliability and security and accounted for accordingly in the calculation (the former would be included, the latter excluded).

**Discussion**

The Commission notes there may be some clarity issues that may arise from the Panel's proposed drafting of the principle statement. The Commission is expressly seeking feedback from stakeholders on these two issues to inform the rule-making process.

The first issue relates to the use of the word 'generation' in the principle statement. The Commission understands the use of 'generation' refers to its definition in Chapter 10 of the NER as "the production of electrical power by converting another form of energy in a *generating unit*."[21] However, the intent of the principle statement may be best captured by referring to generation 'as a concept', and not generation 'as an asset', as it is defined in the

21 National Electricity Rules, Chapter 10, p. 1243

NER. Or, if it is preferable to refer to generation 'as an asset' consistent with the Chapter 10 definition, then it may be necessary to include losses of supply that could have been avoided by investment in *demand response* in the principle statement also.

The intention of the principle statement is to help guide AEMO on how to allocate power system incidents in or out of the unserved energy calculation so that the unserved energy value reflects incidents caused by insufficient supply to meet demand at the wholesale level:

- If the principle statement refers to generation 'as a concept', it speaks to investment in any measure that may close the unserved energy 'gap' between the energy demanded, and the energy supplied at a wholesale level. Measures capable of closing this gap would include investment in generation assets and interconnection elements that would increase energy supplied, or investment in demand response mechanisms that would reduce the energy demanded. As such, if the statement is referring to generation 'as a concept', it would be unnecessary to include reference to "inter-regional transmission elements" in the principle statement, as it would already be captured by the term 'generation.'
- If the principle statement is clarified to refer to generation 'as a concept', then the inclusion of "inter-regional transmission elements" is inconsistent and confuses the intention of the principle statement. Given "inter-regional transmission elements clearly refers to an asset, its inclusion may suggest that the use of the term 'generation' may in fact refer to generation 'as an asset', and not 'as a concept.' Alternatively, if the initial intention to refer to 'generation' consistent with its Chapter 10 definition is preferable, then it may be necessary to also enumerate the inclusion of demand response in the principle statement, in order to preserve the integrity of the statement's intention.

The second issue relates to how the treatment of intra-regional constraints in the unserved energy framework interacts with the proposed wording of the principle statement. As discussed in the *Review of the definition of unserved energy* final report, the Panel considers it inappropriate to include the loss of supply resulting from intra-regional transmission constraints in the unserved energy calculation because:

1. intra-regional transmission constraints cannot necessarily be addressed by closing the gap between wholesale supply and demand, and
2. including these losses may lead to more investment in generation capacity rather than transmission infrastructure, leading to unnecessary higher-cost to consumers.[22]

The intention to not include losses of supply caused by intra-regional constraints in the unserved energy calculation is not reflected in the wording of the principle statement proposed by the Reliability Panel. The statement's current wording is to *"include only those incidents that AEMO considers would have been avoided through additional investment..."*.

Depending on which side of an intra-regional constraint this investment is ultimately located, sometimes incidents may be avoided, but other times they will not.

If the intention of the principle statement is **not to include** supply losses caused by intra-regional constraints, we are interested in stakeholder views on whether the principle

22 Reliability Panel, *Review of the definition of unserved energy*, final report, April 2019, p. 54.

statement should instead be worded in a manner that does not make it possible to include them, depending on the location of wholesale investment relative to the constraint.

We are interested in understanding alternatively appropriate ways to phrase this wording to address this issue. An alternative principle statement could include power system incidents ***caused*** by wholesale incidents that may have been avoided by more investment, rather than those incidents that would have been avoided by additional investment. Such a change, although only discussed demonstratively in this consultation paper, may help to avoid inconsistency between the framework's intention and its wording, and help to contribute towards the clarity of the unserved energy framework.

QUESTION 3: CLARITY OF THE UNSERVED ENERGY FRAMEWORK

1. Does a principle statement strike the right balance between identifying what should contribute towards the unserved energy calculation while avoiding being too prescriptive?
2. Do stakeholders have other suggestions on how to achieve a similar, or better outcome?
3. Is the intention to include reliability events and exclude security events, supported by the examples provided in the clause, sufficient to make the unserved energy calculation a clear, unambiguous investment signal to the market?
4. Does the proposed rule adequately address confusion of 'blurred' events, where unserved energy may be linked to events caused by both security and reliability issues?
5. Do stakeholders have views on the clarity of the principle statement and whether its phrasing could be improved, particularly its ability to talk to generation 'as a concept', and its intention to not include losses of supply caused by intra-regional constraints?

### 5.2.2 The Interim Reliability Measure

As set out in chapter 2, recently another metric based on unserved energy was incorporated into the NER.

Specifically, amendments were made to both clauses 3.9.3C and 3.9.3D of the NER (the clauses in question in this rule change) that *added* a definition for and references to the 'interim reliability measure'. The interim reliability measure does not replace the reliability standard and is relevant only with respect to the contracting for interim reliability reserves under temporary arrangements introduced as part of the *National Electricity Amendment (Interim Reliability Measure) Rule 2020*. No further substantive changes were made to these clauses.

The recommendations made by the Panel in this rule change focus explicitly on the calculation of unserved energy, and not on the reliability standard or the interim reliability standard. The Commission considers the proposed changes to the definition of unserved energy to not alter the intended purpose of either standard. As such, the Commission plans to address changes to 3.9.3C and 3.9.3D in this rule change as they are recommended — specific to increasing the clarity and transparency of the concept of unserved energy —

which in turn will apply to both the reliability standard (0.002%) and the interim reliability measure (0.0006%). Of course, the changes are focused on the ex post calculation of unserved energy, which doesn't distinguish between the reliability standard and interim reliability measures in a reporting sense. We are interested in stakeholder feedback on this point.

QUESTION 4: THE INTERIM RELIABILITY MEASURE

1. Is there anything additional we should consider in this rule change seeking to increase clarity and transparency for unserved energy given the introduction of the interim reliability measure?

## 5.3 Definitional inconsistencies

The Panel considers that there is scope to clarify some aspects of the definition of unserved energy.

Clause 3.9.3C(b)(2)(i) states that unserved energy for the purposes of the reliability standard excludes unserved energy associated with power system security incidents that result from **multiple contingency events, protected events** or **non-credible contingency events** on a generating unit or an inter-regional transmission element (that may occur concurrently with generating unit or inter-regional transmission element outages).

The Panel noted that protected events are a subset of non-credible contingency events, and their inclusion in this clause is redundant.

The Panel also notes that the term 'multiple contingency events' can refer to multiple **credible** and **non-credible** contingency events. However, the clause already refers to 'non-credible contingency events' in the plural as one of the three reasons as to exclude unserved energy from the calculation. A 'multiple **non-credible** contingency event' is a subset of the pluralised 'non-credible contingency events,' which therefore suggests there is scope to clarify the intention of the term ' multiple contingency events.'

As such, the Panel proposes deleting protected events from clause 3.9.3C(b)(2)(i) of the NER, as non-credible contingency events will suffice.

The Panel also proposes clarifying that multiple "contingency events" are in fact multiple "credible contingency events" since multiple non-credible contingency events are already captured by the clause.

Finally, to remove any ambiguity, the Panel proposes to clarify that "non-credible contingency events" include both single and multiple non-credible contingency events.

### QUESTION 5: DEFINITIONAL INCONSISTENCIES

1) Does the proposed solution address the issues adequately?

2) Do stakeholders anticipate any unintended flow on effects of changing this drafting?

# 6 PROCESS FOR THIS RULE CHANGE

## 6.1 Treatment as a non-controversial rule change

The Commission considers that the rule change request is a request for a non-controversial rule because it is unlikely to have a significant effect on the national electricity market.[23] The Commission considers the rule change is unlikely to have a significant effect on the market because it seeks to:

1. clarify some minor aspects of the unserved energy framework to remove ambiguity
2. require AEMO to set out a guideline that would provide greater clarity to the existing unserved energy framework
3. introduce a guiding principle to better reflect the existing purpose of the definition of unserved energy.

In addition, Commission notes that no market participant or end-user costs are expected to flow from the proponent's proposals. Accordingly, it does not impose material costs, or otherwise have a significant effect, either operational or financial, on the market.

Rule changes that are considered to be non-controversial may be processed under an expedited (faster) process under which there is only one round of consultation and the AEMC is required to publish its final rule determination within eight weeks of commencing the rule change process.[24]

The Commission has decided to use an expedited process to consider this rule change request provided that it does not receive any valid requests not to use the expedited process by **8 October 2020**. To be valid, an objection should set out the reasons why the proposed rule in the rule change request will have a significant impact on the national electricity market (and thus should not be considered under the expedited process) and the Commission considers that the reasons are not misconceived or lacking in substance.

## 6.2 Lodging a submission

The Commission invites requests not to make a rule under the expedited process and written submissions on this rule change proposal.

All enquiries on this project should be addressed to Oliver Tridgell on (02) 8296 7863 or oliver.tridgell@aemc.gov.au.

### 6.2.1 Lodging a request not to make a rule under an expedited process

Written requests not to make a rule under the expedited process in s. 96 of the NEL must include reasons for the request, and must be lodged with the Commission by **8 October 2020** online in accordance with the process specified below.

23 Section 87 of the National Electricity Law.

24 The AEMC has published a notice under s. 95 and 96 of the National Electricity Law to commence and assess this rule change request as a non-controversial rule.

### 6.2.2 Lodging a submission to this rule change request

Written submissions on the rule change request must be lodged with Commission by **22 October 2020** online in accordance with the process specified below.

Where practicable, submissions should be prepared in accordance with the Commission's guidelines for making written submissions on rule change requests.[25] The Commission publishes all submissions on its website, subject to a claim of confidentiality. A template is available on the project web page to assist stakeholders in structuring and submitting in their submissions.

### 6.2.3 Lodging online

Submissions, or requests not to make a rule under the expedited process, must be lodged online via the Commission's website, www.aemc.gov.au, using the "lodge a submission" function and selecting the project reference code **ERC0279**.

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

25 This guideline is available on the Commission's website www.aemc.gov.au.

# ABBREVIATIONS

| | |
|---|---|
| AEMC | Australian Energy Market Commission |
| AEMO | Australian Energy Market Operator |
| AER | Australian Energy Regulator |
| Commission | See AEMC |
| DER | Distributed Energy Resources |
| ESOO | Electricity Statement of Opportunities |
| LOR | Lack of Reserve condition |
| MCE | Ministerial Council on Energy |
| MT PASA | Medium-term Projected Assessment of System Adequacy |
| MWh | Megawatt hours |
| NEL | National Electricity Law |
| NEO | National electricity objective |
| RERT | Reliability and Emergency Reserve Trader |
| RRO | Retailer Reliability Obligation |
| RSIG | Reliability Standard Implementation Guideline |
| ST PASA | Projected Assessment of System Adequacy |
| USE | Unserved energy |