

RULE CHANGE REQUEST - ENHANCING OPERATIONAL RESILIENCE

A. Name and address of rule change proponent

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This rule change request proposes changes to the National Electricity Rules (NER) to implement the protected operation framework recommended in Chapter 8 of the AEMC's 'Mechanisms to Enhance Resilience in the Power System – Review of the South Australian Black System Event' report.

B. Description of the rule proposed to be made

This purpose of this rule change request is to seek amendments to the NER to provide AEMO with mechanisms to enhance power system resilience to indistinct events under abnormal conditions.

The main changes proposed are:

- Introduction of the new definition of an indistinct event
- Clarify that standing risks from indistinct events can be managed as a type of protected event and to enhance the protected event approval process
- Implement a new operational tool, protected operation, for AEMO to manage indistinct events, the risk of which are strongly linked to abnormal conditions. Two types of protected operation are proposed:
 - pre-defined protected operation, and ad-hoc protected operation.
- Specify governance arrangements for protected operation

Indistinct event definition

The proposed rule implements an operational mechanism for AEMO to enhance power system resilience to indistinct events. A new NER definition of an indistinct event would be required to implement the mechanism described in this rule change request.

An indistinct event may be defined as an event affecting the power system which:

- occurs over a period of time, rather than being sudden or instantaneous;
- can be widespread or otherwise affect more than one single power system element;
and
- involves the non-credible failure or removal from operational service of multiple generation units and/or transmission elements that are not reasonably identifiable.

Standing risks arising from indistinct events can be managed as a protected event

This rule change is to retain existing arrangements for protected events with the following changes:

- protected events are to apply only to the management of 'standing' events, the occurrence of which are not a strong function of conditions. Risks from indistinct events that are a function of abnormal conditions would be managed through protected operation
- clarify that indistinct events can be declared to be protected events, and
- introduce an expedited approval process for declaring protected events that are not controversial or are otherwise straight forward.

The rule change request proposes an expedited Reliability Panel process to be specified for the approval of distinct and indistinct protected events that are relatively straight forward and not considered controversial. For such applications the Panel would issue a consultation paper and consult for a minimum of 10 business days. If no objections are raised, the Panel would then publish a single final report setting out its decision.

This rule change request does not propose changes to governance arrangements for protected events other than the introduction of an expedited process just described. The Reliability Panel, on the advice of AEMO, would remain the party to determine which non-credible contingency events and indistinct events are to be protected events and approve the management actions proposed by AEMO on the basis of an assessment of costs and benefits.

Implement protected operation as a means for AEMO to manage risks from indistinct risks given abnormal conditions

This rule change request proposes the implementation of the protected operation framework, as a means for AEMO to manage risks from condition dependent indistinct events.

Specifically, protected operation will manage risks arising from indistinct events, the risk of which increases under abnormal conditions. Two types of protected operation are proposed:

- pre-defined protected operation, and
- ad-hoc protected operation

Pre-defined protected operation

This rule change request proposes to allow AEMO to declare a period of protected operation to manage risks from specific indistinct events in accordance with criteria and actions pre- defined for management of risks from these specific indistinct events. Pre-defined protected operation would involve AEMO:

- Pre-identifying, through the GPSR, an indistinct event the risk of which increases during abnormal conditions
- for the identified indistinct event, AEMO specifying and publishing:
- criteria setting out the specific abnormal conditions which would see it enter into a period of protected operation in response to the event,
- its approach to assessing the level of risk arising from the indistinct event, and the actions it would take to prevent a cascading failure, or maintain the system in a secure state (following consideration of the costs and benefits), given the occurrence of the abnormal conditions.

The NER would set out requirements for the criteria specified and published by AEMO.

The proposed rule would allow AEMO to take actions to manage risks arising from pre-identified indistinct events. These actions are those which represent the lowest overall cost approach to managing the identified risk.

In determining what actions should be taken, the proposed rule is for AEMO to follow a cost minimisation principle, which will be defined in the NER.

The cost minimisation principle should not conflict or impede AEMO's obligation to meet its power system security responsibilities. This rule change request should read to be clear that this is the case.

In particular, in terms of the actions taken during a period of protected operation, AEMO must, at a minimum, take actions to minimise the risk of a cascading failure. However, AEMO may also elect to take actions above this, to maintain the power system in a secure state, without load shedding.

To support transparency AEMO must assess, consult on, and publish details of the cost and benefit assessment used to determine the efficiency of the proposed set of management actions. It should also publish the criteria for entering a protected operation period and the range of actions that will be taken by AEMO during a protected operation period.

Ad-hoc protected operation

The rule change proposes an "ad-hoc" version of protected operation, which would allow AEMO to declare a period of ad-hoc protected operation where a risk has arisen from an indistinct event that was not been pre-identified or had management actions pre-defined.

Ad-hoc actions would apply to indistinct risks that are unanticipated, or when AEMO has identified a new and severe risk from an indistinct event but there has been insufficient time to complete the process for a conditional protected operation.

Ad-hoc protected operation is intended to be an emergency measure. On each occasion AEMO declares a period of ad-hoc operation, AEMO would need to report publicly, and to the Panel, as soon as practicable following the occasion. The rule change proposes to specify minimum requirements for AEMO's report, including details of:

- the nature of the abnormal conditions and why these conditions increased risk from an indistinct event sufficiently to justify the use of an ad-hoc protected operation
- the measures that AEMO took to mitigate this risk
- the direct costs of declaring a period of ad-hoc protected operation
- any actions AEMO intends to take to account for this kind of event in the future.

The rule also requires AEMO to explicitly review the risks managed on each occasion it has used its ad-hoc power in the next GPSR. This would allow AEMO to incorporate experience from the use of its ad-hoc power.

Consultation and transparency measures - protected operation

Transparency and market information requirements involving the issuance of market notices are proposed to remain the same as under the existing protected event framework.

Enhanced consultation requirements are proposed for AEMO's use of protected operation. These consultation arrangements require AEMO to consult on:

- the nature of the abnormal conditions and why these conditions increased risk from an indistinct event sufficiently to justify any use of an ad-hoc protected operation
- how AEMO has/will assess the risk arising from the indistinct events, including any assumptions used
- the range of options for managing the risks considered by AEMO and the indicative costs of each
- the indicative benefits associated with the options considered by AEMO for managing the risk
- how the chosen option satisfies the principle of cost minimisation, and
- details of how AEMO will implement protected operation.

AEMO would be required to publicly consult in accordance with the rules consultation procedures.

In line with its current requirements applying to re-classification, AEMO is to report publicly, and to the Panel, on its use of the protected operation framework every six months.

Consultation and transparency measures - reclassification

These enhanced consultation arrangements would also apply to consultation on AEMO's development of criteria for reclassification. Currently, the NER do not set out a clear process for how AEMO should consult and publish information on its reclassification process.

Public consultation is important given the potential impacts on market operation and price outcomes associated with any additional constraints applied to protect against risks from either distinct or indistinct events.

Consultation in accordance with the rules consultation procedures would bring reclassification and protected operation in line with other AEMO system security procedures with significant effects of market outcomes such as the Market Ancillary Services Specification.

Provision for Reliability Panel guidelines and oversight

If the Reliability Panel considers it necessary or desirable, it may elect to determine guidelines for pre-defined and ad-hoc protected operation. The Reliability Panel may also act in a general oversight role by considering framework performance as part of its Annual Market Performance Review (AMPR).

Options for implementation

There are two broad approaches to implementing this proposed change in the NER being:

- Option A - to implement arrangements parallel to the existing contingency classification system, or
- Option B - to implement as a part of an extended contingency classification system

This example rule change request does not recommend a specific approach to implementing protected operation in the NER. Stakeholders are invited to consider the issues outlined in Chapter 8 of the AEMC's 'Mechanisms to Enhance Resilience in the Power System – Review of the South Australian Black System Event' when developing rule change requests.

C. Nature and scope of the issue being addressed

The proposed rule seeks to enhance power system resilience by introducing protected operation for the management of risks and uncertainty from indistinct events associated with abnormal conditions. The proposed rule would also clarify that standing risks and uncertainty from indistinct events can also be declared as protected events.

The power system has always faced risk from a range of sources. Existing frameworks codified the types of events risks, and uncertainties that existed in the power system at the time they were developed. In particular, the NER defined the term 'contingency event' to capture the set of events that represented material risk to power system security at that time.

Contingency events involve distinct risks from the sudden unexpected loss of a specific generating system or network element. The distinct nature of these events, and their association with specific power system assets, means that the effect on the power system of a finite number of specific events needed to be modelled to understand the range of possible outcomes to be protected against.

Existing frameworks are built around the concept of a contingency event. Risks to system security from events that do not qualify as contingency events are therefore difficult to manage under existing arrangements.

The risk to power system security from 'indistinct events' are increasing as the NEM's generation mix transitions. The AEMC South Australian black system review further identified a need to amend existing frameworks to allow for management of 'indistinct events' which are not associated with the failure or removal from service of a single discrete power system element.

Indistinct events and a changing power system risk and resilience profile

The NEM's generation mix has changed markedly in recent years, with the reduced operation, mothballing or retirement of a large number of synchronous thermal generating units, coupled with the rapid deployment of inverter connected / asynchronous renewable generation resources, at both transmission and distribution levels. This changing generation mix is changing the power system risk and resilience profile which includes increasing levels of:

- generation and load risk and uncertainty - The changing generation mix is changing both the events and types of uncertainty regarding generation output. Unlike the failure of thermal generators, unexpected variation from variable generation is often not related to internal failure of the unit, but rather involve weather conditions, such as changes in sunlight intensity or wind speeds. These changes are generally distributed, and can affect a significant number of units and systems in a surrounding area. This means that system security risks may arise from an external event, such as a storm front passing across a region, and require the aggregate impact across all the generating units in the affected area to be considered, rather than the loss of a specific unit.
- system response risk and uncertainty - In addition to new types of generation and load uncertainty, the response of the power system itself to disturbances is also becoming more uncertain. This increase in uncertainty is due to factors including reduction in the level of inertia and fault level as synchronous units have retired, as well as a more complex demand side, due to an increased prevalence of DER. Other factors, such as increasing prevalence of network protection schemes, also increase the complexity and therefore the uncertainty, of power system response to a disturbance.

Indistinct events are becoming more significant given this changing power system risk and resilience profile. Indistinct risks are associated with distributed events, such as weather conditions, which act on multiple generation and network assets in an affected area, over time. An indistinct event is one where the system security risk does not arise from a single specific asset, or the specific asset(s) involved are not reasonably identifiable ex-ante.

Therefore, unlike distinct contingency events, indistinct events cannot be characterised in terms of a contingency event involving the failure or removal from a service of one or more easily identifiable power system elements. Existing frameworks for managing risks to the power system from contingency events are therefore unsuited to managing these new sources of risk. This rule change request seeks to extend existing arrangements to manage indistinct risks under abnormal conditions.

Enhancing power system resilience given a changing power system risk and resilience profile

The majority of the disturbances that affect the operation of a power system can and are classed as credible contingencies. These are disturbances that occur reasonably frequently, with small to moderate impacts, which can easily be modelled. The NER requires AEMO to operate the power system in a secure operating state, without load shedding, for the occurrence of any credible contingency event.

AEMO is not required to maintain the power system in a secure state to non-credible events. The power system's ability to avoid and survive a cascading failure and potential black system event is related to the resilience of power system security. Resilience is a concept which speaks to the ability of a power system to avoid, survive, recover and learn, from non-credible events in the context of measures that make the system stronger, smarter, and more interconnected.

While AEMO is not required to maintain the power system in a secure state for non-credible events, existing NER arrangements provide mechanisms for managing the risks of certain non-credible contingency events. Given the presence of heightened risks due to abnormal conditions, reclassification allows AEMO to, in accordance with criteria it has developed, re-classify certain non-credible contingency events as credible, and maintain the system in a secure state without load shedding should they occur. The existing protected events framework also provides AEMO with a mechanism to maintain the power system in a resilient state to non-credible events where it is efficient to take action to avoid a cascading failure.

Both of these frameworks however are limited to managing distinct contingency events and are not well suited to addressing risks arising from indistinct events.

The AEMC's review of the South Australian black system event identified a need to extend existing frameworks to maintain power system in a resilience state to indistinct events, the probability of which increases due to abnormal conditions. This rule change request seeks to implement the recommendations put forward by the review in this area. In particular, the rule change request proposes:

- clarifying the applicability of protected events for the management of indistinct events, and
- introducing protected operation as a new tool for AEMO to use for managing condition dependent indistinct risks under abnormal conditions.

D. How the proposed rule advances the National Electricity Objective

This rule change request seeks changes to the NER that will advance the National Electricity Objective, which is 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.

The mechanisms for enhancing operational resilience proposed will promote the long term interests of consumers as they should efficiently, transparently, and accountably enhance the safety and security of the national electricity system.

Given the changing power system risk profile and the increasing risks arising from indistinct events, existing frameworks which are solely built around managing distinct contingency events are no longer sufficient to efficiently manage all risks to the power system, particularly under abnormal conditions.

The recommended mechanisms will promote the long term interests of consumers because:

- market design and regulatory arrangements are flexible enough to respond and evolve as circumstances change. The proposed rule does not specify the particular actions AEMO is to take or limit the risks arising from indistinct events to be managed. The proposed rule sets out a framework within which AEMO can manage the risks that will change over time. This flexibility is important given the rate at which the power system risk and resilience profile is changing
- responsibility for determining and implementing actions to manage identified risks are allocated on the basis of organisational skill and experience. The proposed protected operation framework places responsibility for assessing and implementing actions for the management of identified risks with AEMO as the party with the skills, experience, and information necessary to perform this role
- actions taken to manage risks associated with indistinct events are efficient. The recommended protected operation framework includes a proposed cost minimisation objective
- the recommended protected operation framework is transparent, with appropriate levels of organisational accountability. Efficient investment and operational decisions are supported by market participant confidence in AEMO's actions. The recommended protected operation framework provides for transparency, and accountability through the requirements for AEMO to determine, consult on, and publish pre-defined criteria applying to its use of protected operation. Specifically, AEMO will be required to:
 - consult according to the rules consultation procedures. This will provide transparency supporting market confidence in the actions AEMO is taking to manage identified risks. Market participants will also be able to contribute to AEMO's development of criteria thereby resulting in a more informed and robust overall solution than would have been the case in the absence of effective consultation
 - publish protected operation criteria. This will provide reasonable levels of predictability on AEMO's actions to manage identified risks and will enhance the ability of market participants to make decisions to manage their own market and investment risk, and

- report each 6 months, and following each use of ad-hoc protected operation, which will provide accountability as to AEMO's actions. Additional accountability will be provided for through the Reliability Panel's making of guidelines (if required) applying to AEMO's use of protected operation.

In addition, it would promote the long term interests of consumers for AEMO to have operational flexibility to depart from its pre-defined criteria under emergency circumstances. Excessively rigid requirements that do not provide such flexibility for AEMO are unlikely to be in the long term interests of consumers given the high levels of uncertainty that apply to indistinct events. The protected operation framework provides AEMO with the authority to take ad-hoc actions subject to additional reporting and transparency requirements. Authority to take ad-hoc actions, combined with additional report and transparency obligations, balances AEMO's need for operational flexibility with transparency and confidence provided by AEMO following its pre-defined criteria.

E. Impact of the proposed rule on affected parties

Participants affected by the proposed rule, if made, include:

- AEMO
- Market participants

AEMO is directly affected by the proposed rule because of its role as described in this rule change request. AEMO would incur costs in terms of the administrative process of assessing and determining protected operations periods. However, these costs should be minimal and outweighed by the significant security and resilience benefits of implementing the protected operation framework.

Market participants would be affected by the proposed rule as AEMO would take a range of actions including maintaining the power system in a secure state where it is efficient to do so. AEMO may therefore adjust the technical envelope and constrain the power system during certain periods. Constraining the power system would change dispatch and market price outcomes impacting market efficiency.

However, the proposal for protected operation would be for the management of risks from indistinct events during abnormal conditions. Overall cost impacts would therefore be limited by the duration during which the additional constraints apply. Short term actions to constrain the power system to either avoid, or minimise the amount of load shedding from an indistinct event will therefore be limited in their overall market impact.

More generally, the proposed rule manages overall costs, through the requirement that AEMO's actions to manage risks arising from indistinct events be efficient and in line with a cost minimisation principle. Costs to market participants would therefore be included in the assessment conducted by AEMO to choose the lowest cost approach to managing the identified risk.

The transparency requirements imposed by the rule, including the requirement to issue market notices and for AEMO to consult on its proposed actions in accordance with the

rules' consultation procedures are included to provide market participants with confidence in AEMO's exercise of its powers.