



Government of Western Australia  
Energy Policy WA

# Coordinator of Energy Determination: AEMO Non-Co-optimised Essential System Service Trigger Submission

## Fast Frequency Response

28 April 2022

Working together for a **brighter** energy future.

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# 1. This Determination

The Coordinator of Energy (Coordinator) has determined, under clause 3.11A.4 of the WEM Rules, to trigger a Non-Co-optimised Essential System Services (NCESS) procurement process for a Fast Frequency Response service from 1 October 2022 at the request of AEMO. In accordance with clause 3.11A.8 of the WEM Rules, the Coordinator is publishing this determination to outline the reasons for triggering the procurement process for an NCESS.

## 2. Background to the Determination

### 2.1 Purpose of the NCESS Framework

In accordance with the Government Energy Transformation Strategy, the Energy Transformation Taskforce developed a major suite of reforms to the Wholesale Electricity Market (WEM), the majority of which are due to commence on 1 October 2023. This includes the introduction of security-constrained economic dispatch, the move to shorter trading intervals and 'gate closure', and a new framework for competitive Essential System Services (ESS), which will be co-optimised with energy in the market dispatch process.

Previously, under the WEM Rules, Dispatch Support Services (DSS) contracts could be procured by Australian Energy Market Operator (AEMO) to address system security issues not managed by existing ancillary services, and Network Control Service (NCS) contracts could be procured by the Network Operator as an alternative to network augmentation.

On 1 February 2022, DSS and NCS were replaced with a NCESS framework, which has been designed to ensure the rapidly evolving power system continues to meet emerging technical requirements and power system security and reliability standards.

The primary objective of the NCESS framework is to enable AEMO, a Network Operator or the Coordinator) to identify and justify the need for services, not already available through existing market mechanisms, and procure those services in a transparent and efficient manner.

More specifically, the NCESS framework is intended to:

- enable the procurement of new services to respond to unforeseen events or changes in the power system that may threaten system security;
- create appropriate incentives for non-network services to be procured to meet power system security and reliability requirements in a more economically efficient manner when compared to network augmentation; and
- enable maintenance of power system security and reliability at the lowest efficient cost to consumers.

## 2.2 The interim NCESS Framework

The interim NCESS framework commenced on 1 February 2022 to allow for NCESS Contracts to be procured, settled and dispatched in accordance with existing market mechanisms. This interim framework will continue to apply until the new WEM commencement day, when it will be replaced with an enduring NCESS framework.

Under the interim framework, AEMO and the Network Operator may identify the need for NCESS through system planning processes, and if certain conditions are met, may apply to the Coordinator to trigger the NCESS procurement process under the WEM Rules.

The WEM Rules outline the process by which each of the entities may seek to trigger the NCESS procurement process and the factors the Coordinator must consider in assessing a submission by AEMO or a Network Operator.

## 3. The AEMO Submission

### 3.1 Submission Process

The Coordinator received a submission from AEMO on 13 April 2022, requesting that the Coordinator triggers the NCESS procurement process for a Fast Frequency Response (FFR) service.

Under clause 3.11A.2A of the WEM Rules, to make a submission to the Coordinator AEMO must consider that one or more of the following has occurred:

- in the course of its normal power system operations, that a significant threat to Power System Security or Power System Reliability exists or is emerging, and the existing mechanisms under these WEM Rules may not be sufficient to address the threat; or
- a modification to an existing WEM Technical Standard, or introduction of a new WEM Technical Standard, that may impact Power System Security or Power System Reliability, and the existing market mechanisms may not be sufficient to meet the modified or new standard.

AEMO's submission must also contain sufficient information and analysis regarding the potential or actual impact on Power System Security, Power System Reliability or costs for each trigger event to enable the Coordinator to make a determination.

This section provides a brief summary of the issues raised in AEMO's NCESS submission. A more detailed version of AEMO's submission is available [here](#) on Energy Policy WA's website.

### 3.2 AEMO's Submission in brief

One of AEMO's primary functions under the WEM Rules is to ensure the SWIS operates in a secure and reliable manner. AEMO also has System Management functions, which include procuring Ancillary Services where Synergy cannot meet the Ancillary Services Requirements.

As AEMO's analysis demonstrates, the South West Interconnected System (SWIS) is continuing to experience a rapid uptake of Distributed Photovoltaics (DPV), which is resulting in declining levels of system load and increased risk exposure to DPV tripping.

AEMO has conducted power system modelling to identify the risks associated with DPV tripping under a range of credible contingencies. AEMO's analysis suggests that, at times, the Spinning Reserve Ancillary Service (SRAS) requirements for the SWIS may be insufficient to cater for network and/or generation faults and DPV disconnections.

The WEM Rules also require AEMO to minimise involuntary load shedding in the SWIS. AEMO's analysis considered whether the existing suite of Ancillary Services can fulfil this obligation, when faced with lower system load and the risk of DPV tripping.

AEMO's submission concluded that existing mechanisms under the WEM Rules are unlikely to fully mitigate the identified risks, and that the economic impacts of deploying these measures are likely to increase costs in the WEM.

AEMO contends that during low periods of inertia, a new FFR service may assist with frequency disturbances without displacing the remaining synchronous generators.

On this basis, AEMO has requested that the Coordinator triggers the NCESS Procurement Process for an FFR service. The analysis informing AEMO's submission was undertaken by AEMO and Western Power, in consultation with Energy Policy WA.

The Coordinator was satisfied with the amount of detail and analysis provided in AEMO's submission and did not request further information from AEMO to inform this determination.

## 4. Coordinator's Assessment

In accordance with clause 3.11A.7 of the WEM Rules, the Coordinator is required to take a number of factors into account when assessing AEMO's submission and determining whether to trigger the NCESS procurement process. The following section provides a summary of the Coordinator's assessment of these factors, which has relied heavily on the studies and analysis provided in AEMO's submission.

### 4.1 Where the issues relates to Power System Security or Power System Reliability, the extent to which an NCESS will address the issue (clause 3.11A.7(a))

The Coordinator has determined that the issue the NCESS is aimed at addressing relates to Power System Security, and that an FFR service procured via the NCESS process has the potential to address the issue.

#### 4.1.1 The issue the NCESS is aiming to address

The rapid uptake of DPV in the SWIS is resulting in declining levels of system load and increased risk of DPV tripping. DPV tripping contributes significantly to contingency sizes when DPV tripping occurs in consequence of credible contingencies involving network or generator faults.

AEMO considers that, without procuring a FFR service via the NCESS procurement process ahead of the commencement of new market arrangements on 1 October 2023, there is a material risk that AEMO will be unable to operate the power system securely under certain operating conditions. As a result, there is a risk involuntary load shedding may occur in the event of a contingency.

The WEM Rules place specific obligations on AEMO to minimise involuntary load shedding in the SWIS. AEMO has considered whether it can effectively fulfil this obligation using the current suite of Ancillary Services (and the associated procurement processes) in the context of declining levels of system load and higher risk of DPV tripping.

AEMO's analysis indicates that, as system load declines, the impacts of DPV tripping in response to power system disturbances may not be able to be fully mitigated through existing mechanisms under the WEM Rules.

As system load declines, the power system becomes less resilient and more vulnerable to disturbances. Fewer synchronous generators can remain online to provide a level of inertia and reserves sufficient to suppress frequency deviations, and to provide other services essential for keeping the power system secure.

AEMO has conducted power system modelling to identify the risks associated with DPV tripping under a range of credible contingencies. The analysis suggests that, at times, the Spinning Reserve

Ancillary Service (SRAS) requirements for the SWIS may be insufficient to cater for faults, which can involve network and/or generation faults and DPV disconnections.

AEMO's modelling reflected the quantities of Ancillary Services that could be made available via the current mechanisms from the existing fleet.

The mitigation measures for which AEMO currently has access, include:

1. Enablement of additional SRAS from Synergy Portfolio Facilities.
2. Curtailment of utility-scale generation out-of-merit to minimise contingency sizes.

While these two measures reduce the number of incidents where underfrequency load shedding may be triggered, AEMO's modelling indicates that there is a proportion of intervals in which insufficient load is available for AEMO to dispatch increased levels of SRAS from the available providers.

The modelling, therefore, indicates that the identified risks cannot be fully mitigated and AEMO has determined that further measures would be required.

AEMO has determined that a service that is capable of delivering a more targeted response than that specified for SRAS under the WEM Rules would be required.

#### **4.1.2 Extent to which NCESS will address this issue**

Without procuring an FFR service ahead of 1 October 2023, AEMO's analysis indicates that there is a significant risk that involuntary load shedding cannot be fully mitigated via measures that increase SRAS and/or limit maximum contingency sizes.

AEMO's analysis supports that FFR will be required to mitigate risk beyond that achieved through existing mitigations (additional SRAS and/or constraining generation). AEMO has indicated that this is critical for AEMO's ongoing ability to maintain power system security while managing the risk of DPV tripping in low-load conditions.

AEMO's system studies relating to DPV tripping have identified that 100 MW of FFR would be capable of reducing intervals at risk of Under Frequency Load Shedding under the largest credible contingency from approximately 5% of intervals to less than 1% of intervals.

### **4.2 The extent to which an NCESS will minimise costs in the WEM (clause 3.11A.7(b))**

The Coordination considers that procuring FFR service via the new NCESS framework can reduce risks associated with the identified trigger conditions and can be procured at an efficient cost.

AEMO has presented relevant analysis to allow the Coordinator to consider the extent to which an NCESS will minimise costs in the WEM.

AEMO performed an economic analysis regarding the economic impacts of not procuring a FFR service via the NCESS framework.

Power system modelling had identified that AEMO can reduce power system security risk in the event of increased DPV uptake through the following actions:

- Enabling additional SRAS appropriate according to system needs;
- Constraining the maximum contingency size (resulting in constrained compensation); and
- Enabling an FFR service.

Consequently, the additional costs to the WEM as assessed by the analysis relate to:

- Provisioning additional SRAS; and
- Constrained Compensation payments associated with intervening in the dispatch process to provision additional SRAS and limit the maximum contingency size.

AEMO's analysis assessed the additional WEM costs of managing power system security associated with two scenarios:

- A 100MW FFR service is procured; and
- No FFR is procured.

For each scenario, the power system modelling generated (on an interval basis until October 2023) the MW quantity of SRAS needed, and the MWh of constrained on and constrained off quantities needed to minimise power system security risks.

In a scenario where no FFR is procured, AEMO must manage power system security through enabling additional SRAS and intervening more frequently with greater constrained quantities.

To calculate the future monthly costs of SRAS and Constrained Compensation in both scenarios - where 100MW of FFR is procured and where no FFR is procured - the quantity of SRAS and the constrained quantity was generated by the power system modelling. An average monthly cost was then applied to the volumes of intervention in each scenario.

The Coordinator recognises that this is a simplified economic assessment but considers it provides sufficient approximation of cost impacts, which indicate that an NCESS can minimise costs in the Wholesale Electricity Market.

At the request of AEMO, the Coordinator has redacted commercially sensitive information from the analysis presented below in accordance with 3.11A.8.

### **4.3 The relative merits between procuring an NCESS or augmenting the network (clause 3.11A.7(c))**

In making its assessment of the emerging risks to its ability to manage Power System Security, AEMO did not find any instances of relevant network augmentation being able to mitigate the risk associated with DPV tripping.

The Coordinator, therefore, accepts that network faults will continue to be a credible contingency for which appropriate market services will be required to mitigate risk.

### **4.4 The outcome of any investigation of behaviour that reduces the effectiveness of the market, including behaviour related to market power (clause 3.11A.7(d))**

The Coordinator is not aware of any investigations relating to the issue identified in AEMO's submission.

### **4.5 Whether the procurement of an NCESS is consistent with the Wholesale Market Objectives (clause 3.11A.7(e))**

The Coordinator considers that the proposed procurement of an NCESS as a mitigation of the issues identified in the AEMO submission is consistent with the Wholesale Market Objectives.

The current Wholesale Market Objectives, under section 122 of the *Electricity Industry Act 2004* and clause 1.2.1 of the WEM Rules, include to:

- promote the economically efficient, safe and reliable production and supply of electricity (clause 1.2.1(a));

The Coordinator considers that:

- a competitive procurement process for an FFR via the NCESS will ensure the cost of the service is as efficient as possible; and

- the issue the FFR service is aimed at addressing relates to Power System Security, and an FFR service procured via the NCESS has the potential to adequately address the issue.
- encourage competition (clause 1.2.1(b));

The Coordinator considers that the two-stage NCESS procurement process in the WEM Rules has been developed to encourage maximum competition and, therefore, the proposed use of this process meets the objective in clause 1.2.1(b).

- avoid discrimination in the market against particular energy options and technologies (clause 1.2.1(c));

In accordance with clause 3.11B.1, AEMO must prepare a draft NCESS service specification, which amongst other things must include the *maximum* quantity of the service required.

The Coordinator considers that, to meet the Wholesale Market Objective in clause 1.2.1(c), a service specification can be developed by AEMO such that the service can be delivered by a range of technologies.

Importantly, in accordance with clause 3.11B.3A, AEMO must develop and publish, an expression of interest form, setting out the details prospective service providers must provide, which must include whether the facility or equipment that may be able to provide the service can *fully or partially* meet the draft NCESS Service Specification. This would allow a range of technologies to compete for the FFR service.

- minimise the long-term cost of electricity supply to customers in the SWIS and encourage measures to manage the amount of electricity used.

The Coordinator considers that the proposed procurement of an NCESS has the potential to minimise the long-term cost of electricity supply to customers in the SWIS, as follows:

- In accordance with clause 3.11B.10, AEMO must select one or more NCESS offers which meet the NCESS Service Specification and will result in the highest value for money for providing the NCESS;
- In accordance with clause 3.11B.11, AEMO must, when assessing highest value for money conduct cost-benefit analysis or other assessments to demonstrate how a NCESS offer will maximise value for money; and
- In accordance with clause 3.11B.12, AEMO may decide to not select any NCESS offers if it considers that none of the NCESS Submissions represent value for money.

## 4.6 Whether procurement of an NCESS will be in the long-term interests of consumers (clause 3.11A.7(f))

The Coordinator considers that the mitigation of the issues identified in AEMO's submission are in the long-term interest of consumers.

In addition to the assessment against the Wholesale Market Objectives, as well as the rest of the factors, presented above there are other considerations.

In the longer term, the management of DPV may assist in increasing load levels to allow for additional SRAS units to be brought online. However, in the near term the level of DPV available under the Emergency Solar Management (ESM) scheme is expected to be relatively small, providing less flexibility to effectively increase load levels. The Coordinator also notes that ESM is intended to be used as a last resort measure. An FFR service may reduce the incidents of ESM where AEMO is required to increase load via ESM to ensure sufficient SRAS providers may be dispatched.

## 5. Determination Summary

On the basis of the Coordinator's assessment of the factors in this determination, the Coordinator considers that without an NCESS procurement for a FFR service, there is a risk that AEMO will be unable to operate the power system in a secure manner.

AEMO's submission included both technical and commercial analysis to demonstrate that the existing mechanism under the WEM Rules are unlikely to be sufficient to mitigate the identified risks.

The Coordinator is satisfied that the trigger conditions in section 3.11A of the WEM Rules have been met, and that a NCESS procurement process should be conducted in accordance with section 3.11B of the WEM Rules.

## 6. Next Steps - NCESS Procurement Process

Based on the information in AEMO's submission, the Coordinator has determined that AEMO is the procuring party for this NCESS and will be responsible for paying for the FFR service once the commercial terms are determined.

On this basis, AEMO must prepare a draft NCESS Service Specification for the FFR service in accordance with clause 3.11B.5 of the WEM Rules. AEMO must consult with Western Power in the preparation of this draft specification.

Within 20 Business Days of the publication of this determination, unless otherwise agreed with the Coordinator, AEMO must advertise a call for expressions of interest on the WEM Website and in a major Australian newspaper.

Respondents must be given at least 20 Business Days to respond to the expression of interest, from the time it is published.

This first step of the process will enable AEMO to determine whether any suitable FFR providers exist and what solutions they can provide to meet fully or partially the requirements. Suitability may depend on several factors such as the type of technology, operational limitations, etc. If suitable providers are not found, the service specification may need to be modified, or the NCESS procurement may be postponed or may not proceed.

If the NCESS procurement is to proceed based on the expressions of interest received, AEMO will issue a request for tender and publish a final service specification to commence the procurement process.

Any existing or new facility or equipment whether belonging to registered or intending market participants is able to participate in an NCESS procurement. New providers that did not participate in the first step can also apply.



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