Automated procedures for identifying intervals subject to review

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Contents

Tables

Figures

Current version release details

Version	Effective date	Summary of changes
4	TBD ~~04/10/2023~~	Updated with FCAS requirement threshold to detect FCAS MII
3	01/07/2022	Updated with amendments to Interconnector flow thresholds
2	31/12/2020	Updated due to delayed five-minute settlement start date.
1	12/07/2019	Updated template. Modified terminology to incorporate five-minute settlement.

1. Introduction to the automated procedure

1.1. Rules requirement and purpose of this document

This document describes the automated procedures, required under clause 3.9.2B(h) of the National Electricity Rules (NER), for identifying intervals subject to review. The procedures were developed in consultation with Registered Participants and have effect only for the purposes set out in the NER. The NER and the National Electricity Law prevail over this document to the extent of any inconsistency.

In this document:

- terms that are defined in the NER have the same meanings;

- the word "interval" refers to a *dispatch interval* prior to 1 October 2021, and to a *trading interval* from 1 October 2021; and

- the word "price" refers ~~to a *dispatch price* or *ancillary service price* prior to 1 October 2021, and~~ to both~~a~~ *spot price*s ~~and~~or *ancillary service price*s ~~from 1 October 2021~~.

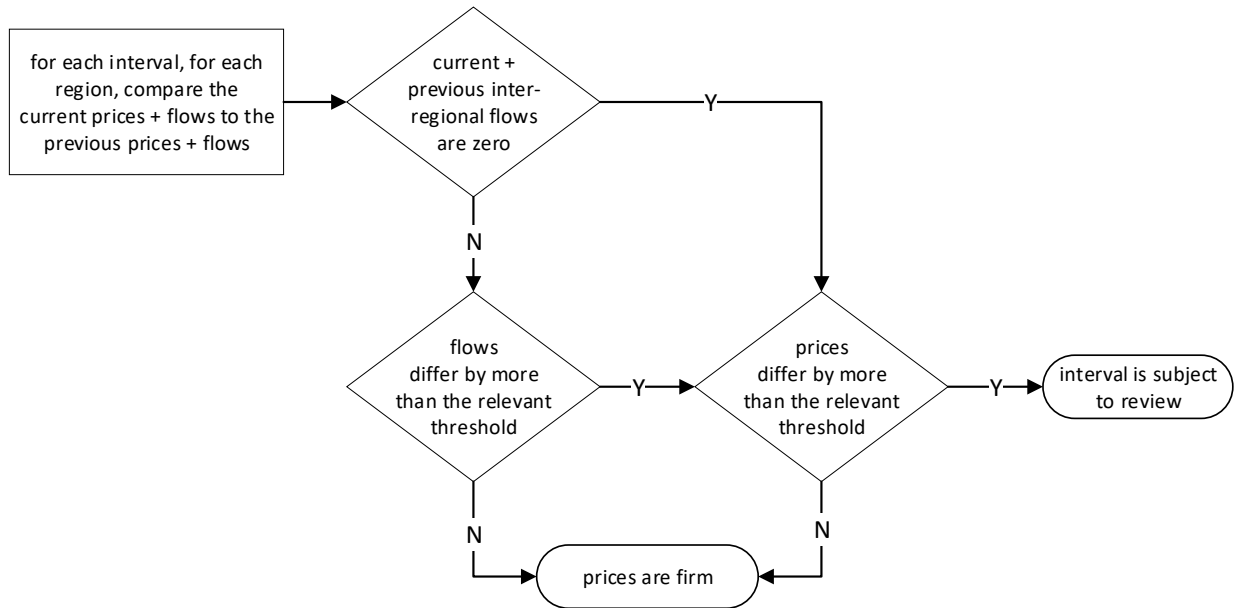## 1.2. Overview of the automated procedure

NER 3.9.2B requires AEMO to apply automated procedures to identify intervals that are subject to review. If an interval is identified as subject to review, AEMO must then determine whether the interval subject to review contained a manifestly incorrect input (MII) to the dispatch algorithm. If AEMO determines that an interval contained an MII, the prices for that interval are overwritten with the prices from the previous interval.

For the spot market, e~~E~~very interval AEMO compares the spot price in each region and the interconnector flow into or out of that region to the spot price and flow for that region in the previous interval. The interval is subject to review if the changes in the spot price and flow for any region breach predetermined thresholds.

An exception is made if the interconnector flows are zero for the current and previous intervals – in other words, if the region is electrically "islanded" from the rest of the National Electricity Market (NEM). In this case, only the spot prices between consecutive intervals are compared. The interval is subject to review if the change in spot prices for the islanded region breaches a predetermined threshold.

The automated procedure for the spot market is shown schematically in Figure 1.

Figure 1   The automated procedure for detecting ~~trading~~ intervals subject to review for the spot market

To detect frequency control ancillary services (FCAS) MIIs, a FCAS requirement threshold is set for the automated procedures. Every interval AEMO checks if the FCAS requirements in each region breach the FCAS requirement thresholds.

The interval is subject to review if the FCAS requirement for any region is above the predetermined thresholds.

The automated procedure for the FCAS markets is shown schematically in Figure 2.

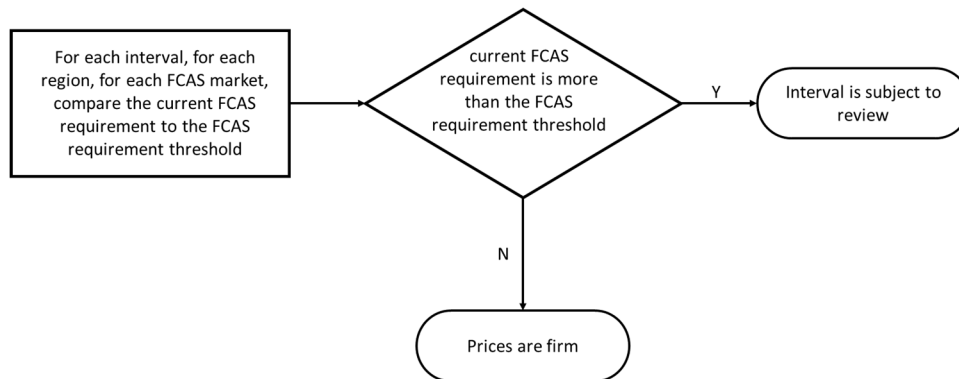**Figure 2   The automated procedure for detecting intervals subject to review for FCAS markets**

2. Price and flow thresholds for the spot market

2.1. Spot pPrice thresholds

Spot pPrice thresholds are based on two parameters: an absolute number X and a relative number Y. The parameters are specific to each region.

If the spot prices for the current interval and previous interval both exceed X, the threshold is breached if the difference between the spot prices, expressed as a multiple of the smaller spot price, exceeds Y. If the spot price for the current interval or the spot price for the previous interval does not exceed X, the threshold is breached if the difference between the spot prices exceeds X*Y.[1]

This can be expressed mathematically as:

> The spot price threshold is breached if
>
> $$Min(|P_i|, |P_{i-1}|) > X \ and \ |P_i - P_{i-1}|/Min(|P_i|, |P_{i-1}|) > Y$$
>
> or
>
> $$Min(|P_i|, |P_{i-1}|) \leq X \ and \ |P_i - P_{i-1}| > X * Y$$
>
> where
>
> $P_i = spot \ price \ in \ the \ current \ interval$
>
> $P_{i-1} = spot \ price \ in \ the \ previous \ interval$

The spot price parameters for each region are shown in Table 1:

Table 1   Regional spot price threshold parameters

Region	X ($/MWh)	Y
NSW	20	3
QLD	20	3
SA	20	3
TAS	20	4
VIC	20	3

2.2. Flow thresholds

Flow thresholds are based on a single parameter Z. The thresholds are specific to the direction of flow on each interconnector.

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[1] The prices used in these comparisons are the Regional Original Price (ROP) for each interval. The ROP includes the cost of any constraint violations and can exceed the Market Price Cap (MPC). If the ROP exceeds the MPC it will be automatically revised before it is published as the Regional Reference Price (RRP) for the interval.

The flow threshold is breached if the difference between the flows for the current and previous intervals exceeds Z.[2]

This can be expressed mathematically as:

The flow threshold is breached if

$$|F_i - F_{i-1}| > Z$$

where

$$F_i = flow\ in\ the\ current\ interval$$

$$F_{i-1} = flow\ in\ the\ previous\ interval$$

The flow parameters for each interconnector are shown in Table 2:

Table 2   Interconnector flow threshold parameters

Region	Direction	Z (MW)
NSW1-QLD1 **(QNI)**	NSW ⇨ QLD	450
	QLD ⇨ NSW	240
N-Q-MNSP1 **(Terranora)**	NSW ⇨ QLD	100
	QLD ⇨ NSW	100
T-V-MNSP1 **(Basslink)**	TAS ⇨ VIC	190
	VIC ⇨ TAS	190
VIC1-NSW1	VIC ⇨ NSW	500
	NSW ⇨ VIC	500
V-SA **(Heywood)**	VIC ⇨ SA	300
	SA ⇨ VIC	300
V-S-MNSP1 **(Murraylink)**	VIC ⇨ SA	100
	SA ⇨ VIC	100

3.   FCAS requirement thresholds

FCAS requirement thresholds are set for triggering FCAS MII automated procedures to identify intervals that are subject to review, Once the FCAS requirement for any region breach the FCAS requirement threshold, the interval is subject to review.

The FCAS requirement thresholds can detect FCAS MII and retain the effectiveness of the existing automated procedures. The predetermined FCAS requirement thresholds are the same for all regions.The threshold parameters for each FCAS market are shown in Table 3:

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[2] The flows used in these comparisons are the interconnector targets for each interval.

Table 3   FCAS requirement threshold parameters

FCAS Market	FCAS requirement threshold (MW)
Raise 6 sec (R6)	500450
Raise 60 sec (R60)	500450
Raise 5 min (R5)	500450
Raise regulation (RREG)	500450
Lower 6 sec (L6)	500450
Lower 60 sec (L60)	500450
Lower 5 min (L5)	500450
Lower regulation (LREG)	500450
Raise 1 sec (implement in October 2023)	500450
Lower 1 sec (implement in October 2023)	500450

4.   The MII price review process

A Market Notice is automatically generated if the automated procedures identify an interval subject to review. The Market Notice will specify the interval that is under review and state that prices for that interval are not firm. Subsequent intervals will also be subject to review, with accompanying Market Notices, until the sooner of:

- prices in the original interval being accepted or rejected; or
- 30 minutes from the start of the original interval subject to review.

NER 3.9.2B(f) allows AEMO up to 30 minutes to reject the prices from any interval that is subject to review. The prices will be rejected only if AEMO considers that the interval contained an MII. In other words, prices will be rejected only if one or more of the inputs used in the dispatch algorithm appears manifestly incorrect. If the prices have been neither rejected nor accepted after 30 minutes they must be automatically accepted.

If prices are rejected, they are replaced with the prices from the most recent interval that was not subject to review. In this case a Market Notice is automatically generated that identifies the interval, the original prices, and the revised prices, which are now firm.

If the prices are accepted, either manually or after 30 minutes without a decision being made, a Market Notice is automatically generated that identifies the interval and states that the original prices are now firm.

The MII price review process is detailed in Power System Operating Procedure 3705.[3]

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[3] https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/power_system_ops/procedures/so_op_3705-dispatch.pdf?la=en https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/power-system-operation/power-system-operating-procedures

Glossary

In addition to the terms defined in the NER, other specific terms or abbreviations used in this document have the meanings given in the table below:

Term	Definition
FCAS	Frequency Control Ancillary Services
Market Notice	A notice issued by AEMO to Registered Participants and published on the 'Market Notices' section of AEMO's website
MII	Manifestly Incorrect Input
MPC	Market Price Cap
NER	National Electricity Rules
ROP	Regional Original Price
RRP	Regional Reference Price