

2022 WEM TOLERANCE RANGE REVIEW PAPER

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VERSION: 1.0
EFFECTIVE DATE: 16 December 2022
STATUS: FINAL

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IMPORTANT NOTICE

Purpose

The purpose of this publication is to document the process conducted by the Australian Energy Market Operator (AEMO) to review the current Tolerance Range and any Facility Tolerance Ranges under the Wholesale Electricity Market Rules (WEM Rules) for 2022.

AEMO publishes this 2022 Tolerance Range Review Paper in accordance with clauses 2.13.6D, 2.13.6E, and 2.13.6G of the WEM Rules. This publication is generally based on information available to AEMO as at 1 July 2022. More recent information may have been included where practical.

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EXECUTIVE SUMMARY

The publication of this review paper completes the process conducted by the Australian Energy Market Operator (AEMO) to review the current Tolerance Range under the Wholesale Electricity Market Rules (WEM Rules).

AEMO is required in accordance with clauses 2.13.6D, 2.13.6E, and 2.13.6G of the WEM Rules to:

- (a) review the Tolerance Range and any Facility Tolerance Ranges at least annually; and
- (b) vary the Tolerance Range and any Facility Tolerance Ranges following this review, if required.

The review has indicated no reason for AEMO to vary the existing Tolerance Range.

The review documents, including this paper, are available at <https://www.aemo.com.au/Electricity/Wholesale-Electricity-Market-WEM/Data/Tolerance-ranges>.

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1. PURPOSE

This paper documents the process conducted by the Australian Energy Market Operator (AEMO) to review the current Tolerance Range and any Facility Tolerance Ranges under the Wholesale Electricity Market Rules (WEM Rules) for 2022.

The relevant WEM Rule requirements are detailed in Section 2, with the current Tolerance Range and any Facility Tolerance Ranges specified in Section 3.

Sections 4.1 and 4.2 describe the review process and Section 4.7 details the outcome of the review.

2. WEM RULE REQUIREMENTS

Clause 2.13.6G of the WEM Rules states:

AEMO must review the Tolerance Range and any Facility Tolerance Ranges at least annually. AEMO may vary the Tolerance Range and any Facility Tolerance Ranges following this review.

Clause 2.13.6D of the WEM Rules states:

AEMO may determine the Tolerance Range to apply to all Facilities for the purpose of AEMO's reporting of alleged breaches of clause 7.10.1 and section 3.21 to the Economic Regulation Authority under clause 2.13.6A. When determining the appropriate Tolerance Range to apply for all Market Participants, AEMO must:

- (a) consult with Rule Participants prior to setting the Tolerance Range; and*
- (b) publish on the Market Web Site at least 14 Business Days prior to the date from which change to the Tolerance Range becomes effective, the following:*
 - (i) all submissions received from Rule Participants;*
 - (ii) the Tolerance Range; and*
 - (iii) an effective date for the commencement of the Tolerance Range.*

Clause 2.13.6E of the WEM Rules states:

AEMO may determine a Facility Tolerance Range to apply to a specific generation Facility. A Facility Tolerance Range will apply for a specific generation Facility in place of the Tolerance Range determined under clause 2.13.6D. When determining the Facility Tolerance Range to apply for the specific generation Facility, AEMO must:

- (a) consult with Market Participants prior to setting the Facility Tolerance Range; and*
- (b) publish on the Market Web Site at least 14 Business Days prior to the date from which any changes to the Facility Tolerance Range become effective the following:*
 - (i) the reasons for AEMO's decision;*
 - (ii) any submissions received from Market Participants;*
 - (iii) the applicable Facility Tolerance Range; and*
 - (iv) an effective date for the commencement of the applicable Facility Tolerance Range.*

3. CURRENT TOLERANCE RANGE AND FACILITY TOLERANCE RANGES

The current Tolerance Range, as determined by AEMO in July 2018, is:

For Scheduled Generators:

$$TR \text{ (MW)} = (+/-) \text{ MAX } (6, \text{ MIN } [5\% \text{ NPC}, 4*RR])$$

Where:

- *NPC* is the nameplate capacity of the Scheduled Generator, expressed in MW, using the value set in Standing Data **[Appendix 1(b)(ii)]**; and
- *RR* is the ramp rate of the Scheduled Generator, expressed in MW/min, using the value set in Standing Data **[Appendix 1(b)(v)]**.

(a) For Non-Scheduled Generators:

$$TR \text{ (MW)} = (+) 6$$

(b) For Demand Side Programmes:

$$TR \text{ (MW)} = (+) \text{ MAX } (6, 5\% \text{ MCL})$$

Where:

- *MCL* is the maximum amount of load that can be curtailed by the Demand Side Programme, expressed in MW, using the value set in Standing Data **[Appendix 1(h)(iii)]**.

(c) For all other Facilities:

$$TR \text{ (MW)} = 0$$

There are no current Facility Tolerance Ranges.

4. REVIEW OF THE TOLERANCE RANGE FOR 2022

4.1. Requirements of review

4.1.1. Tolerance Range

Step 3.2.1 of the PSOP: Tolerance Range requires that the factors AEMO must consider in reviewing the Tolerance Range include, but are not limited to:

- (a) Any submissions received from Rule Participants.
- (b) The number and extent of historical deviations from Dispatch Instructions.
- (c) The likely impacts of deviations from Dispatch Instructions on the standard for Load Following Service.
- (d) Any other circumstances or information that AEMO considers relevant.

4.1.2. Facility Tolerance Range

Clause 2.13.6E of the WEM Rules states that AEMO may determine a Facility Tolerance Range to apply to a specific generation Facility.

Step 3.3.1 of the PSOP: Tolerance Range states that the factors that AEMO must consider in reviewing whether a Facility Tolerance Range should apply to a specific Facility include, but are not limited to, one or more of the following:

- (a) AEMO has revised the Tolerance Range and a Market Participant provides evidence that it would be inappropriate to apply the Tolerance Range to one of its Registered Facilities.
- (b) Any submissions received from Market Participants.
- (c) The number and extent of historical deviations from Dispatch Instructions.

- (d) The likely impacts of deviations from Dispatch Instructions on the standard for Load Following Service.
- (e) Any other circumstances that AEMO considers relevant.

AEMO reviews whether a Facility Tolerance Range should apply to a specific generation Facility as part of the annual review of the Tolerance Range. In general, a Facility Tolerance Range is not applicable unless:

- (a) A Market Participant submits evidence that it would be inappropriate to apply the Tolerance Range to one of its Registered Facilities.
- (b) The review of the Tolerance Range indicates that the Tolerance Range as applied to a specific Registered Facility does not adequately consider the ramping behaviour of that Registered Facility.

4.2. Basis of review

AEMO has reviewed the Tolerance Range as it applies to all Facilities in line with:

- (a) Any submissions received from Rule Participants.
- (b) Step 2.1.2 of the PSOP: Tolerance Ranges (the Tolerance Range Objectives) which requires that the Tolerance Range is set having regard to:
 - (i) The degree of compliance with Dispatch Instructions and Operating Instructions that is required to ensure the SWIS operates in a secure and reliable manner.
 - (ii) The degree of costs imposed on Market Participants as a result of AEMO's monitoring of compliance with Dispatch Instructions and Operating Instructions.
 - (iii) The degree of operational impost on Market Participants for non-significant deviations.
- (c) Changing conditions in the South West Interconnected system (SWIS).

Assessment against the Tolerance Range Objectives will also detail the following factors identified in section 4.1.1:

- (a) The number and extent of historical deviations from Dispatch Instructions.
- (b) The likely impacts of deviations from Dispatch Instructions on the standard for LFAS.

4.3. Submissions received from Rule Participants

Step 3.1.3. of the PSOP: Tolerance Range provides that, at any time, Rule Participants may provide submissions regarding the Tolerance Range, and Market Participants may provide submissions regarding any Facility Tolerance Ranges. AEMO must consider any issues raised from these submissions.

AEMO has not received any submissions from Rule Participants since the last review.

4.4. Assessment against the Tolerance Range Objectives

4.4.1. Compliance with Dispatch Instructions and Operating Instructions

WEM Rule 7.10.1 requires each Market Participant to comply with the most recently issued Dispatch Instruction or Operating Instruction applicable to its Registered Facility for the Trading Interval, and WEM Rule 7.10.5 requires AEMO to monitor all Facilities for compliance with WEM Rule 7.10.1.

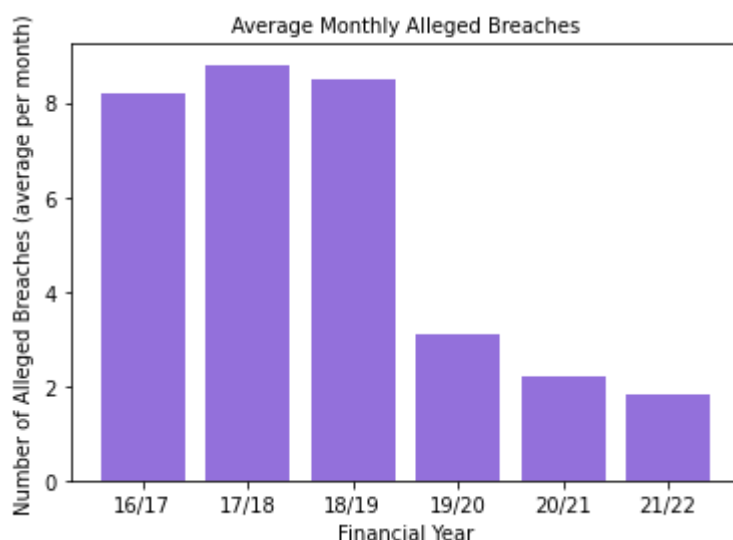
WEM Rules 2.13.6B and 2.13.8 require AEMO to report an alleged breach by a Market Participant of WEM Rule 7.10.1 to the Economic Regulation Authority where:

- (a) the extent of the alleged breach exceeds the Tolerance Range or the Facility Tolerance Range for that Facility; and
- (b) the alleged breach exceeds a single Trading Interval.

The quantity of those alleged compliance breaches reflects the degree to which Facilities did not operate as expected, which may have impacted AEMO's ability to ensure that the SWIS operated in a secure and reliable manner.

A year-on-year change in the quantity of alleged breaches may indicate that Market Participant behaviour, in aggregate, has varied and that the existing Tolerance Range may no longer be appropriate. Error! Reference source not found. shows the average quantity of alleged breaches per month.

Figure 1 Average monthly alleged breaches



The quantity of alleged non-compliance with WEM Rule 7.10.1 does not indicate that the existing Tolerance Range is inappropriate.

4.4.2. Costs imposed on Market Participants as a result of AEMO's monitoring of compliance

AEMO monitors compliance with WEM Rule 7.10.1 every minute and provides warning notifications to the relevant Rule Participant where the variance exceeds the Tolerance Range or the Facility Tolerance Range. The Market Participant must then return to the Dispatch Instruction level and may be required to provide an explanation.

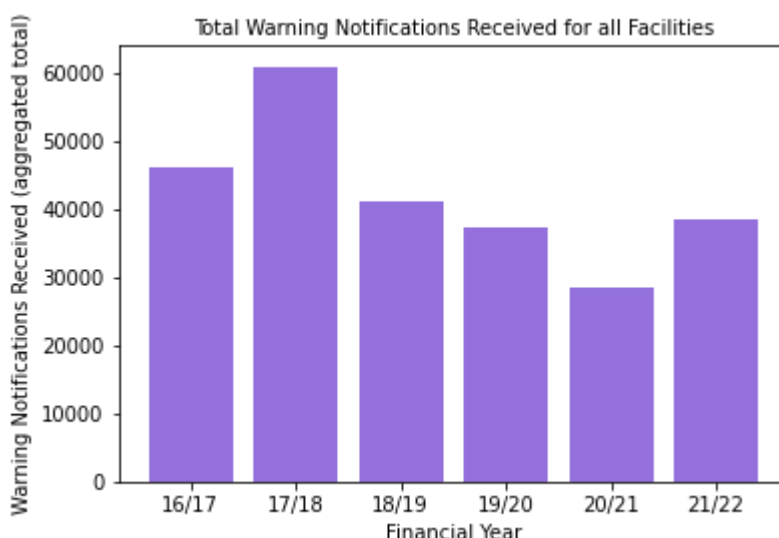
AEMO has assessed the quantity of these notifications, along with the number of alleged breaches detailed in section 4.4.1, as a proxy for the costs imposed on Market Participants as a result of AEMO's monitoring of compliance.

By design, the number of notifications will always far exceed the number of breaches alleged by AEMO¹. A significant year-on-year change in the quantity of these notifications may indicate that Market Participant behaviour has varied and that the existing Tolerance Range may no longer be appropriate.

¹ See section 4.4.1 for a discussion of what constitutes a non-compliance of WEM Rule 7.10.1.

Figure 2 shows the total warning notifications received for all Facilities.

Figure 2 Total warning notifications received for all Facilities



AEMO investigates each warning as a part of its compliance review process. In some cases, the data may represent:

- SCADA issues affecting the Facility;
- the operating duration of the Facility; and
- the operation of the Facility.

Trend of warning notifications as a result of non-compliance with WEM Rule 7.10.1 has not increased significantly year-on-year since Financial Year 2017/2018, and therefore this measure does not indicate that the existing Tolerance Range is inappropriate.

4.4.3. Operational impost on Market Participants for non-significant deviations

Non-significant deviations are variations that do not exceed the Tolerance Range. A significant increase in the quantity of these deviations will place an impost on LFAS and may increase the LFAS requirement, thereby increasing impost on Market Participants. For example, the general threshold of all Tolerance Ranges is 6 MW. If there were a significant number of deviations at the 5 MW level, this would indicate Market Participant behaviour to deviate from Dispatch Instructions to the extent possible within the Tolerance Range, which would increase the impost on LFAS.

AEMO has assessed the operational impost count, which is the impost of non-significant deviations for each Trading Interval by comparing the variation in each Facility's Metered Schedule from the Theoretical Energy Schedule (TES)². TES is calculated for each Trading Interval based on Facility Standing Data and the Balancing Merit Order (BMO) for that interval, and active constraints are not included as part of this calculation. AEMO identified all instances where the Facility's metered quantity was:

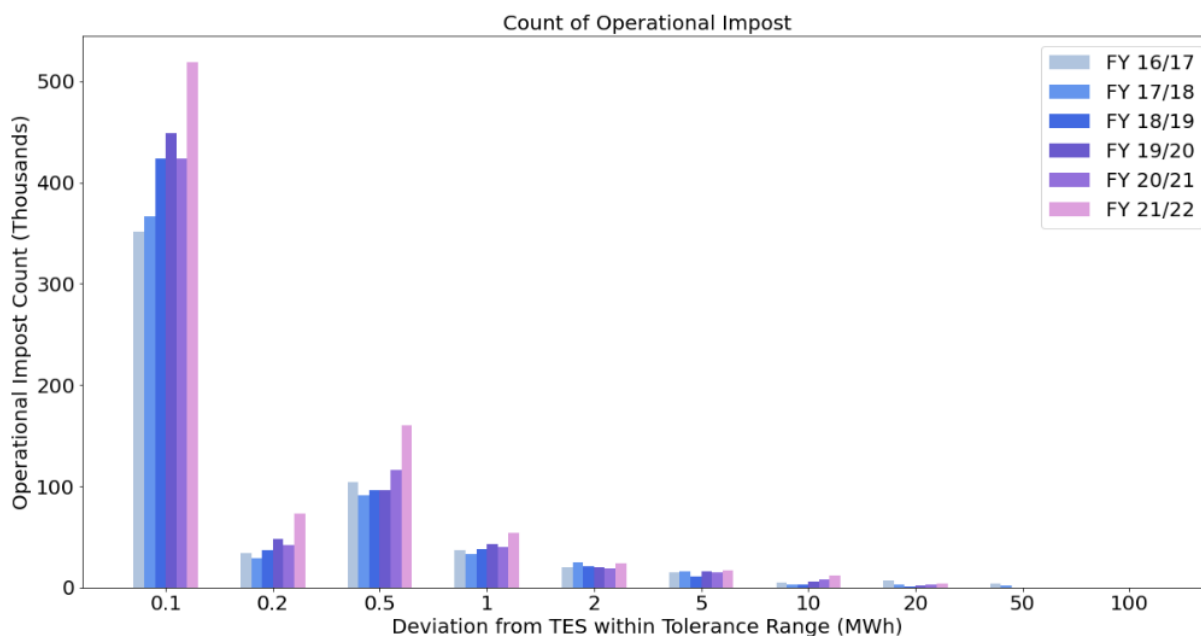
- within the Tolerance Range; and
- above the Facility's Maximum TES or below than the Facility's Minimum TES.

² For further information see the *Theoretical Energy Schedule FAQ*. Available at: https://www.aemo.com.au/-/media/Files/PDF/aemo--theoretical-energy-schedule-faq_v16450963f29c46dc8b2c9ff0000bd36b5.pdf

AEMO considers that a year-on-year change in the quantity of instances may indicate that Rule Participant behaviour has varied and that the existing Tolerance Range may no longer be appropriate.

Figure 3 shows the results of this analysis for Financial Years 2016/17 to 2021/22.

Figure 3 Count of operational impost³



As the vast majority of deviations during these Financial Years were less than 0.5 MWh, this measure does not indicate that the existing Tolerance Range is inappropriate.

4.5. Changes to the South West Interconnected system

A variation in the SWIS may require AEMO to vary, as appropriate, the Tolerance Range.

The SWIS has changed with the introduction of further rooftop PV and Non-Scheduled Generators. However, AEMO is managing these impacts through varying the LFAS requirements and other measures. As such, these changes to the SWIS are not fundamentally impacting AEMO's approach to determining the Tolerance Range at this stage.

4.6. Outcome of assessment

AEMO concludes that the year-on-year impacts of:

- (a) Compliance with Dispatch Instructions and Operating Instructions;
- (b) Costs imposed on Market Participants as a result of AEMO's monitoring of compliance; and
- (c) Operational impost on Market Participants for non-significant deviations;

are non-significant and provide no indication that the existing Tolerance Range formula should be varied.

³ Variance between this figure published in previous Tolerance Range Review Papers and the figure in this review paper is a result of rounding, data cleansing and other similar factors.

4.7. Outcome of review

AEMO has concluded to not vary the current determination of the Tolerance Range. In addition, AEMO has not identified any need for new Facility Tolerance Ranges.

APPENDIX A. WARNING NOTIFICATIONS RECEIVED BY FACILITY

Table 1 Warning notifications received by Facility⁴

Facility	Notifications					
	FY16/17	FY17/18	FY18/19	FY19/20	FY20/21	FY21/22
Facility 1	5569	5594	8645	1662	411	4691
Facility 2	10187	18412	9256	14281	5905	6486
Facility 3	6590	8402	7413	2603	1932	3234
Facility 4	1836	1638	3417	2601	3172	430
Facility 5	1377	1900	2043	4989	2406	467
Facility 6	392	242	5	17	13	11
Facility 7	0	0	86	142	523	1226
Facility 8	1	0	0	0	0	0
Facility 9	2200	2142	1551	1102	2603	7108
Facility 10	3091	2262	1180	1332	3596	5684
Facility 11	0	2571	20	166	211	6
Facility 12	0	0	0	1	45	0
Facility 13	0	60	0	116	46	3
Facility 14	23	125	0	0	0	0
Facility 15	5427	0	0	0	0	0
Facility 16	0	45	77	493	1661	1841
Facility 17	0	0	0	0	43	70
Facility 18	384	4	0	0	0	0
Facility 19	504	4	0	0	0	0
Facility 20	541	0	0	0	0	0
Facility 21	733	4	0	0	0	0
Facility 22	164	34	0	9	13	1
Facility 23	40	300	132	15	120	134
Facility 24	811	846	643	1493	1051	1381
Facility 25	491	389	21	507	109	169
Facility 26	0	0	200	0	0	0
Facility 27	2576	4300	4772	2916	1061	1305
Facility 28	42	501	447	964	1472	1538
Facility 29	0	1	0	0	0	0
Facility 30	0	0	0	0	0	102
Facility 31	0	5397	0	0	0	0

⁴ Facility names are not specified as this information is Rule Participant Market Restricted. For more information, refer to the information confidentiality status of WEM related information and documents available at <https://aemo.com.au/-/media/files/electricity/wem/data/confidentiality-status-publication7ae2953f29c46dc8b2c9ff0000bd36b5.pdf>

Facility	Notifications					
	FY16/17	FY17/18	FY18/19	FY19/20	FY20/21	FY21/22
Facility 32	671	810	955	1436	612	970
Facility 33	2	1	0	0	0	0
Facility 34	0	0	0	0	120	0
Facility 35	0	0	0	0	7	5
Facility 36	9	0	0	0	0	90
Facility 37	0	0	0	0	3	0
Facility 38	2401	4862	332	450	1006	370
Facility 39	0	0	0	0	163	547
Facility 40	0	0	0	0	117	672
Total	46062	60846	41195	37295	28421	38541