

WEM Procedure: Adjustment of Real-Time Inputs

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IMPORTANT NOTICE – EXPLANATORY NOTES

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1. Introduction

1.1. Purpose and scope

- 1.1.1. This WEM Procedure: Adjustment of Real-Time Inputs (Procedure) is made in accordance with AEMO's functions under clause 2.1A.2(h) of the Wholesale Electricity Market Rules (WEM Rules).
- 1.1.2. The *Electricity Industry Act 2004* (WA), the WEM Regulations and the WEM Rules prevail over this Procedure to the extent of any inconsistency.
- 1.1.3. In this Procedure, where obligations are conferred on a Rule Participant, that Rule Participant must comply with the relevant obligations in accordance with clause 2.9.7A, 2.9.7D or 2.9.8 of the WEM Rules, as applicable.
- 1.1.4. The purpose of this Procedure is to document:
- the information and processes, including the application of any formulae, AEMO will use in making a determination under clause 7.4.52; and
 - the circumstances in which AEMO will adjust the inputs specified in clause 7.4.52 **[Clause 7.4.53]**.
- 1.1.5. Appendix A of this Procedure outlines the head of power clauses that this Procedure is made under, as well as other obligations in the WEM Rules covered by this Procedure.

1.2. Definitions

- 1.2.1. Terms defined in the *Electricity Industry Act 2004* (WA), the WEM Regulations and the WEM Rules have the same meanings in this Procedure unless the context requires otherwise.
- 1.2.2. The following definitions apply in this Procedure unless the context requires otherwise.

Table 1 Definitions

Term	Definition
ESS Trapezium	The Constraints formed by WEMDE using the Enablement Minimum, Low Breakpoint, High Breakpoint, Enablement Maximum, and the sum of the In-Service Capacity of a given Essential System Service
SCADA	Supervisory Control and Data Acquisition used to describe telemetry and associated real-time control/indication functions.
SCADA-telemetered Downward Ramp Rate Limit	Values provided by a Registered Facility to AEMO via SCADA (or another medium approved by AEMO), indicating the Maximum Downwards Ramp Rate of the Registered Facility in real-time.
SCADA-telemetered High Limit	A value provided by a Registered Facility to AEMO via SCADA (or another medium approved by AEMO), indicating the maximum dispatchable quantity in MW of the Registered Facility in real-time.
SCADA-telemetered Low Limit	A value provided by a Registered Facility to AEMO via SCADA (or another medium approved by AEMO), indicating the minimum dispatchable quantity in MW of the Registered Facility in real-time.
SCADA-telemetered Upward Ramp Rate Limit	Values provided by a Registered Facility to AEMO via SCADA (or another medium approved by AEMO), indicating the Maximum Upwards Ramp Rate of the Registered Facility in real-time.
Wholesale Electricity Market Dispatch Engine (WEMDE)	The software that AEMO uses to solve the Dispatch Algorithm

Term	Definition
Primary Dispatch Interval	The first Dispatch Interval in a Dispatch Schedule, from which operative Dispatch Instructions and Market Clearing Prices are determined.

1.3. Interpretation

1.3.1. The following principles of interpretation apply in this Procedure unless the context requires otherwise.

- (a) Clauses 1.3 to 1.5 of the WEM Rules apply in this Procedure.
- (b) References to time are references to Australian Western Standard Time.
- (c) Terms that are capitalised, but not defined in this Procedure, have the meaning given in the WEM Rules.
- (d) A reference to the WEM Rules or WEM Procedures includes any associated forms required or contemplated by the WEM Rules or WEM Procedures.
- (e) Words expressed in the singular include the plural and vice versa.
- (f) A reference to a paragraph refers to a paragraph of this Procedure.
- (g) A reference to a clause refers to a clause or section of the WEM Rules.
- (h) References to WEM Rules in this Procedure in bold and square brackets **[Clause XXX]** are included for convenience only, and do not form part of this Procedure.
- (i) Text located in boxes and headed as Explanatory Note X in this Procedure is included by way of explanation only and does not form part of this Procedure. The Procedure prevails to the extent of any inconsistency with the explanatory notes contained within it. The body of this Procedure prevails to the extent of any inconsistency with the figures, diagrams, appendices, schedules, annexures or attachments contained within this document.
- (j) Measurements are specified using the International System of Units with the following symbols:
 - (i) MW: megawatts

1.4. Related documents

1.4.1. The documents in Table 2 are associated with this Procedure.

Table 2 Related documents

Reference	Title	Location
WEM Procedure	WEM Procedure: Dispatch Algorithm Formulation	AEMO Website

2. Scaling ESS trapezia to technical limits

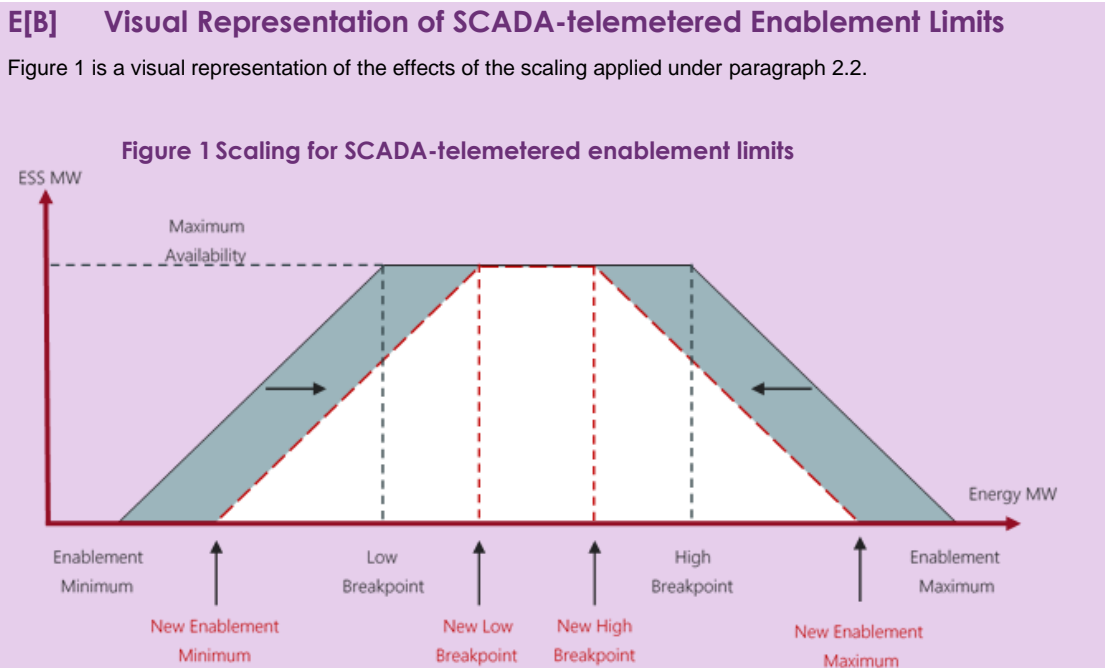
2.1. Rationale and Process for Scaling ESS Trapezia

- 2.1.1. AEMO will treat any SCADA-telemetered Low Limits, SCADA-telemetered High Limits, and SCADA-telemetered Ramp Rate Limits, provided by a Registered Facility, as the most accurate representation of a Registered Facility's capabilities.
- 2.1.2. AEMO will adjust the Enablement Minimum, Low Breakpoint, High Breakpoint, and Enablement Maximum for any Essential System Services that a Registered Facility has included in its Effective Real-Time Market Submission in accordance with paragraphs 2.2, 2.3, and 2.4.
- 2.1.3. Where the prerequisites for more than one of the forms of scaling set out in paragraphs 2.2, 2.3, and 2.4 are met, AEMO will use the most restrictive values for Enablement Minimum, Low Breakpoint, High Breakpoint, and Enablement Maximum determined under these paragraphs.
- 2.1.4. The logic for the adjustments set out in paragraphs 2.2, 2.3, and 2.4 is only applied to the Primary Dispatch Interval, and is not applied to Pre-Dispatch Intervals in the Pre-Dispatch Schedule or Week-Ahead Schedule.

E[A] Note on paragraph 2.1

The result of paragraph 2.1.4 is that if there is a significant difference between a parameter in a Registered Facility's Effective Real-Time Market Submission, and a parameter provided via SCADA. The indicative dispatch outcomes from future Dispatch Intervals and Pre-Dispatch Intervals produced by WEMDE for that Facility will not be accurate. It is intended that the adjustments in this Procedure are an additional measure to reflect changes that occur in near to real-time, before a Market Participant has an opportunity to make an updated Real-Time Market Submission. The adjustments in this Procedure are not intended to be used as a measure for reflecting a Registered Facility's technical limitations in the Dispatch Algorithm ahead of time and are a short-term measure only.

2.2. Scaling for SCADA-telemetered enablement limits



- 2.2.1. For each Essential System Service included in a Registered Facility's effective Real-Time Market Submission, AEMO will set the Enablement Minimum for that Essential System Service to the greater of:
- the Enablement Minimum provided in the effective Real-Time Market Submission under clause 7.4.41(d) or 7.4.42(b) of the WEM Rules; and
 - the SCADA-telemetered Low Limit.
- 2.2.2. For each Essential System Service included in a Registered Facility's effective Real-Time Market Submission, AEMO will set the Enablement Maximum for that Essential System Service to the lesser of:
- the Enablement Maximum provided in the effective Real-Time Market Submission under clause 7.4.41(g) or 7.4.42(e) of the WEM Rules; and
 - the SCADA-telemetered High Limit.
- 2.2.3. For each Essential System Service included in a Registered Facility's Effective Real-Time Market Submission:
- Where AEMO has applied scaling to the Enablement Minimum to reduce it to the value of the SCADA-telemetered Low Limit under paragraph 2.2.1, AEMO will adjust the Low Breakpoint value LB_{adj} to:

$$LB_{adj} = LB_{RTMS} + LL - EMin_{RTMS}$$

Where:

- LB_{RTMS} is the Low Breakpoint value provided in the effective Real-Time Market Submission;
- LL is the SCADA-telemetered Low Limit;

- $EMin_{RTMS}$ is the Enablement Minimum value provided in the effective Real-Time Market Submission.
- (b) Where AEMO has applied scaling to the Enablement Maximum to reduce it to the value of the SCADA-telemetered High Limit under paragraph 2.2.2, AEMO will adjust the High Breakpoint value HB_{adj} to:

$$HB_{adj} = HB_{RTMS} + HL - EMax_{RTMS}$$

Where:

- HB_{RTMS} is the High Breakpoint value provided in the effective Real-Time Market Submission;
 - HL is the SCADA-telemetered High Limit;
 - $EMax_{RTMS}$ is the Enablement Maximum value provided in the effective Real-Time Market Submission.
- 2.2.4. For each Essential System Service included in a Registered Facility's effective Real-Time Market Submission, if the SCADA-telemetered Low Limit is greater than the SCADA-telemetered High Limit, AEMO will not apply the adjustments calculated in paragraphs 2.2.1, 2.2.2, and 2.2.3, and the Enablement Minimum, Low Breakpoint, High Breakpoint, and Enablement Maximum values will revert to the values offered in the effective Real-Time Market Submission for the Essential System Service.

E[C] Note on paragraph 2.2.4

Note that the SCADA-telemetered Low Limit should always be less than or equal to the SCADA-telemetered High Limit. However, paragraph 2.2.4 is included in case system errors or communication delays mean this is not true at the time of dispatch.

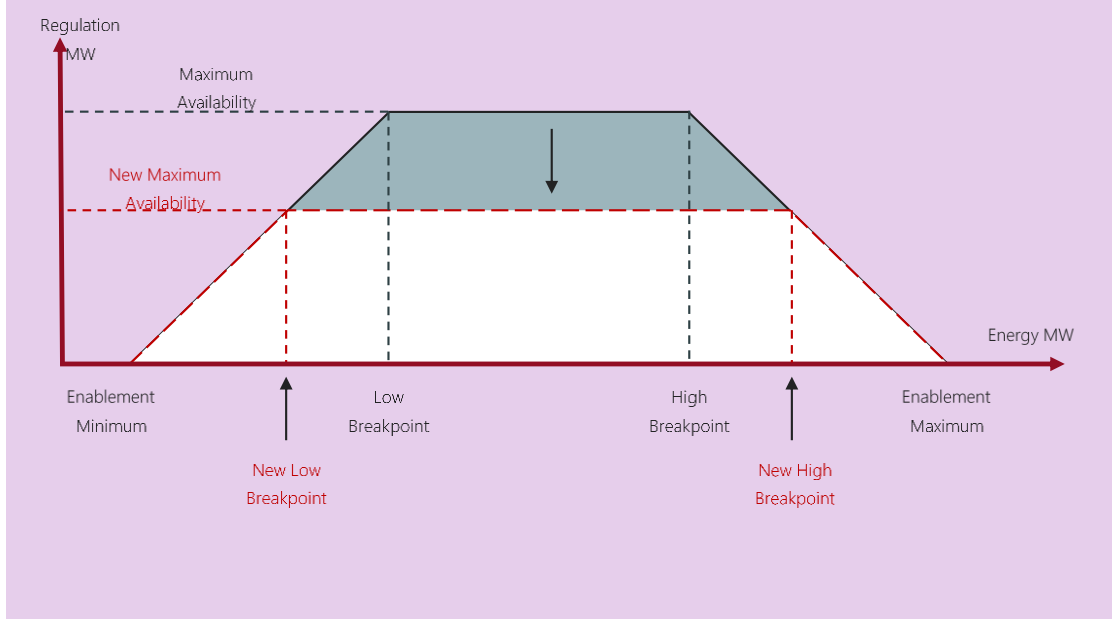
2.3. Scaling for SCADA-telemetered Ramp Rate Limits

E[D] Visual Representation of SCADA-telemetered Ramp Rate Limits

Note that Maximum Upwards Ramp Rate and Maximum Downwards Ramp Rate are both non-negative numbers. Unlike other modifications undertaken in this Procedure, changes to ramp rates are accounted for within the WEMDE formulation of Essential System Service constraints, so no explicit scaling or changes are required in addition to the variation of ramp rate.

Figure 2 is a visual representation of the scaling applied under paragraph 2.3.

Figure 2 Essential System Service trapezium scaling for SCADA-telemetered Ramp Rate Limits



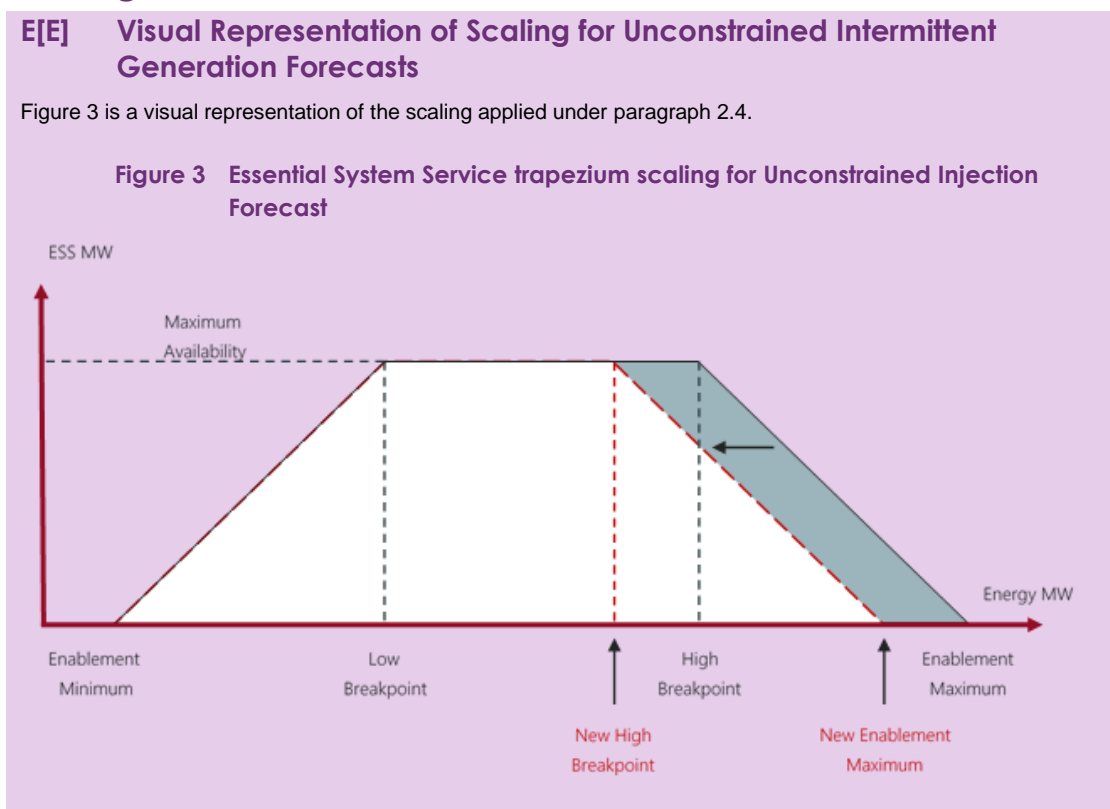
2.3.1. For each Essential System Service included in a Registered Facility's effective Real-Time Market Submission, AEMO will set the effective Maximum Upwards Ramp Rate for that Essential System Service to the lesser of:

- (a) the Maximum Upwards Ramp Rate provided in the effective Real-Time Market Submission; and
- (b) the SCADA-telemetered Maximum Upwards Ramp Rate.

2.3.2. For each Essential System Service included in a Registered Facility's effective Real-Time Market Submission, AEMO will set the effective Maximum Downwards Ramp Rate for that Essential System Service to the greater of:

- (a) The Maximum Downwards Ramp Rate provided in the effective Real-Time Market Submission; and
- (b) the SCADA-telemetered effective Maximum Downwards Ramp Rate.

2.4. Scaling for Unconstrained Forecasts



- 2.4.1. For each Essential System Service included in a Registered Facility's effective Real-Time Market Submission, AEMO will set the Enablement Minimum for that Essential System Service to the greater of:
- the Enablement Minimum provided in the effective Real-Time Market Submission; and
 - the Unconstrained Withdrawal Forecast
- 2.4.2. For each Essential System Service included in a Registered Facility's effective Real-Time Market Submission, AEMO will set the Enablement Maximum for that Essential System Service to the lesser of:
- the Enablement Maximum provided in the effective Real-Time Market Submission; and
 - the Unconstrained Injection Forecast
- 2.4.3. For each Essential System Service included in a Registered Facility's effective Real-Time Market Submission:
- Where AEMO has applied scaling to the Enablement Maximum under paragraph 2.4.2, AEMO will adjust the High Breakpoint value HB_{adj} to:

$$HB_{adj} = HB_{RTMS} + UIF - EMax_{RTMS}$$

Where:

- HB_{RTMS} is the High Breakpoint value provided in the effective Real-Time Market Submission;
- $EMax_{RTMS}$ is the Enablement Maximum value provided in the effective Real-Time Market Submission;

- UIF is the Unconstrained Injection Forecast value.

- (b) Where AEMO has applied scaling to the Enablement Maximum under paragraph 2.4.2, AEMO will adjust the Low Breakpoint value LB_{adj} to:

$$LB_{adj} = MIN[LB_{RTMS}, HB_{adj}]$$

Where:

- LB_{RTMS} is the Low Breakpoint value provided in the effective Real-Time Market Submission;
- HB_{adj} is the adjusted High Breakpoint value determined under paragraph 2.4.3(a).

- (c) Where AEMO has applied scaling to the Enablement Minimum under paragraph 2.4.1, AEMO will adjust the Low Breakpoint value LB_{adj} to:

$$LB_{adj} = LB_{RTMS} + UWF - EMin_{RTMS}$$

Where:

- LB_{RTMS} is the Low Breakpoint value provided in the effective Real-Time Market Submission;
- $EMin_{RTMS}$ is the Enablement Minimum value provided in the effective Real-Time Market Submission;
- UWF is the Unconstrained Withdrawal Forecast value.

- (d) Where AEMO has applied scaling to the Enablement Minimum under paragraph 2.4.1, AEMO will adjust the High Breakpoint value HB_{adj} to:

$$HB_{adj} = MAX[HB_{RTMS}, LB_{adj}]$$

Where:

- HB_{RTMS} is the High Breakpoint value provided in the effective Real-Time Market Submission;
- LB_{adj} is the adjusted High Breakpoint value determined under paragraph 2.4.3(a).

Appendix A. Relevant clauses of the WEM Rules

Table 3 details:

- (a) the head of power clauses in the WEM Rules under which the Procedure has been developed; and
- (b) each clause in the WEM Rules requiring an obligation, process or requirement be documented in a WEM Procedure, where the obligation, process or requirement has been documented in this Procedure.

Table 3 Relevant clauses of the WEM Rules

Clause
7.4.53(a)
7.4.53(b)

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