

WEM PROCEDURE: LIMIT ADVICE REQUIREMENTS

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Approved for distribution and use by:

APPROVED BY: Cameron Parrotte
TITLE: Executive General Manager – Western Australia

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1 PROCEDURE OVERVIEW

1.1 Relationship with the Wholesale Electricity Market Rules

- 1.1.1 This WEM Procedure: Limit Advice Provision (Procedure) is made in accordance with AEMO's functions under clause 2.1A.2(h) of the Wholesale Electricity Market Rules (WEM Rules). This Procedure is also made in accordance with clause 2.27A.10 and clause 1.33.1 of the WEM Rules.
- 1.1.2 This purpose of this Procedure is to outline:
- (a) In respect of the information to be provided by a Network Operator to AEMO under clause 2.27A.2 of the WEM Rules,
 - (i) the information and data to be provided by a Network Operator to AEMO; and
 - (ii) the processes to be followed for the provision of and updates to such information and any other information referred to in clause 2.27A.4 of WEM Rules from each Network Operator to AEMO, 1. including the format, form, manner in which such information must be provided; and 2. where these Market Rules do not provide a timeframe for the provision of such information to AEMO, the time by which such information must be provided [Clause 2.27A.10(a)].
 - (b) Any other processes or procedures relating to Constraints or Network congestion that AEMO considers are reasonably required to enable it to carry out its functions under the Market Rules [Clause 2.27A.10(d)].
- 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 clauses 2.9.7, 2.9.7A, and 2.9.8 of the WEM Rules, as applicable.
- 1.1.4 References to WEM Rules within this Procedure in bold and square brackets [clause XX] are included for convenience only and are not part of this Procedure.
- 1.1.5 Text located in boxes within this Procedure is included by way of explanation only and does not form part of this Procedure.

1.2 Definitions and interpretation

- 1.2.1 Terms defined in the WEM Rules have the same meanings in this Procedure unless otherwise specified in this clause. The words, phrases and abbreviations in the table below have the meanings set out opposite them when used in this Procedure.

Table 1 Defined Terms

Term	Definition
EMS	Energy Management System
IT	Information Technology
Left Hand Side	Terms on the left hand side of the Constraint Equation, as defined in WEM Procedure: Constraint Formulation.
NRS	Network Reinforcement Scheme such as a runback scheme or inter-tripping scheme.

- 1.2.2 The following principles of interpretation apply to this Procedure unless otherwise expressly indicated:
- (a) references to time are references to Australian Western Standard Time.
 - (b) terms that are capitalised, but not defined in this Procedure, have the meaning given in the WEM Rules.
 - (c) the WEM Rules prevail to the extent of any inconsistency with this Procedure.
 - (d) a reference to the WEM Rules or WEM Procedures includes any associated forms required or contemplated by the WEM Rules or Market Procedures.
 - (e) words expressed in the singular include the plural and vice versa.
 - (f) conventions in clauses 1.3 to 1.4 of the WEM Rules apply to this Procedure.
 - (g) a reference to paragraph refers to a paragraph of this Procedure.

1.3 Related documents

The following documents in Table 2 provide background information to this Procedure.

Table 1 **Background documents**

Reference	Title	Location
	WEM Rules	Economic Regulation Authority (ERA) website
Technical Rules	Technical Rules	Economic Regulation Authority (ERA) website
SO_OP_WA_3805	IMS Interface WEM Procedure – Network Operators and AEMO	WEM Web Site
SO_OP_WA_3808	WEM Procedure: Power System Security	WEM Web Site
SO_OP_WA_3807	WEM Procedure: Network Modelling Data	WEM Web Site
TBA	WEM Procedure: Constraint Formulation	WEM Web Site
TBA	WEM Procedure: Development of Limit Advice	WEM Web Site
TBA	WEM Procedure: Congestion Information Resource	WEM Web Site

2 THERMAL LIMIT ADVICE REQUIREMENTS

E[A] Equipment thermal limits

E[A2] Background

E[A2.1] Equipment thermal limits are required to be provided by Network Operators to support real-time contingency monitoring in AEMO's EMS under the WEM Procedure: Network Modelling Data. These thermal limits should be as aligned as possible with the Constraints used as part of the central dispatch process to avoid real-time operator intervention. Therefore, AEMO will utilise information, provided by Network Operators on thermal limits for the purposes of EMS modelling, as thermal Limit Advice, to support development of thermal Network Constraints.

2.1 Format, Form and Manner

2.1.1 Network Operators must provide thermal Limit Advice to AEMO in accordance with the format, form and manner specified in

- (a) WEM Procedure: Network Modelling Data; and
- (b) IMS Interface WEM Procedure – Network Operators and AEMO;

and within the timeframe outlined in paragraph 2.2 of this Procedure.

2.2 Timeframe

2.2.1 For existing equipment, a relevant Network Operator must provide an updated thermal Limit Advice to AEMO in accordance with paragraph 2.1 as soon as practicable after the Network Operator forms a view that the current thermal Limit Advice is no longer complete, current and/or accurate.

2.2.2 For new equipment, Network Operators must provide thermal Limit Advice to AEMO in accordance with paragraph 2.1 at least 3 months prior to commissioning of the relevant equipment.

2.2.3 In the event an emergency or temporary thermal Limit Advice is required due to unforeseen circumstances, Network Operators must provide the relevant thermal Limit Advice to AEMO in accordance with paragraph 2.1 as soon as practically possible.

2.3 Communication

2.3.1 Network Operators must provide thermal Limit Advice in accordance with WEM Procedure: Network Modelling Data and IMS Interface WEM Procedure.

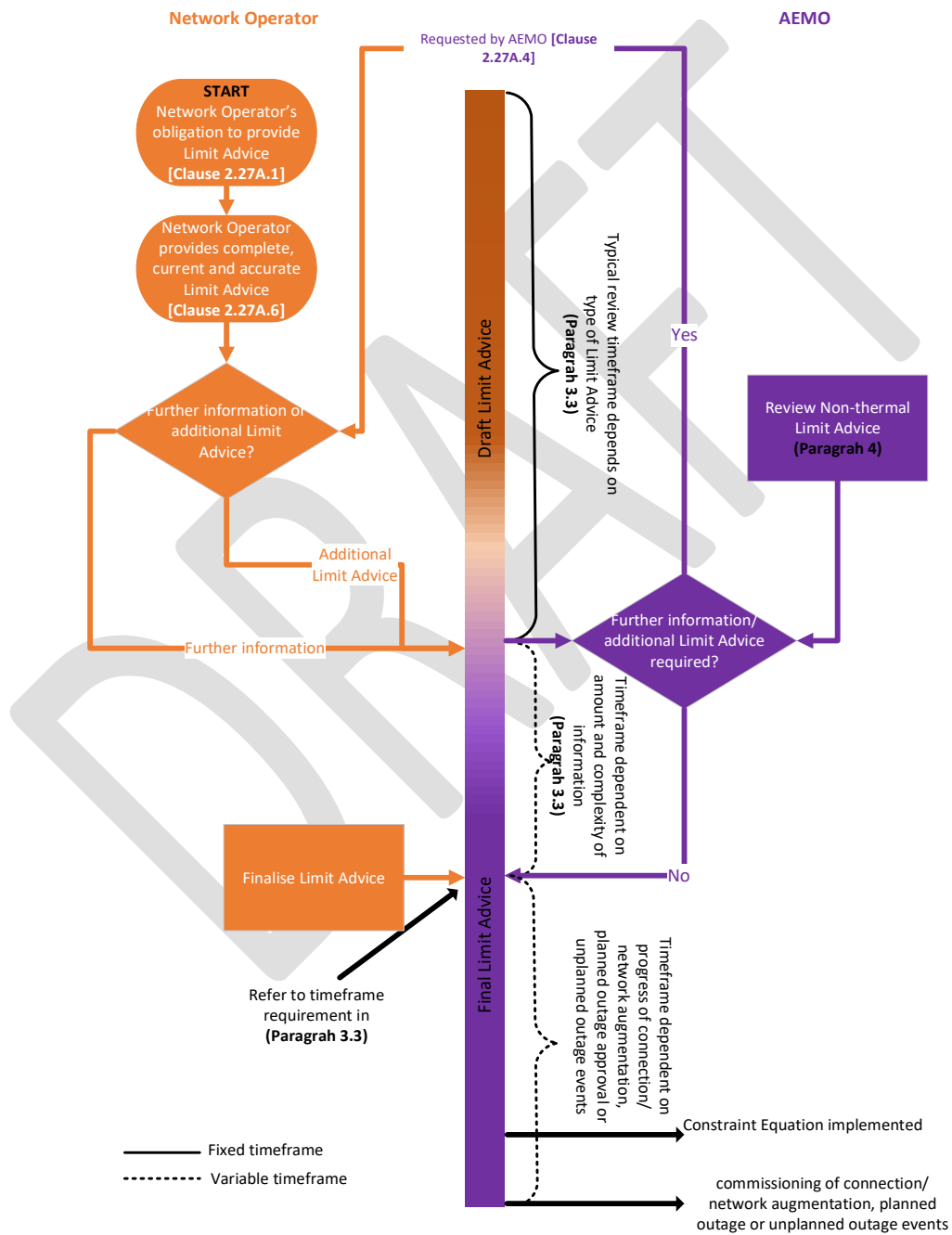
2.3.2 Network Operators must provide thermal Limit Advice to AEMO via an agreed shared location.

3 NON-THERMAL LIMIT ADVICE REQUIREMENTS

3.1 Overview

3.1.1 The requirements for provision of non-thermal Limit Advice are described in Figure 1. References made in bold parentheses (Paragraph XX) in Figure 1 refer to paragraphs within this Procedure, while references made in bold and square brackets [clause XX] refer to clauses in the WEM Rules.

Figure 1 Non-thermal Limit Advice provision lifecycle



3.2 Format

- 3.2.1 A Network Operator must provide a non-thermal Limit Advice in the following format:
- (a) a non-thermal Limit Equation must be a mathematical equation or a constant;
 - (b) relevant graphs and tables must be provided as supporting information and data;
 - (c) a non-thermal Limit Equation must be only for a single non-thermal Network Limit type;
 - (d) the non-thermal Network Limit type must be clearly stated;
 - (e) where in relation to existing equipment, a Limit Advice must only contain constraints and other terms that are readily available via SCADA (that is, it must not reference points in the Network where there is no SCADA visibility);
 - (f) the non-thermal Limit Equation must be expressed as a linear combination of Left-Hand Side Terms¹ (refer to the WEM Procedure: Constraint Formulation);

and it must include as a minimum:

- (f) identification of the relevant SWIS computer model provided in accordance with the WEM Procedure: Network Modelling Data²;
- (g) words identifying whether it is a draft or a final non-thermal Limit Advice in accordance with Figure 1 in this Procedure;
- (h) if the Limit Advice is an updated non-thermal Limit Advice that is replacing an existing non-thermal Limit Advice, identification of any relevant existing non-thermal Limit Advice that are being replaced;
- (i) identification of any terms used in a Limit Equation, where they are in relation to new equipment and SCADA is not readily available, and indication when they will be available by;
- (j) clear definitions for all terms in the non-thermal Limit Equation. For example, what constitutes 'Eastern Goldfield Export';
- (k) a description of the contingency(s), types of fault and relevant protection fault clearance times where the non-thermal Network Limit applies;
- (l) specific conditions of the Network, including dispatch of specific Facilities, during which the non-thermal Network Limit applies in accordance with WEM Procedure: Power System Security;
- (m) specific Network conditions whereby NRS and control schemes apply;
- (n) applicable NRS and control schemes, including detail of the schemes such as monitored elements, available SCADA information, thresholds of activation of the scheme, and actions following the activation ; and the impact on the non-thermal Limit Advice where these schemes are out of service;
- (o) if applicable, specific timeframe during which the non-thermal Network Limit applies;
- (p) equipment or areas of the SWIS where the non-thermal Network Limit applies in accordance with WEM Procedure: Power System Security;

¹ This may include piecewise linearisation of non-linear Limit Equations. This Limit Advice must clearly describe the intention and justification as to why a piecewise implementation is necessary.

² This requirement refers to identifying and referencing relevant computer models provided under clause 2.28.3B(a) of the WEM Rules and in accordance with the WEM Procedure: Network Modelling Data, not re-provision of the information.

3.3 Timeframe

- 3.3.1 In its provision of non-thermal Limit Advice in relation to various purposes, a Network Operator must make provision for non-thermal Limit Advice to be finalised in accordance with the timeline in Table 2, in order to allow sufficient time for AEMO to construct the relevant Constraint Equation and/or for the final non-thermal Limit Advice to be published.
- 3.3.2 Non-thermal Limit Advice are typically related to complex power system stability and reliability limits, and the Network Operator must provide sufficient time for AEMO to carry out a review in accordance with paragraph 4 of this Procedure prior to finalisation by the Network Operator.
- 3.3.3 AEMO must use its best endeavours to review different types of non-thermal Limit Advice in accordance with the durations in Table 2:
- (a) if a Network Operator requires the non-thermal Limit Advice to be expedited, this may be agreed by AEMO on a case by case basis;
 - (b) AEMO may give consideration to additional time required due to complexity of the non-thermal Limit Advice; and
 - (c) AEMO may give consideration to delays due to out-of-date Network information and data as required under paragraph 3.2.1 of this Procedure, and the necessary requirements for further clarification, requests for further information, clarification of review outcomes and subsequent revision of non-thermal Limit Advice.
- 3.3.4 AEMO may nominate and notify a relevant Network Operator required durations for reviews of additional information by AEMO following a request for clarification and more information, depend on the amount and complexity of the information, could be up to the maximum period described in Table 2 of this Procedure.

Table 2 Typical requirement and review timeframe for different non-thermal Limit Advice

Typical lead time	Cause of non-thermal Limit Advice requirement	Circumstances of provision of non-thermal Limit Advice	Maximum Business Days to complete (from the start of review)	Timeframe of requirement for non-thermal Limit Advice to be finalised
A year or more in advance	Significant change to SWIS under normal operation, ³ due to network augmentation or reinforcement	After Network augmentation/ reinforcement has been approved for detailed design And, typically, 6 months prior to commissioning of new equipment	30 days	Typically at least 3 months prior to commissioning of new equipment
	Significant change to SWIS under normal operation, due to new connections	After Detailed Planning Data ⁴ in relation to relevant connection details becomes available to the Network Operator, And, typically, 6 months prior to commissioning of new connection	30 days	Typically, at least 3 months prior to commissioning of new connection
Months and up to a year in advance	Single Outage	As soon as practically possible after a Network Operator forms a view that a non-thermal Limit Advice is required for Outages, and typically 4 months prior to finalisation of the Limit Advice ⁵	20 days	If a Network Operator forms a view that non-thermal Limit Advice is required for Outages, non-thermal Limit Advice should be provided to AEMO for finalisation as soon as practically possible.
	Multiple Outages		20 days, and additional 2 days per Network Limit	Where in relation to Planned Outages, prior to approval of an Outage and typically 2 months prior to commencement of the Outage.

³ Examples of significant change to SWIS under normal operation include: a new generation or load connection, Network augmentations, and new Network equipment having significant impact on system normal operation.

⁴ Detailed Planning Data has the meaning given in Attachment 3 of Technical Rules.

⁵ Note that Constraint Equations for the power system under Outage conditions are typically implemented in advance and must be ready to be invoked when Outages take place. Therefore, relevant non-thermal Limit Advice must be provided as soon as practically possible, whenever a Network Operator forms a view that an updated or a new non-thermal Limit Advice is required.

Typical lead time	Cause of non-thermal Limit Advice requirement	Circumstances of provision of non-thermal Limit Advice	Maximum Business Days to complete (from the start of review)	Timeframe of requirement for non-thermal Limit Advice to be finalised
	Planned minor change to SWIS under normal operation ⁶	Typically, 3 months prior to proposed changes	Up to 20 days	Typically 1 month prior to the approval of the change to the SWIS
Immediate and up to 1 day in advance	Unforeseen events ⁷	As required and best endeavours	As required and best endeavours	Immediate and best endeavours

3.4 Communication

All non-thermal Limit Advices must be emailed to wemlimitadvice@aemo.com.au. A non-thermal Limit Advice document must clearly indicate if it is a draft or final version in accordance with paragraph 3.2.1(g) of this Procedure.

4 NON-THERMAL LIMIT ADVICE REVIEW

4.1 Scope of assessment

4.1.1 AEMO must review the draft non-thermal Limit Advice to check for inconsistencies or additional matters that must be considered in order to maximise the maintenance of Power System Security and Power System Reliability and to inform AEMO's request for additional information and ~~or~~ [additional](#) non-thermal Limit Advice.

AEMO is not required to:

- (a) review the Network Operator's study methodology and assumptions in formulating the non-thermal Limit Advice⁸.
- (b) recalculate the non-thermal Limit Equations; and
- (c) modify non-thermal Limit Equations provided by a Network Operator.

⁶ Examples of minor changes to the SWIS under normal operation include: change of normally open or closed points, and change of switching philosophy of Network equipment.

⁷ Examples of unforeseen events include multiple and non-credible contingencies due to bushfire or storms determined and re-classified by AEMO as Credible Contingencies in accordance with clause 3.8A.5 of the WEM Rules.

⁸ A Network Operator's process for Limit Advice formulation will be documented separately in a WEM Procedure in accordance with clause 2.27A.11 of the WEM Rules.

- 4.1.2 The scope of AEMO’s non-thermal Limit Advice review is limited to assessing a particular non-thermal Limit Advice for residual Power System Security and Power System Reliability risks and unnecessary consequences to the SWIS. This assessment must inform AEMO’s development of relevant Constraint Equations in accordance with the Wholesale Electricity Market Objectives and good electricity industry practice.
- 4.1.3 AEMO’s review of the non-thermal Limit Advice must be performed to assess Power System Security and Power System Reliability to the extent possible with the available modelling data, which typically includes data down to the level of zone substation distribution busbars:
- (a) an AEMO’s non-thermal Limit Advice review may typically not include assessment of:
 - (i) impact of the non-thermal Limit Advice on SWIS distribution systems and associated distribution connected generation and equipment; and
 - (ii) contingency events on the distribution systems or zone substation equipment connected to the distribution systems⁹ (e.g. zone substation transformers);

⁹ There may be circumstances where AEMO may need to consider contingencies involving distribution connected reactive devices.

- 4.1.4 Where a non-thermal Limit Advice is applied to a distribution connected Market Participant, the Network Operator's must ensure the non-thermal Limit Advice is adequate to maintain security and reliability of the distribution systems in accordance with Technical Rules.

4.2 Additional information and data

- 4.2.1 In addition to paragraph 3.2.1 of this Procedure, under clause 2.27A.4 of the WEM Rules, AEMO may request the relevant Network Operator to provide additional information and data or clarification in relation to a particular non-thermal Limit Advice prior to starting, during and following the review process in accordance with [Clause 2.27A.4].
- 4.2.2 In addition to paragraph 3.2.1 of this Procedure, AEMO may request the relevant Network Operator to provide additional information and data (e.g. power system studies) to clarify the absence of a non-thermal Limit Advice.
- 4.2.3 Where AEMO requests additional information or data to support its assessment, the relevant Network Operator must provide the information and data within a timeframe nominated by AEMO in consultation with the Network Operator, allowing for extensions where approved by AEMO, acting reasonably.

4.3 Assessment analysis and criteria

- 4.3.1 Under clause 2.27A.9 of the WEM Rules, AEMO must perform its review of a non-thermal Limit Advice based on required SWIS Operating Standards as defined in WEM Rules and Technical Rules and good electricity industry practice.

4.4 Assessment

- 4.4.1 In general, AEMO may request clarification, further information and additional non-thermal Limit Advice in accordance with clause 2.27A.4 of the WEM Rules. If AEMO's assessment under paragraph 4.1.1 of this Procedure indicates that the non-thermal Limit Advice:
- (a) fails to maintain Power System Security or Power System Reliability;
 - (b) is deemed overly conservative and may result in unnecessary consequences to the SWIS such that it prevents AEMO from developing relevant Constraint Equation(s) that are consistent with Wholesale Electricity Market Objectives as required by clause 2.27A.9 of the WEM Rules; or
 - (c) may have unintended impact on power systems¹⁰ other than that intended by the non-thermal Limit Advice.

¹⁰ The unintended impact includes, but is not limited to constraint of generation due to reasons other than that intended by the non-thermal Limit Advice, which may result in unintended Power System Security and Power System Reliability risks.

- 4.4.2 In support of paragraph 4.4.1(a) of this Procedure, AEMO may determine that a non-thermal Limit Advice fails to maintain Power System Security when it considers, as a part of its assessment under paragraph 4.3.1, that SWIS Operating Standards in the WEM Rules and Technical Rules will be breached.
- 4.4.3 In support of paragraph 4.4.1(b) of this Procedure, AEMO may determine that a non-thermal Limit Advice is overly conservative, where there is sufficient evidence from historical data and analysis available indicating that the non-thermal Limit Advice can be relaxed without impacting Power System Security or Power System Reliability. Where historical data is not available, AEMO may consider that a non-thermal Limit Advice is too conservative if its review indicates that the non-thermal Limit Advice could be relaxed by more than 10% from the non-thermal Limit Advice provided by the Network Operator under paragraph 3.2.1 without impacting Power System Security or Power System Reliability.
- 4.4.4 In support of paragraph 4.4.1(c), AEMO may determine that a non-thermal Limit Advice may result in unintended impact on the SWIS, where AEMO deems that evidence available from power system analysis or tests performed in relation to the relevant Constraint Equation indicates that generation is constrained due to reasons other than that outlined in the non-thermal Limit Advice.

4.5 Assessment outcome

- 4.5.1 For each non-thermal Limit Advice, AEMO may produce a report either indicating a particular non-thermal Limit Advice is finalised, requesting more information or additional non-thermal Limit Advice. The report may include, but is not limited to:
- (a) scenarios in which the non-thermal Limit Advice fails to maintain Power System Security or Power System Reliability, or is found to be overly conservative;
 - (b) relevant assumptions;
 - (c) requests for more information, such as additional studies.
- 4.5.2 If AEMO requests clarification or further information regarding a non-thermal Limit Advice or additional non-thermal Limit Advice:
- (a) the relevant Network Operator must comply with such requests based on any refined/modified scenario list provided, and any other feedback provided by AEMO, with the submission and review process described in this Procedure continuing until a non-thermal Limit Advice is finalised (as shown in the Figure 1 in this Procedure); and
 - (b) the relevant Network Operator must consider the impact on the non-thermal Limit Advice implementation timeframe set out in Paragraph 3.3 in this Procedure. Where clarification or further information is requested by AEMO, AEMO consultation with the Network Operator, must consider additional lead time for non-thermal Limit Advice to be provided by the Network Operator.

- 4.5.3 If non-thermal power system limits, as defined in clause 3.2 of the WEM Rules, are identified and cannot be resolved by generation dispatch or network switching to adequately maintain Power System Security or Power System Reliability, the Network Operator must revise the non-thermal Limit Advice to indicate under what conditions and the extent to which Network reconfiguration and load shedding are required in order to maintain Power System Security and, in the case of load shedding, the Network Operator must assist AEMO in developing any necessary load shedding plans to cater for these events.

5 GENERAL

5.1 General Review

- 5.1.1 AEMO may conduct a general review of the Constraint Equations in a particular area when there are significant changes in conditions, including:
- (a) significant changes to generation and the generation mix;
 - (b) significant changes to load demand and the load mix;
 - (c) significant network augmentation; or
 - (d) significant changes to the operation of the Network.
- 5.1.2 AEMO may also conduct a general review of the Constraint Equations that have not been invoked operationally for at least two years.
- 5.1.3 As a result of a general review, AEMO may request a Network Operator to provide additional and/or updated Limit Advice for a particular area in accordance with clause 2.27A.4 of the WEM Rules.

5.2 Publication

- 5.2.1 AEMO must publish a thermal Limit Advice on the WEM Website when the thermal Limit Advice is provided by the Network Operator in accordance with paragraph 2 of this Procedure;
- 5.2.2 AEMO must publish a non-thermal Limit Advice on the WEM Website where AEMO concludes under paragraph 4 of the WEM Rules that the non-thermal Limit Advice is finalised.

5.3 Revising an existing Limit Advice

- 5.3.1 AEMO may request for clarification or further information from a Network Operator regarding an existing Limit Advice that has been finalised and converted to Constraint Equation(s) for real-life operation, when evidence from real-time operation indicates that the associated Constraint Equation(s) may have resulted in results that are inconsistent with Wholesale Market Objectives and good electricity industry practice. These issues include but not limited to:
- (a) those related to Power System Security and Power System Reliability.
 - (b) overly conservative constraints (see paragraph 4.4.1(b) of this Procedure); or
 - (c) those with irregular market pricing or other abnormal behaviour.

5.3.2 AEMO may notify the relevant Network Operator where a replacement Limit Advice is required for an existing Limit Advice, and may include in the notification:

- (a) the cause for revision; and
- (b) recommendation for future Limit Advice formulation by the Network Operator and explanation of the review process by AEMO.

5.4 Retirement of Limit Advice

5.4.1 An existing Limit Advice may be retired when the:

- (a) relevant Network Operator has specified that it is to be replaced by an updated Limit Advice in accordance with paragraph 3.2.1 of this Procedure; and
- (b) relevant Network Operator has specified that it is obsolete or out-of-date following general review described in paragraph 5.1 of this Procedure.

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