Department of Energy, Mines, Industry Regulation and Safety
Energy Policy WA
GOVERNMENT OF WESTERN AUSTRALIA

# Meeting Agenda

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| **Meeting Title:** | Evolution of Pilbara Network Rules Working Group |
| **Workstream** | Workstream 2 (HTR Workstream) |
| **Date:** | 11 July 2024 |
| **Time:** | 9:30am – 11:00am |
| **Location:** | Online, via TEAMS |

| Item | Item | Responsibility | Type | Duration |
|---|---|---|---|---|
| **1** | Welcome and Agenda<br>• Conflicts of interest<br>• Competition Law | Chair | Noting | 4 min |
| **2** | Meeting Apologies and Attendance | Chair | Noting | 1 min |
| **3** | Minutes of Meeting 2024_05_09<br>Published 5 July 2024 | Chair | Noting | 1 min |
| **4** | Action Items | Chair | Noting | 4 min |
| **5** | HTR Issue List:<br>**a)** Options/proposals for high priority simple issues (Issues 4 and 18)<br>**b)** Progress report on high priority substantive issues (Issues 3, 5, 7, 8, 10, 11, 13, 14, 16, 28, 29 and 30)<br>**c)** Further definition, rationale and justification for Issues 35 and 38 | Chair<br>Issue Leads | Discussion | 60 min |
| **6** | Next steps | Chair | Noting | 15 min |
| | Next meeting: 9:30 AM,12 September 2024 (HTR workstream) | | | |

## Competition and Consumer Law Obligations

Members of the PAC's Evolution of the Pilbara Network Rules Working Group (**Members**) note their obligations under the *Competition and Consumer Act 2010* (**CCA**).

If a Member has a concern regarding the competition law implications of any issue being discussed at any meeting, please bring the matter to the immediate attention of the Chairperson.

Part IV of the CCA (titled "Restrictive Trade Practices") contains several prohibitions (rules) targeting anti-competitive conduct. These include:

(a) **cartel conduct**: cartel conduct is an arrangement or understanding between competitors to fix prices; restrict the supply or acquisition of goods or services by parties to the arrangement; allocate customers or territories; and or rig bids.

(b) **concerted practices**: a concerted practice can be conceived of as involving cooperation between competitors which has the purpose, effect or likely effect of substantially lessening competition, in particular, sharing Competitively Sensitive Information with competitors such as future pricing intentions and this end:

- a concerted practice, according to the ACCC, involves a lower threshold between parties than a contract arrangement or understanding; and accordingly; and
- a forum like the EPNRWG is capable being a place where such cooperation could occur.

(c) **anti-competitive contracts, arrangements understandings**: any contract, arrangement or understanding which has the purpose, effect or likely effect of substantially lessening competition.

(d) **anti-competitive conduct (market power)**: any conduct by a company with market power which has the purpose, effect or likely effect of substantially lessening competition.

(e) **collective boycotts**: where a group of competitors agree not to acquire goods or services from, or not to supply goods or services to, a business with whom the group is negotiating, unless the business accepts the terms and conditions offered by the group.

A contravention of the CCA could result in a significant fine (up to $500,000 for individuals and more than $10 million for companies). Cartel conduct may also result in criminal sanctions, including gaol terms for individuals.

**Sensitive Information** means and includes:

(a) commercially sensitive information belonging to a Member's organisation or business (in this document such bodies are referred to as an Industry Stakeholder); and

(b) information which, if disclosed, would breach an Industry Stakeholder's obligations of confidence to third parties, be against laws or regulations (including competition laws), would waive legal professional privilege, or cause unreasonable prejudice to the Coordinator of Energy or the State of Western Australia).

### Guiding Principle – what not to discuss

In any circumstance in which Industry Stakeholders are or are likely to be in competition with one another a Member must not discuss or exchange with any of the other Members information that is not otherwise in the public domain about commercially sensitive matters, including without limitation the following:

(a) the rates or prices (including any discounts or rebates) for the goods produced or the services produced by the Industry Stakeholders that are paid by or offered to third parties;

(b) the confidential details regarding a customer or supplier of an Industry Stakeholder;

(c) any strategies employed by an Industry Stakeholder to further any business that is or is likely to be in competition with a business of another Industry Stakeholder, (including, without limitation, any strategy related to an Industry Stakeholder's approach to bilateral contracting or bidding in the energy or ancillary/essential system services markets);

(d) the prices paid or offered to be paid (including any aspects of a transaction) by an Industry Stakeholder to acquire goods or services from third parties; and

(e) the confidential particulars of a third party supplier of goods or services to an Industry Stakeholder, including any circumstances in which an Industry Stakeholder has refused to or would refuse to acquire goods or services from a third party supplier or class of third party supplier.

### Compliance Procedures for Meetings

If any of the matters listed above is raised for discussion, or information is sought to be exchanged in relation to the matter, the relevant Member must object to the matter being discussed. If, despite the objection, discussion of the relevant matter continues, then the relevant Member should advise the Chairperson and cease participation in the meeting/discussion and the relevant events must be recorded in the minutes for the meeting, including the time at which the relevant Member ceased to participate.

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# Agenda Item 4: Action Items

### Evolution of the Pilbara Networks Rules Working Group (EPNRWG) Workstream 2 – Meeting - 2024_07_11

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|---|---|
| Shaded | Shaded action items are actions that have been completed since the last EPNRWG (WS2) meeting. Updates from last EPNRWG (WS2) meeting provided for information in RED. |
| Unshaded | Unshaded action items are still being progressed. |
| Missing | Action items missing in sequence have been completed from previous meetings and subsequently removed from log. |

| Item | Action | Responsibility | Meeting Arising | Status |
|---|---|---|---|---|
| 1/2024 | Circulate PSSR Standards Review materials to EPNRWG HTR workstream participants. | EPWA | 2024_05_09 | **Completed**<br>EPWA circulated materials for the PSSR Standards Review for the SWIS to the working group on 17 May 2024. |
| 2/2024 | Issue Lead (for Issues 35 and 38) to elaborate on issue definition, rationale and justification for discussion at the 11 July 2024 EPNRWG meeting. | BHP | 2024_05_09 | **Open**<br>BHP to provide update during Item 5(c). |
| 3/2024 | Update the workbook to reflect meeting outcomes and circulate to members by close of business Friday 10 May 2024. | EPWA | 2024_05_09 | **Completed**<br>EPWA circulated an updated workbook (allocating leads and supports for individual issues) to the working group on 21 May 2024. |

| Item | Action | Responsibility | Meeting Arising | Status |
|---|---|---|---|---|
| 4/2024 | Members to review the updated workbook and provide feedback (including nominations to support Issue Leads) by close of business Tuesday 14 May 2024. | All | 2024_05_09 | **Completed** |
| 5/2024 | Issue Leads for high priority simple issues (Issues 4 and 18), to develop options or proposals for resolving the issues and present those to the next HTR workstream meeting on 11 July 2024. Supporting meeting materials should be provided to EPWA by close of business 1 July 2024. | Issue Leads | 2024_05_09 | **Open**<br>Issue Leads to provide update during Item 5(a). |
| 6/2024 | Issue Leads for high priority substantive issues to provide a progress report outlining potential solutions or, where relevant, further scoping of the issue at the 11 July 2024 HTR workstream meeting. Supporting meeting materials should be provided to EPWA by close of business 1 July 2024. | Issue Leads | 2024_05_09 | **Open**<br>Issue Leads to provide update during Item 5(b). |

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# Agenda Item 5

## HTR Issues: Current status and meeting material

This table provides the status of HTR Issues (as of 2 July 2024) provided by Issue Leads. Where materials have been provided by Issue Leads to support discussion at the working group meeting on 11 July 2024, a page number reference is provided.

Note. Where no status update has been received from Issue Leads, this is denoted by a dash (-), while 'no update' is used to reflect Issue Leads report.

| Issue ID | | Priority | Simple or Substantive | Lead | Support | Status | Page # |
|---|---|---|---|---|---|---|---|
| I3 | I3 | High | Substantive | Noel (Rio) | David (HP); Lekshmi (BP), Gemma (ISO); Njabulo and Bec (BHP) | • Sub-working group meeting held<br>• Definitions gathered from AEMC, AEMO and compared to the PNR and HTR<br>• Submission made to ISOCo for inclusion into the issues paper under development for the review of subchapter 7.3 and 7.4 | p.4 |
| | I36 | Moderate | Substantive | | | • No considerable progress given it is substantive and technical<br>• Consideration given to gather historical fault data to help determine the limits | - |
| I4 | | High | Simple | David (HP) | Nik (APA); Njabulo and Bec (BHP); Noel (Rio), Gemma (ISO) | • Update provided | p.16 |
| I5 | I5 | High | Substantive | David (HP) | Nik (APA); Shervin and Scott (Woodside); Lekshmi (BP); Gemma (ISO); Njabulo and Bec (BHP); Noel (Rio) | • Issues comprise those requiring detailed study<br>• Draft scope of works for study commenced.<br>• Initial meeting scheduled for week of 15/7/2024 | - |
| | I6 | High | Substantive | | | | - |
| | I15 | High | Substantive | | | | - |
| | I17 | High | Substantive | | | | - |
| | I19 | High | Substantive | | | | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | I34 | Moderate | Substantive | | | | - |
| I7 | | High | Substantive | Nik (APA) | Njabulo and Bec (BHP); Gemma (ISO); Noel (Rio); Lekshmi (BP) | • No update, issue will progress from mid-July | - |
| I8 | I8 | High | Substantive | Gemma (ISO) | David (HP); Noel (Rio); Njabulo and Bec (BHP), Nik (APA) | • No update | - |
| | I9 | High | Substantive | | | | - |
| | I12 | High | Substantive | | | | - |
| I10 | | High | Substantive | Njabulo (BHP) | Nik (APA) | • Update provided | p.17 |
| I11 | | High | Substantive | Njabulo (BHP) | Nik (APA) | | |
| I13 | I13 | High | Substantive | Gemma (ISO) | David (HP); Njabulo and Bec (BHP), Nik (APA) | • No update - | - |
| | I37 | Moderate | Substantive | | | | - |
| I14 | | High | Substantive | Lekshmi (BP) | Gemma (ISO); Njabulo and Bec (BHP);Nik (APA) | • No update | - |
| I16 | | High | Substantive | David (HP) | Gemma (ISO); Njabulo and Bec (BHP); Noel (Rio), Nik (APA) | • Updated included in I5 update | - |
| I18 | | High | Simple | Lekshmi (BP) | Njabulo and Bec (BHP) | • No update | - |
| I22 | | Moderate | Simple | David (HP) | Njabulo and Bec (BHP); Noel (Rio); Nik (APA) | • No update | - |
| I23 | | Moderate | Simple | David (HP) | Nik (APA); Njabulo and Bec (BHP) | • No update | - |
| I24 | I24 | Moderate | Simple | David (HP) | Lekshmi (BP); Njabulo and Bec (BHP); Noel (Rio); Nik (APA); Gemma (ISO) | • No update - | - |
| | I25 | Moderate | Simple | | | | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| I27 | Moderate | Simple | Nik (APA) | David (HP); Gemma (ISO); Njabulo and Ben (BHP); Nik (APA) | • Meeting held with Njabulo Mlilo & David Stephens 06/06/24. Agreement was to propose that a set of minimum requirements for generating unit protection, aligned with rating, location and technology. NW to issue summary of meeting | - |
| I28 | High | Substantive | David (HP) | Noel (Rio); Gemma (ISO); Njabulo and Bec (BHP), Nik (APA) | • No update. Initial meeting scheduled for week of 15/7/2024 | - |
| I29 | High | Substantive (study likely) | Gemma (ISO) | David (HP); Njabulo and Bec (BHP) | • No update | - |
| I30 | High | Substantive | Shervin and Scott (Woodside) | David (HP); Noel (Rio); Njabulo and Bec (BHP), Nik (APA), Gemma (ISO) | - | - |
| I31 | Moderate | Simple | David (HP) | Njabulo and Bec (BHP) | • No update | - |
| I35 | Moderate | Substantive | Njabulo (BHP) | | - | - |
| I38 | Moderate | Substantive | Njabulo (BHP) | Shervin and Scott (Woodside) | • Update provided | p.22 |
| I40 | Low | Simple | David (HP) | Njabulo and Bec (BHP) | • No update | - |
| I44 | Low | Simple | Noel (Rio) | Gemma (ISO); David (HP); Nik (APA); Njabulo and Bec (BHP) | • No update | - |
| I45 | Low | Simple | Noel (Rio) | Gemma (ISO); Njabulo and Bec (BHP); Nik (APA) | • No update | - |

RioTinto

# Credible contingency event definition

EPNRWG HTR working group

June 2024

# Proposal

Proposed solution or options:

1. Align with AEMC and AEMO definitions?
   – Choose AMEC or AEMO definition, or a hybrid version

2. Separate out threats from contingency events
   - Operational planning, how are credible events identified in operations, what could lead to a contingency event occurring

3. Do nothing, no changes to existing PNR and HTR

4. Combine with ISOCo consultation on Ch 7.3 and 7.4 review
   - Define pre-contingent measures using advanced weather forecasting and other tools.
   - Risk assessment ahead of and during notifiable events, and during operation

Any analysis, modelling or assessment necessary?

# Framing the issue

- Costs incurred, are the costs warranted if there are no threats (a nice sunny day, is it likely a transmission line will trip?)
- Costs might be high but likelihood of the event occurring may be low.  Is that acceptable?
- If consequence is high, can influence any pre-contingent activities carried out.  Is the cost worth it.
- Does the operations desk have appropriate guidance to allow for these decisions to be made.  How can the Operator be protected for the decisions they make, provided they are made in line with the intent of the rules.  How is this guidance facilitated in an operational environment.
- Procurement of reserves, can there be guidance of what can operationally be managed without procurement of additional reserves.  What can be predicable events that can inform the procurement of additional reserves.  What tools/systems can be used to predict events.
- Some worked examples could be used to define some situations that can warrant the procurement of additional reserves.
- Pilbara context, Pilbara threats should be factored into the definition.  Outline what the threats could be and how they trigger a credible contingency event.
- Define the principles and some worked examples to help frame the issue in the rules and operational protocols.
- Primary issue here is operational use of the term of credible contingencies.  Planning requirements however do use this term and define what is planned for and which events are considered.  What events feed into planning activities as credible contingencies needs to be considered in parallel.  Planning and operational definitions may have some differences but should be considered in parallel.

# Existing definition in PNR

**Credible:** In relation to an event or other thing, means that an experienced operator acting in accordance with GEIP would consider it to be reasonably possible in the surrounding circumstances.

**Credible Contingency {also Credible Contingency Event}:** Means a Contingency event — a) which the Protocol Framework identifies as a Credible Contingency event; or b) which the ISO Control Desk otherwise considers to be reasonably possible in the surrounding circumstances.

Without limiting the generality of this definition, examples of Credible Contingency events are likely to include — i) the unexpected automatic or manual disconnection of, or the unplanned reduction in capacity of, one operating Generating Unit; or ii) the unexpected disconnection of a Transmission Element anywhere on the Power System.

**Pre-Contingent Threat:** Means — a) a Credible imminent threat to the System Security Objective arising from — i) an approaching external threat (such as a storm or bushfire); or ii) impending material Equipment failure, or b) an imminent risk of physical injury or death to any person or material damage to Equipment, which can be mitigated if appropriate preparatory measures (Pre-Contingent Actions) are taken.

# Existing definition in PNR - continued

(1) The Protocol Framework must set out —

(a) a list of agreed Credible Contingencies, including Credible Islanding Events and the resulting Credible Islands; and

(b) a list of Credible Network Constraints; and

(c) any communications requirements necessary to implement the Protocol Framework; and

(d) at least the following protocols —

(i) a Protocol to deal with each listed Credible Contingency; and {A single Protocol under rule 79(1)(d)(i) may deal with more than one Contingency.}

(ii) one or more protocols to deal with other contingencies, including NonCredible contingencies, multiple contingencies and an emergency being declared under State legislation; and

(iii) if judged necessary under rule 72, a Protocol to deal with any Credible Planning Criteria Interactions identified under rule 72; {Rule 72 considers the impact of the various NSPs' Network Planning Criteria on other networks in the Power System.} and

(iv) unless the ISO and Registered NSPs agree otherwise, a Protocol (the "Pre-Contingent Protocol") dealing with Pre-Contingent Threats. {The list in rule 79(1)(d) is not closed — for example, System Operations Participants may decide that there should be a Protocol to deal with system restart, or the management of certain constraints.} (2) Rule 79(1) does not limit the things a Protocol Framework may contain.

# Existing definition in HTR

**credible contingency event**

means a single contingency event of one of the following types:

a) a three-phase to earth fault cleared by disconnection of the faulted component, with the fastest main protection system out of service;

b) a single-phase to earth fault cleared by the disconnection of the faulted component, with the fastest main protection system out of service;

c) a single-phase to earth fault cleared after unsuccessful highspeed single-phase auto-reclosure onto a persistent fault;

d) a single-phase to earth small zone fault or a single-phase to earth fault followed by a circuit breaker failure, in either case cleared by the operation of the fastest available protection scheme; or

e) a sudden disconnection of a system component, e.g. a transmission line or generating unit

# AEMC definition

**S5.1.2.1**

**Credible contingency events**

*Network Service Providers* must plan, design, maintain and operate their *transmission networks* and *distribution networks* to allow the transfer of power from *generating units* to *Customers* with all *facilities* or equipment associated with the *power system* in service and may be required by a *Registered Participant* under a *connection agreement* to continue to allow the transfer of power with certain facilities or *plant* associated with the *power system* out of service, whether or not accompanied by the occurrence of certain faults (called *credible contingency events*).

The following *credible contingency events* and practices must be used by *Network Service Providers* for planning and operation of *transmission networks* and *distribution networks* unless otherwise agreed by each *Registered Participant* who would be affected by the selection of *credible contingency events*:

**(a)**The *credible contingency events* must include the *disconnection* of any single *generating unit* or *transmission line*, with or without the application of a single circuit two-phase-to-ground solid fault on lines operating at or above 220 kV, and a single circuit three-phase solid fault on lines operating below 220 kV. The *Network Service Provider* must assume that the fault will be cleared in primary protection time by the faster of the duplicate protections with installed intertrips available. For existing *transmission lines* operating below 220 kV but above 66 kV a two-phase to earth fault criterion may be used if the modes of operation are such as to minimise the probability of three-phase faults occurring and operational experience shows this to be adequate, and provided that the *Network Service Provider* upgrades performance when the opportunity arises.

**(b)**For lines at any *voltage* above 66 kV which are not protected by an overhead earth wire and/or lines with tower footing resistances in excess of 10 ohms, the *Network Service Provider* may extend the criterion to include a single circuit three-phase solid fault to cover the increased risk of such a fault occurring. Such lines must be examined individually on their merits by the relevant *Network Service Provider*.

**(c)**For lines at any *voltage* above 66 kV a *Network Service Provider* must adopt operational practices to minimise the risk of slow fault clearance in case of inadvertent closing on to earths applied to equipment for maintenance purposes. These practices must include but not be limited to:

**(1)**Not leaving lines equipped with intertrips alive from one end during maintenance; and

**(2)***Off-loading* a three terminal (tee connected) line prior to restoration, to ensure switch on to fault *facilities* are operative.

**(d)**The *Network Service Provider* must ensure that all *protection systems* for lines at a *voltage* above 66 kV, including associated intertripping, are well maintained so as to be available at all times other than for short periods (not greater than eight hours) while the maintenance of a *protection system* is being carried out.

# AEMC definition

**CLAUSE**
**4.2.3**
**Credible and non-credible contingency events and protected events**
**(a)**A *contingency event* means an event affecting the *power system* which *AEMO* expects would be likely to involve the failure or removal from operational service of one or more *generating units* and/or *transmission elements*.
**(b)**A *credible contingency event* means a *contingency event* the occurrence of which *AEMO* considers to be reasonably possible in the surrounding circumstances including the *technical envelope*. Without limitation, examples of *credible contingency events* are likely to include:
**(1)**the unexpected automatic or manual *disconnection* of, or the unplanned reduction in capacity of, one operating *generating unit*; or
**(2)**the unexpected *disconnection* of one major item of *transmission plant* (e.g. *transmission line*, *transformer* or *reactive plant*) other than as a result of a three phase electrical fault anywhere on the *power system*.
**(c)[Deleted]**
**(d)[Deleted]**
**(e)**A *non-credible contingency event* is a *contingency event* other than a *credible contingency event*. Without limitation, examples of *non-credible contingency events* are likely to include:
**(1)**three phase electrical faults on the *power system*; or
**(2)**simultaneous disruptive events such as:
**(i)**multiple *generating unit* failures; or
**(ii)**double circuit *transmission line* failure (such as may be caused by tower collapse).
**(f)**A *protected event* means a *non-credible contingency event* that the *Reliability Panel* has declared to be a *protected event* under clause 8.8.4, where that declaration has come into effect and has not been revoked. *Protected events* are a category of *non-credible contingency event*.

# AEMC definition

Power system security relates to:
•the technical parameters of the power system such as voltage and frequency
•the rate at which these parameters might change
•the ability of the system to withstand faults.
The power system is secure when technical parameters such as voltage and frequency are maintained within defined limits. To maintain frequency the power system has to instantaneously balance electricity supply against demand.
The system security and reliability standards needed for a reliable and secure electricity market are defined in the National Electricity Rules and also by the AEMC's Reliability Panel. Australian Energy Market Operator (AEMO) and network businesses operate the system in line with these standards.
The ongoing challenge is determining the best ways to keep the power system stable as the generation mix changes, with a large number of wind and solar farms, and storage including pumped hydro, set to connect in coming years while older synchronous generators are retiring.

**Secure operating environment**

When the system is operating within the range of acceptable limits it is considered to be secure. For frequency, the optimal operation of the system is 50 cycles per second, or 50 Hertz.
A secure power system is designed to withstand a single credible contingency event.

**Contingency events**

A contingency event is an event that affects the power system in a way which would likely involve the failure or sudden and unexpected removal from operational service of a generating unit or transmission element.
There are two categories of contingency events.

**Credible contingency events**

Credible contingency events are events that AEMO considers to:
•be reasonably possible to occur
•have the potential for a significant impact on the power system.
These include:
•the loss of single element or generator
•a single phase or phase to phase line fault.
Credible contingency events can occur on transmission and distribution lines where there is short-circuiting due to:
•ionised particles
•wind causing conductors to clash
•pollution of insulators due to salt or dirt build-up
•mechanical failure due to cracking, tower damage
•lightning.
They can also occur on transformers where internal insulation failure can lead to pressure build up due to:
•insufficient maintenance (oil)
•age
•manufacturing problems
•the power system not being satisfactory (high voltages and overloads).
Generators can also be the cause of credible contingency events due to:
•mechanical problems due to interruption in the fuel supply
•electrical insulation failure or overloading/overheating.

**Non-credible contingency events**

Non-credible contingency events are contingency events other than credible contingency events. These are generally considered to be events that are rare in occurrence, such as the combination of a number of credible contingency events occurring at the same time.
AEMO can re-classify non-credible events as credible when the risk of rare events more becomes likely, including during extreme weather such as bushfires or storms.

**Protected events**

Through its Power System Frequency Risk Review, AEMO is required to regularly and transparently assess risks to power system operation caused by events that are unlikely but would have high impacts if they were to happen.
If AEMO believes that there are more transparent and cost-effective ways of managing any of the risks it identifies it can request that the Reliability Panel declare a risk as a 'protected event.'
The Reliability Panel will then consider the net economic benefits of managing the event as a protected event. If the Panel declares a protected event, AEMO can take additional steps to proactively manage the risk.


https://www.aemc.gov.au/energy-system/electricity/electricity-system/security

# AEMO SWIS definition

A Contingency Event is an event affecting the South West interconnected system (SWIS) which AEMO expects would be likely to involve:

a) the failure or removal from operational service of one or more energy producing units, Facilities and/or Network elements; or
b) an unplanned change in load, Intermittent Generation or other elements of the SWIS not controlled by AEMO. A contingency event is an event affecting the power system that AEMO expects would likely involve the failure or removal from operational service of one or more generating units and/or transmission elements.

AEMO is responsible for determining which SWIS events are classified as Credible Contingency Events. This is described in WEM Procedure: Credible Contingency Events.

**Credible Contingency Event**

A Credible Contingency Event means one or more Contingency Events, the occurrence of which AEMO considers in accordance with the WEM Procedure referred to in clause 3.8A.4 to be reasonably possible in the prevailing circumstances, taking into account the Technical Envelope. Without limitation, examples of Credible Contingency Events include:

a) the unexpected automatic or manual disconnection of, or the unplanned change in output of, one or more operating energy producing units or Facilities;
b) the unexpected disconnection of one or more major items of Network equipment; or
c) Non-credible Contingency Events reclassified as Credible Contingency Events in accordance with the WEM Procedure referred to in clause 3.8A.4.

**Non-Credible Contingency Event**

A Non-credible Contingency Event means a Contingency Event other than a Credible Contingency Event. Without limitation, examples of Non-credible Contingency Events include simultaneous disruptive events such as:

a) multiple Facility failures; or
b) failure of multiple items of Network equipment



https://aemo.com.au/en/energy-systems/electricity/wholesale-electricity-market-wem/wem-events-and-reports/contingency-events

# NER Chapter 5

S5.1.2.1 Credible contingency events Network Service Providers must plan, design, maintain and operate their transmission networks and distribution networks to allow the transfer of power from generating units to Customers with all facilities or equipment associated with the power system in service and may be required by a Registered Participant under a connection agreement to continue to allow the transfer of power with certain facilities or plant associated with the power system out of service, whether or not accompanied by the occurrence of certain faults (called credible contingency events). The following credible contingency events and practices must be used by Network Service Providers for planning and operation of transmission networks and distribution networks unless otherwise agreed by each Registered Participant who would be affected by the selection of credible contingency events:

(a) The credible contingency events must include the disconnection of any single generating unit or transmission line, with or without the application of a single circuit two-phase-to-ground solid fault on lines operating at or above 220 kV, and a single circuit three-phase solid fault on lines operating below 220 kV. The Network Service Provider must assume that the fault will be cleared in primary protection time by the faster of the duplicate protections with installed intertrips available. For existing transmission lines operating below 220 kV but above 66 kV a two-phase to earth fault criterion may be used if the modes of operation are such as to minimise the probability of three-phase faults occurring and operational experience shows this to be adequate, and provided that the Network Service Provider upgrades performance when the opportunity arises.

(b) For lines at any voltage above 66 kV which are not protected by an overhead earth wire and/or lines with tower footing resistances in excess of 10 ohms, the Network Service Provider may extend the criterion to include a single circuit three-phase solid fault to cover the increased risk of such a fault occurring. Such lines must be examined individually on their merits by the relevant Network Service Provider.

(c) For lines at any voltage above 66 kV a Network Service Provider must adopt operational practices to minimise the risk of slow fault clearance in case of inadvertent closing on to earths applied to equipment for maintenance purposes. These practices must include but not be limited to: (1) Not leaving lines equipped with intertrips alive from one end during maintenance; and (2) Off-loading a three terminal (tee connected) line prior to restoration, to ensure switch on to fault facilities are operative.

(d) The Network Service Provider must ensure that all protection systems for lines at a voltage above 66 kV, including associated intertripping, are well maintained so as to be available at all times other than for short periods (not greater than eight hours) while the maintenance of a protection system is being carried out.

# ISOCo review is under way

ISOCo notice to review subchapter 7.3 and 7.4 is under way.

This relates more to operational considerations for credible contingencies.

Pilbara ISOCo

24 May 2024

**NOTICE: Review of Subchapter 7.3 and Subchapter 7.4 of the Pilbara Networks Rules**

Rule 178 of the Pilbara Networks Rules (the Rules) requires the ISO periodically to conduct a review of the processes set out in Subchapter 7.3 and Subchapter 7.4 against the Pilbara electricity objective.

Subchapters 7.3 and 7.4 deal with system coordination and the notification of planned and unplanned outages. These processes commenced in October 2021 and the ISO now seeks to engage with registered NSPs, registered controllers and other interested stakeholders on the effectiveness of these processes, including:

- notification, assessment and approval process for notifiable events;
- the process for determining how and by whom a notifiable event is to be managed or mitigated, including how the system is to be configured and operated, and how contingencies are to be managed, during the notifiable event, and the role and effectiveness of the protocol framework;
- roles, responsibilities and accountability of registered NSPs, registered controllers, ISO control desk and ISO including transparency requirements; and
- the allocation of costs associated with notifiable events.

Following this review the ISO will publish and consult on a Report containing any recommended rules and procedure changes.

**Proposed timing**

| Timing | Event |
|---|---|
| June 2024 | Finalise scope of review, engage consultant and publish issues paper |
| July 2024 | Meet with registered NSPs and other interested stakeholders and finalise Report |
| August 2024 | Publish Report and if necessary prepare rule and procedure change proposal for submission to the Pilbara Advisory Committee. |

Please contact the ISO at info@pilbaraisoco.com.au should you require more information or wish to propose issues for inclusion in the Issues Paper.

## PHTR Issue 4 – Updated WA Voltage and Frequency Regulations

***Issue #4 – Classification:***

High Priority, Simple, Technical

***Issue #4 – Description:***

The recent Electricity Industry Amendment (Distributed Energy Resources) Act 2024 (the DER Act) will remove the voltage and frequency requirements from the Electricity Act 1945 and place them in subsidiary instruments, being the Electricity Industry (Electricity System and Market) Regulations 2024 (ESMR) (for voltage) and various market rules and technical rules (for frequency).

As part of these changes the ESMR will require compliance with the AS IEC 60038:2022 standard for voltage, resulting in a new Low Voltage distribution network nominal voltage of 230V, with at ±10% voltage range.

This issue deals with the alignment of the Pilbara Harmonised Technical Rules with the regulatory changes.

***Issue #4 – Solution Options:***

1. Update in alignment with proposed regulations *(Recommended, noting that there may be some areas which are not distribution networks where the voltage regulations may not apply)*
2. Leave as is *(Not a suitable option – inconsistent with review objectives, and not compatible with ESMR)*

***Issue #4 – Recommended Actions:***

- Update PHTR Section 2.2.2(a) in alignment with the proposed updates to voltage regulations, including any specific clarifications related to low voltage networks which are not distribution networks (eg within generation facilities etc).
- Update PHTR Section 2.2.10 Figure 2.1 to reflect the new upper voltage limit for LV.
- No change to frequency standards are required as a result of the new regulations as the new regulations defer to relevant Technical Rules (i.e. the PHTR).
- Check proposed wording for WEM/SWIS to ensure alignment.
- Check the scope and application of the ESMR to network operators only or more broadly.

# MEETING AGENDA AND MINUTES

| Name of Meeting | Location | Date / Time | Written by |
|---|---|---|---|
| Issue 11 & Issue 12 | Online | 28-06-2024<br>2:30-3:30pm | Njabulo Mlilo |

| Attendees | | Distribution |
|---|---|---|
| Njabulo Mlilo - BHP | | |
| Nik Walker - APA | | |
| David Stephens – Horizon Power | | |
| | | |

**Apologies**

N/A

**Agenda**

- I10 Inverter Dynamic Performance – Oscillation Damping
- I11 Inverter Dynamic Performance – Reactive current injection/absorption during fault & recovery period

**Meeting Minutes**

**Issue 10 Inverter Dynamic Performance – Oscillation Damping**

**Background/context**

- HTR damping clause 2.2.8 wording synchronous generator technology centric.
- Grid following inverter connected generation does not have concept of rotor angle stability.
- Inverter connected generation can be a source of power system oscillations putting power system security at risk, hence there need to be requirements governing their performance.

**Options**

- **Do nothing**

(a) The clause 2.2.8 lacks comprehensive clarity with treatment of inverter connected generation.

- **Include new requirements in HTR.**

(a) Rules need to align with reality on the ground – increasing penetration of inverter-based generation in NWIS.
(b) Any performance measures applied to inverter-based generation need to be appropriate for NWIS specific network conditions.
(c) May require guidelines to define what good looks like and how that would be assessed.
(d) Clauses for damping in the rules should be technology agnostic to accommodate emerging technologies.
(e) Definition of rotor angle stability needs to be clarified further in the rules.
(f) Damping ratio requirements specification would require justification via studies – part of this work may feed into the studies stream.

**Issue 11 Inverter Dynamic Performance – Reactive current injection/absorption during fault & recovery period**

**Background/context**

- HTR clause 3.3.3.3(f) requires non-synchronous generation to terminate pre-fault absorption within 200msec, and are permitted to resume absorption 60 sec after post fault voltages stabilise. This clause does not fully utilise inverter connected generation capability to support voltage recovery during & post fault recovery period.
- HTR clause 3.3.3.3(g) requires generation to have capability to deliver reactive power post fault sufficient to ensure connection point voltage is within the range for continuous uninterrupted operation, however, it does not quantify performance requirement for reactive current injection/absorption magnitudes to support this requirement.

**Options**

**Do nothing.**

(a) Network may fail to utilize and take advantage of full capability of inverter connected generation to support network voltage recovery during and post fault period.

(b) Clause 3.3.3.3(f) may create a pervasive situation where a complying generator does not fully support the network security even though it has capacity, and still be deemed compliant.

**Include new requirements in HTR**

(a) Review HTR clause 3.3.3.3(f) for relevance to NWIS.

(b) Review how this clause has been applied in NWIS for inverter-based generation.

(c) Review clauses 3.3.3.3(f) against other markets and see how it is treated and if there are lessons to be learnt.

(d) Review HTR clause 3.3.3.3(g) and consider including quantifiable measures of reactive current injection/absorption during fault and post fault.

   a. Define voltage support principles for all generators and define requirements that maximize capability/strength usage for various technologies e.g. grid forming, grid following, synchronous generators. Principles may include tunable functionality that can be customized for different locations throughout NWIS.

   b. Principles to be supported by power system studies to define required performance.

**Actions**

| Item | Discussion and Decisions | Action By | Due Date |
|---|---|---|---|
| 1 | Send minutes to the group | N Mlilo | 28/06/2024 |
| 2 | Review and provide comments | All | Midday 01/07/2024 |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |

**Next Steps**

**Issue 10 – approach taken by others**

**HTR Clause**

### 2.2.8 Oscillatory rotor angle stability

System oscillations originating from system electro-mechanical characteristics, electromagnetic effect or non-linearity of system components, and triggered by any *small disturbance* or *large disturbance* in the *power system*, must remain within the *small disturbance rotor angle stability* criteria and the *power system* must return to a stable operating state following the disturbance. The *small disturbance rotor angle stability* criteria are:

(a) The *damping ratio* of electromechanical oscillations must be at least 0.1.

(b) For electro-mechanical oscillations as a result of a *small disturbance*, the *damping ratio* of the oscillation must be at least 0.5.

(c) In addition to the requirements of subclause 2.2.8(a), the *halving time* of any electro-mechanical oscillations must not exceed 5 seconds.

**WEM Rules – includes specific clause for non synchronous generation**

*Asynchronous Generating Systems*

A12.4.2.13. A Generating System, comprised of Asynchronous Generating Units, must have a voltage and Reactive Power Control System that has a power oscillation damping capability with sufficient flexibility to enable damping performance to be maximised, with the stabilising circuit responsive and adjustable over a frequency range from 0.1 Hz to 2.5 Hz. Any power system stabiliser must have measurements of power system frequency and Active Power output of the Generating Unit as inputs.

**NEM Rules approach**

(4) a *generating system*, other than one comprised of *synchronous generating units*, must have a *voltage control system* that:

(i) **[Deleted]**

(ii) **[Deleted]**

(iii) **[Deleted]**

(iv) **[Deleted]**

(v) with the *generating system connected* to the *power system*, has settling *times* for *active power*, *reactive power* and *voltage* due to a step change of *voltage* setpoint or *voltage* at the location agreed under clause subparagraph (2B)(i), of less than:

(A) 5.0 seconds for a 5% *voltage* disturbance with the *generating system connected* to the *power system*, from an operating point where the *voltage* disturbance would not cause any limiting device to operate; and

(B) 7.5 seconds for a 5% *voltage* disturbance with the *generating system connected* to the *power system*, when operating into any limiting device from an operating point where a *voltage* disturbance of 2.5% would just cause the limiting device to operate;

(vi) has *reactive power* rise time, for a 5% step change in the *voltage* setpoint, of less than 2 seconds; and

(vii) has a power oscillation damping capability with sufficient flexibility to enable damping performance to be maximised:

(A) with characteristics as described in paragraph (c); or

(B) where *AEMO* has published characteristics for a *generating system* other than one comprised of *synchronous generating units*, following consultation in accordance with the *Rules consultation procedures*, with characteristics as published by *AEMO*.

**ISSUE 11 BACKROUND INFORMATION**

**WEM Rules**

*Asynchronous Generating Systems*

A12.9.2.5. Subject to any changed power system conditions or energy source availability beyond the operator of the Generation System's reasonable control, a Generating System comprised of Asynchronous Generating Units, for the faults referred to in clause A12.9.2.2, must have equipment capable of supplying to, or absorbing from, the Network:

(a) to assist the maintenance of power system voltages during the fault:

(i) capacitive reactive current in addition to its pre-disturbance level of at least 4% of the Maximum Continuous Current of the Generating System including all operating Asynchronous Generating Units (in the absence of a disturbance) for each 1% reduction of voltage at the Connection Point below a specified threshold level within the under-voltage range of 85% to 90% of nominal voltage, except where a Generating System is directly connected to the SWIS with no step-up or connection

**Asynchronous generating systems**

(f) Subject to any changed *power system* conditions or energy source availability beyond the *Generator's* reasonable control, a *generating system* comprised of *asynchronous generating units*, in respect of the types of fault described in subparagraphs (c)(2) to (4), must have *facilities* capable of supplying to or absorbing from the *network*:

(1) to assist the maintenance of *power system voltages* during the fault:





(i) capacitive reactive current in addition to its pre-disturbance level of at least 4% of the maximum continuous current of the *generating system* including all operating *asynchronous generating units* (in the absence of a disturbance) for each 1% reduction of *voltage* at the *connection point* below the relevant range in which a reactive current response must commence, as identified in subparagraph (g)(1), with the *performance standards* to record the required response agreed with *AEMO* and the *Network Service Provider*; and

(ii) inductive reactive current in addition to its pre-disturbance level of at least 6% of the maximum continuous current of the *generating system* including all operating *asynchronous generating units* (in the absence of a disturbance) for each 1% increase of *voltage* at the *connection point* above the relevant range in which a reactive current response must commence, as identified in subparagraph (g)(1), with the *performance standards* to record the required response agreed with *AEMO* and the *Network Service Provider*,

during the disturbance and maintained until *connection point voltage* recovers to between 90% and 110% of *normal voltage*, or such other range agreed with the *Network Service Provider* and *AEMO*, except for *voltages* below the relevant threshold identified in paragraph (h); and

(2) from 100 milliseconds after clearance of the fault, *active power* of at least 95% of the level existing just prior to the fault.

# MEETING AGENDA AND MINUTES

| Name of Meeting | Location | Date / Time | Written by |
|---|---|---|---|
| Issue 38 | 125 St Georges Tce, Perth | 28-06-2024<br>1:00-2:00pm | Njabulo Mlilo |

| Attendees | | Distribution |
|---|---|---|
| Njabulo Mlilo - BHP | | |
| Abhi Pandey - BHP | | |
| Shervin Fani – Woodside | | |
| Scott Hiscock - Woodside | | |

**Apologies**

N/A

**Agenda**

- I38 UFLS integrity & transparency

**Meeting Minutes**

**Issue background/Context.**

UFLS settings appear to take a set and forget approach at present.

No clarity whether NSPs has full confidence the scheme will operate as intended when called upon.

**Side issue discussed**: As PV penetration increases, some Dx feeders are expected to be back feeding to the network, how are these back feeding feeders monitored and discriminated from UFLS scheme operation.

**Options discussed.**

(a) Do nothing.
   a. Supporting argument is that there is already a requirement for customers to self-report for any material changes in their plant/facilities.
   b. Question is whether there a CMS underfrequency setting used as backup to enable NSP to remove customer loads that may not comply during an UFLS event?
   c. Disadvantage may be that human errors or equipment malfunctions not identified if not tested periodically.

(b) Formal compliance monitoring program.
   a. Advantage is that this will put checks and balances to ensure integrity of the overall UFLS scheme.
   b. Disadvantage is that mandated annual tests may be onerous on customer operations, these may require outages that impact production revenue.

(c) Self-regulation tied to customer periodic maintenance routines.
   a. Avoid mandated outages.
   b. Testing done by customers as part of their periodic maintenance routines
   c. Accountability put on customers for UFLS settings assigned to their facilities

**Actions**

| Item | Discussion and Decisions | Action By | Due Date |
|---|---|---|---|
| 1 | Send meeting minutes to attendees | N Mlilo | 28/06/2024 |
| 2 | Review minutes comments | All | Midday 01/07/2024 |
| 3 | | | |
| 4 | | | |

| | | | |
|---|---|---|---|
| 5 | | | |
| 6 | | | |
| 7 | | | |

**Next Steps**

**Background information – approach taken by others**

WEM Rules clauses

> 3.6.10. Each Network Operator must, in respect of its Network, provide a report to AEMO on the compliance of its UFLS Specification with the UFLS Requirements:
>
> (a) annually, on the projected ability to meet the requirements over a future ten-year horizon; and
>
> (b) within a timeframe agreed with AEMO, both parties acting reasonably, following each under frequency load shedding event.
>
> 3.6.11. Without limiting AEMO's ability to amend the UFLS Requirements in accordance with this section 3.6, AEMO must review the UFLS Requirements to ensure they are appropriate and consistent with the requirements of this section 3.6 within three years of the date the UFLS Requirements are first published by AEMO under clause 3.6.1(b) and then at least once in every three-year period from completion of the previous review.

**NEM Rules clauses**

### 5.7.4 Routine testing of protection equipment

(a) A *Registered Participant* must co-operate with any relevant *Network Service Provider* to test the operation of equipment forming part of a *protection system* relating to a *connection point* at which that *Registered Participant* is *connected* to a *network* and the *Registered Participant* must conduct these tests:

(1) prior to the *plant* at the relevant *connection point* being placed in service; and

(2) at intervals specified in the *connection agreement* or in accordance with an asset management plan agreed between the *Network Service Provider* and the *Registered Participant*.

(a1) A *Network Service Provider* must institute and maintain a compliance program to ensure that its *facilities* of the following types, to the extent that the proper operation of a *facility* listed in this clause may affect *power system security*, operate reliably and in accordance with their performance requirements under schedule 5.1:

(1) *protection systems*;

(2) *control systems* for maintaining or enhancing *power system* stability;

(3) *control systems* for controlling *voltage* or *reactive power*; and

(4) *control systems* for *load shedding*.

**Note**

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(a2) A compliance program under clause 5.7.4(a1) must:

(1) include monitoring of the performance of the *facilities*;

### S5.1.10.3 Transmission Network Service Providers

*Transmission Network Service Providers* must:

(a) conduct periodic functional tests of the *load shedding facilities* and *emergency frequency control schemes*; and





(b) notify *Distribution Network Service Providers* regarding the settings of under-voltage *load* shed relays as determined by *AEMO* in consultation with the *Transmission Network Service Provider*.