Department of Energy and Economic Diversification

GOVERNMENT OF WESTERN AUSTRALIA

Energy Policy WA

Meeting Agenda

Meeting Title:	Pilbara Advisory Committee (PAC)
Date:	Thursday 23 July 2026
Time:	1:30 PM – 3:30 PM
Location:	Online

#	Item	Responsibility	Type	Duration
1	Welcome and Agenda • Conflicts of interest • Competition Law	Chair	Noting	3 min
2	Meeting Apologies/Attendance	Chair	Noting	3 min
3	Minutes of Meeting 2026_05_21 Published 22 June 2026	Chair	Noting	2 min
4	PAC Action Register	Chair	Noting	2 min
5	ISO Pre-Rule Change Proposal Consultation	ISOCo	Discussion	30 min
6	EPNR Update on Working Group Meetings • WG outcomes on NSP-to-NSP Connection Framework (18 June) • Updates on the HTR (2 July) • Initial discussion on confidential information framework LT Planning and ESS (9 July)	DEED Tim Robinson	Discussion	75 min
7	General Business	Chair	Discussion	5 min
	Next meeting: 17 September 2026 at 1:30pm			

Please note, this meeting will be recorded.

Competition and Consumer Law Obligations

Members of the PAC (**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 PAC 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

(a) 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: PAC Action Register

Pilbara Advisory Committee (PAC) Meeting 2026_07_23

Shaded	Shaded action items are actions that have been completed since the last PAC meeting. Updates from last PAC 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
1/2026	Working Group (HTR) to consider whether transitional arrangements are required, particularly for storage standards planned for Q4 2026.	DEED	2026_03_26	Closed WG Meeting held on 2 July 2026. Debrief on meeting provided in Agenda Item 6.
2/2026	DEED and ISO to clarify the process for progressing the incident investigation recommendations, including the role of the PAC and interaction with the ISO consultation processes.	DEED ISOCo	2026_05_21	Closed See Agenda Item 5.
3/2026	DEED to develop scenarios and diagrams to clarify NSP-to-NSP connection arrangements.	DEED	2026_05_21	Closed

Item	Action	Responsibility	Meeting Arising	Status
				WG Meeting held on 18 June 2026. Debrief on meeting provided in Agenda Item 6.
4/2026	DEED to consider early rule changes (Package 0) to address ISO model access issues.	DEED	2026_05_21	Open
5/2026	Powering WA to provide a further update to the PAC on CEFC funding allocation when additional information becomes available.	DEED	2026_05_21	Open
6/2026	DEED to consider the need for an additional PAC meeting following further working group progress.	DEED	2026_05_21	Open

Department of Energy and Economic Diversification

GOVERNMENT OF WESTERN AUSTRALIA

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Agenda Item 5: ISO Pre-Rule Change Proposal Consultation

Pilbara Advisory Committee (**PAC**) Meeting 2026_07_23

1. Purpose

The purpose of this agenda item is for the ISO to consult the PAC, under Rule A2.5.1A of the Pilbara Networks Rules (PNR), prior to commencing the development of a Rule Change Proposals and Procedure Change Proposals relating to recommendations in the ISO's investigation report into the incident on 22 November 2025.

2. Recommendation

That the PAC:

(1) notes the information provided in the Concept Paper (**Attachment 1**) and ISO's investigation report (**Attachment 2**); and

(2) provides feedback prior to the ISO commencing the development of a Rule Change Proposal.

3. Background

- On 26 March 2026, ISO provided the Pilbara Advisory Committee (PAC) with a high-level overview of the incident on the North West Interconnected System (NWIS) that occurred on 22 November 2025 involving widespread loss of supply on the covered networks ("the incident").
- On 20 May 2026, ISO published its investigation report under Rule 197 of the Pilbara Networks Rules ("the Rules") and sought stakeholder feedback. The report is found in **Attachment 2**.
- The ISO has received six submissions, which will be published subject to the confidentiality processes in Subchapter 11.2 of the PNR.
- On 21 May 2026, ISO provided the PAC with a briefing and overview of the report and recommendations.
- Rule 197 requires ISO's investigation report to recommend changes to the Rules, procedures and operational practices that ISO considers necessary or desirable. Rule 198 stipulates that if the ISO considers, following discussions or an investigation under Subchapter 7.6 of the Rules that a change to the Rules or a procedure is necessary or desirable, it must submit a suitable rule change proposal or procedure change proposal, as applicable.
- The investigation report featured 12 recommendations including 8 rule changes and 1 procedure change.
- Before commencing the development of a Rule Change Proposal, the ISO must consult with the PAC on:

    - the matters to be addressed by the Rule Change Proposal and, if applicable, the nature and scope of the support or assistance requested by another party;
    - what options exist to resolve the matters to be addressed by the Rule Change Proposal;
    - the ISO's estimated costs to be recovered through fees of developing the Rule Change Proposal or providing the support or assistance requested by the other party;
    - whether and when the ISO should develop the Rule Change Proposal or if the ISO should provide the support or assistance requested by another party; and
    - whether and how the Pilbara Advisory Committee will be consulted during the development of the Rule Change Proposal,
- The ISO must take account of any feedback the PAC may provide in deciding whether, when and how to develop the Rule Change Proposal (A2.5.1A of the PNR).

Details of the ISO's proposed Rule and Procedure changes are to be provided in the PAC meeting, with reference to the materials in **Attachment 1** and **Attachment 2**.

4. Next Steps

- Taking account of any matters raised by the PAC in the meeting and submissions received on the ISO's investigation report, the ISO may develop a Rule Change Proposal and Procedure Change Proposal for the matters listed in **Attachment 1**, specifically,
    - Generator black-start and dual fuel capabilities to become standing data
    - Introduce head of power in PNR for System Restart Procedure
- For matters agreed to be progressed through DEED reforms, ISO will work with DEED to ensure the matters are included in the appropriate reform initiatives and associated consultation processes. These matters proposed in **Attachment 1** include:
    - Develop outage assessment procedure
    - Develop outage risk assessment framework
    - Develop list of equipment for which planned outages must be notified and coordinated through the PNR
    - Develop mechanism to reclassify non-credible contingencies to credible contingencies during certain planned outages
    - New regime for protected events and special protection regimes
    - Clarify role of gas supply infrastructure in PNR outage coordination regime
    - Include procedural fairness processes in PNR relating to publication of informal discussion notes and investigation reports
- ISO will consider all stakeholder submissions on the investigation report when developing or contributing to the proposed rule and procedure changes.

5. Attachment

(1) Agenda Item 5 – Attachment 1 - Concept paper - 22 Nov 2025 Blackout Recommended Rule Changes_v1.0

(2) Agenda Item 5 – Attachment 2 – NWIS Blackout 22 November 2025 Report

Pilbara ISOCo
Independent System Operator

CONCEPT PAPER

22 NOVEMBER 2025 BLACKOUT RULE CHANGES

9 July 2026

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1. Introduction

1.1.1 On 26 March 2026, the ISO provided the Pilbara Advisory Committee (PAC) with a high-level overview of the 22 November 2025 incident on the North West Interconnected System (NWIS), which involved widespread loss of supply on the covered networks.

1.1.2 On 20 May 2026, the ISO published its investigation report under Rule 197 of the Pilbara Networks Rules (PNR) and sought stakeholder feedback. The ISO has received six submissions, which will be published subject to the confidentiality processes in Subchapter 11.2 of the PNR.

1.1.3 On 21 May 2026, the ISO briefed PAC on the investigation report, including the report's findings and recommendations.

1.1.4 Rule 197 requires an ISO investigation report to recommend any changes to the PNR, procedures or operational practices that the ISO considers necessary or desirable. Rule 198 provides that, where the ISO considers following discussions or an investigation under Subchapter 7.6 that a change to the PNR or a procedure is necessary or desirable, the ISO must submit a suitable rule change proposal or procedure change proposal, as applicable.

1.1.5 The investigation report made 12 recommendations. Of those, this Concept Paper focuses on the recommendations that involve proposed changes to the PNR or related procedures.

1.1.6 This Concept Paper is provided to PAC under Rule A2.5.1A of the PNR. Before commencing development of a rule change proposal, the ISO must consult PAC on:

- the matters to be addressed by the rule change proposal;
- the options available to resolve those matters;
- the ISO's estimated costs, to be recovered through fees, of developing the rule change proposal;
- whether the ISO should develop the rule change proposal or assist another party to do so; and
- whether and how PAC should be consulted during development of the rule change proposal.

The ISO will consider any advice, comments or objections provided by PAC members or observers before deciding whether, when and how to develop the relevant rule change proposal or procedure change proposal.

2. Recommended Rule Changes

2.1 Recommendations of the Investigation Report

2.1.1 For PAC members' convenience, Appendix 1 restates the investigation report recommendations that involve proposed rule or procedure changes arising from the 22 November 2025 incident. Appendix 1 should be read together with the ISO's investigation report, which contains the full analysis and rationale for each recommendation.

Consultation question

1. *Do PAC members agree that rule and procedure changes should be pursued to address the recommendations proposed in Table 3?*

2.2 Interaction with DEED Reforms

2.2.1 Several recommended rule changes overlap with reforms being progressed by the Department of Energy and Economic Diversification (DEED) through the Evolution of the Pilbara Networks Rules (EPNR) process.

2.2.2 Table 1 identifies how each recommendation may interact with DEED reform initiatives and proposes a pathway to progress the relevant rule and procedure changes in an efficient and coordinated manner.

2.2.3 Table 1 proposes one of the following pathways for each recommendation:

(a) **Progress the change through the existing EPNR process –** Under this option, the relevant change would be developed through DEED's EPNR process. PAC consultation would occur through the consultation mechanisms used for that process, including HTR and PNR working group meetings and any public consultation on draft rule changes determined by DEED.

(b) **Progress the change through a new ISO-led proposal –** Under this option, the ISO would develop the relevant rule change proposal or procedure change proposal under the PNR. PAC consultation would occur through the standard PNR consultation processes for those proposals.

Consultation question

2. *Do PAC members agree with the proposed pathways in Table 1 for progressing the recommended rule and procedure changes?*
   - *changes progressed through EPNR would be developed through DEED's reform process; and*
   - *changes progressed by the ISO would be developed under the PNR rule or procedure change processes.*

Table 1 – Interactions with DEED reforms and proposed pathway to progress recommended rule changes

Item	Relevant Rule/ Procedure clauses	Rule or procedure change recommendation from the 22 November 2025 investigation report	Interaction with EPNR reforms	Proposed pathway for rule or procedure change
1	PNR 166, 181(2)	**Develop outage assessment procedure**	EPNR Consultation Paper: - Proposal 10.2: All registered facilities on an outage planning list will be required to participate. - Proposal 10.3: The outage planning list will be published from time to time by the ISO and will contain the facilities of which outages have the potential to materially impact PSSR. - Proposal 10.8: The ISO must develop an outage assessment procedure containing a risk-based outage assessment framework, in consultation with connected parties. - Proposal 10.9: The ISO must assess outages according to the assessment framework and must approve outages unless doing so would have a material impact on PSSR. Draft PNR Implementation Plan: - Action ID 15: Develop and consult on outage coordination process, including risk framework - Action ID 16: Develop criteria for outage equipment list - Action ID 17: Develop procedure to help participants identify outage impacts. PAC 21 May 2026 papers: - Pack zero initial rule change: a head of power for ISO to develop outage regime	**Proposed pathway:** To be progressed through EPNR reforms **Rationale:** Existing changes to the HTR and PNR are in train through the EPNR reforms to deliver this recommendation.
2	PNR 166, 181(2)	**Develop outage risk assessment framework**		
3	PNR 166, 181(2)	**Develop list of equipment for which planned outages must be notified and coordinated through the PNR**		
4	PNR 166, 181(2)	**Develop mechanism to reclassify non-credible contingencies to credible contingencies during certain planned outages**		

Item	Relevant Rule/ Procedure clauses	Rule or procedure change recommendation from the 22 November 2025 investigation report	Interaction with EPNR reforms	Proposed pathway for rule or procedure change
			- Pack 3 (ISO-led): The ISO will lead discussion of these topics at the PNR working group during Q3: o Outage coordination process, including risk assessment framework o Criteria for including equipment on the outage planning list	
5	Interim Registration and Standing Data Procedure 3.5.1	**Generator black-start and dual fuel capabilities to become standing data**	No overlap or interaction with the EPNR reforms has been identified.	**Proposed pathway:** To be progressed as a new ISO-led procedure change proposal **Rationale:** No overlap or interaction with the EPNR reforms has been identified. Accordingly, this procedure change is best progressed through a discrete ISO-led procedure change proposal. The recommendation concerns operational arrangements for identifying and managing existing system restart resources. It does not require new commercial arrangements and is less directly connected to the future network build-out matters being addressed through the EPNR reforms.
9	Operational practice – managing interconnector overloads	**Operational practice to manage interconnector overloads**	EPNR WG 2 July 2026 papers: - Draft amending rules developed under Issue 28 Special Protection Schemes seek to introduce Rule 198A outlining new powers and obligations with respect to protected events (low probably, high impact non-credible contingencies).	**Proposed pathway:** To be progressed through EPNR reforms **Rationale:**

Item	Relevant Rule/ Procedure clauses	Rule or procedure change recommendation from the 22 November 2025 investigation report	Interaction with EPNR reforms	Proposed pathway for rule or procedure change
			- Members of the HTR working group formed under the EPNR framework were provided with draft amending rules on 23 January 2026 and WG discussions on the proposed changes are ongoing. - ISO understands DEED intends to undergo public consultation on the draft amending rules in the near future.	Existing changes to the HTR and PNR are in train through the EPNR reforms to deliver this recommendation.
10	PNR 192	**Introduce head of power in PNR for System Restart Procedure**	No overlap or interaction with the EPNR reforms has been identified.	**Proposed pathway:** To be progressed as a new ISO-led rule change proposal. **Rationale:** No overlap or interaction with the EPNR reforms has been identified. Accordingly, this rule change is best progressed through a discrete ISO-led rule change proposal. The recommendation concerns the governance and oversight of existing system restart arrangements. It does not require new commercial structures and is less directly connected to the future network build-out matters being addressed through the EPNR reforms.
11	PNR 8 "equipment"	**Clarify role of gas supply infrastructure in PNR outage coordination regime**	EPNR Consultation Paper: - Proposal 10.2: All registered facilities on an outage planning list will be required to participate.	**Proposed pathway:** To be progressed in a more limited form through EPNR reforms related to the outage planning list.

Item	Relevant Rule/ Procedure clauses	Rule or procedure change recommendation from the 22 November 2025 investigation report	Interaction with EPNR reforms	Proposed pathway for rule or procedure change
			- Proposal 10.3: The outage planning list will be published from time to time by the ISO and will contain the facilities of which outages have the potential to materially impact PSSR. Draft PNR Implementation Plan: - Action ID 16: Develop criteria for outage equipment list PAC 21 May 2026 papers: - Pack 3 (ISO-led): The ISO will lead discussion of these topics at the PNR working group during Q3: o Criteria for including equipment on the outage planning list	**Rationale:** The purpose of this recommendation is to ensure that gas supply infrastructure is appropriately recognised in the outage planning regime where that infrastructure can materially affect NWIS security or reliability. ISO considers this to be an urgent improvement given the frequency and significance of gas-supply-related incidents on the NWIS. Changing the definition of "equipment" is one way to address this issue. However, that approach may also affect other parts of the PNR that rely on the same definition, including CPC compliance and legacy standards. However, other avenues to deliver the required improvements to the outage coordination regime may exist within the broad suite of rule and procedure changes that are likely to arise through the EPNR reforms of the outage coordination regime. Given the urgency of this change and the wider implications of changing the defined term for "equipment" that would likely demand prolonged consideration, ISO proposes to achieve the aim of this recommendation through existing EPNR reforms relating to outage coordination.
12	PNR 196, 197	**Include procedural fairness processes in PNR relating to publication of informal discussion notes and investigation reports**	EPNR WG 2 July papers: - Draft amending rules developed under Issue 28 Special Protection Schemes seek to introduce Rule 198A outlining new powers and obligations with respect to protected events (low probably, high impact non-credible contingencies).	**Proposed pathway:** To be progressed through EPNR reforms, specifically, HTR issue 28 relating to ISO's investigation function. **Rationale:**

Item	Relevant Rule/ Procedure clauses	Rule or procedure change recommendation from the 22 November 2025 investigation report	Interaction with EPNR reforms	Proposed pathway for rule or procedure change
			- Members of the HTR working group formed under the EPNR framework were provided with draft amending rules on 23 January 2026 and WG discussions on the proposed changes are ongoing. - ISO understands DEED intends to undergo public consultation on the draft amending rules in the near future.	This rule change can be readily bundled into the PNR rule changes associated with EPNR HTR issue 28, which seeks to introduce changes to Subchapter 7.6 to expand ISO and NSP functions with respect to formal investigations under Rule 197. ISO considers it efficient for both ISO and stakeholders to bundle these changes with other rule changes that are already in train.

2.3 ISO's Estimated Costs

2.3.1 ISO's estimated additional costs of progressing the recommended rule and procedure changes as proposed in Table 1 are shown in Table 2.

Consultation question

3. *Do PAC members have any comments on the ISO's estimated additional costs in Table 2 for progressing the proposed rule and procedure changes?*

Table 2 - ISO costs of proposed pathways for rule and procedure changes

Recommendations	Estimated additional ISO costs to be recovered through ISO fees	Comments
To be progressed through EPNR reforms 1 Develop outage assessment procedure 2 Develop outage risk assessment framework 3 Develop list of equipment for which planned outages must be notified and coordinated through the PNR 4 Develop mechanism to reclassify non-credible contingencies to credible contingencies during certain planned outages 9 Operational practice to manage interconnector overloads 11 Clarify role of gas supply infrastructure in PNR outage coordination regime 12 Include procedural fairness processes in PNR relating to publication of informal discussion notes and investigation reports	$0	Funded from the approved budget for EPNR reforms. Any increase in reform expenditure from incorporating these recommendations into existing initiatives is expected to be negligible.
To be progressed as a new ISO-led procedure change proposal 5 Generator black-start and dual fuel capabilities to become standing data	$0	Delivered in-house with existing resources.
To be progressed as a new ISO-led rule change proposal 10 Introduce head of power in PNR for System Restart Procedure	$40,000	Allowance for support from external subject matter experts. Costs are expected to be met from the approved 2026/27 budget.

Appendix 1 Investigation Report's Recommended Rule and Procedure Changes

Table 3 - Recommendations of the investigation report involving rule and procedure changes

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
1	PNR 166, 181(2)	**Develop outage assessment procedure** i. EPWA to expedite rule changes and associated reforms under proposal 10 (outage planning and timing) of the EPNR consultation paper concerning development of an outage assessment procedure.	ISO considers the PNR places adequate legal obligations on controllers of registered facilities to notify their NSP of planned outages affecting the facility (however, see recommendation 2 and its rationale). The Protocol Framework Procedure further clarifies roles and responsibilities for unplanned outages. However, ISO notes the PNR does not expressly empower the development of a procedure for coordinating planned outages. A dedicated procedure would provide clearer, more practical guidance on Rules Participants' roles, responsibilities and expectations for planned-outage coordination. ISO has raised similar comments in its Issues Paper and Draft Decision for its review of Subchapter 7.3 and 7.4 conducted in 2024. ISO notes that EPWA is proposing reforms to the outage coordination regime that would address these concerns.
2	PNR 166, 181(2)	**Develop outage risk assessment framework** i. EPWA to expedite rule changes and associated reforms under proposal 10 (outage planning and timing) of the EPNR consultation paper concerning development of an outage risk assessment framework.	The Factual Report found that TransAlta did not notify its NSP of the planned works at SHPS because it had successfully completed the works on numerous occasions previously without incident and so therefore the works were not classified as a Notifiable Event, i.e. that it was not the case that the works "might credibly be expected to adversely affect… security or reliability" (r166). The Factual Report further found that even though the works had occurred without incident previously, it would be reasonable to expect that a failure would represent a single point failure mode with a potential to initiate a Non-Credible Contingency. ISO's view is also that, even if the works had been notified, the lack of guidance within the regime regarding risks associated with particular notified works means it is uncertain whether any mitigations would have been identified as necessary. ISO considers the PNR provides insufficient guidance for registered facility controllers, registered NSPs and ISO to determine when a planned outage

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
			presents enough risk - if uncoordinated or unmitigated - to warrant coordination under the PNR outage coordination regime. The lack of a risk assessment criteria undermines both the effectiveness of the requirement to notify as well as the system coordination regime's ability to adequately manage works once notified. ISO raised similar issues in Section 6.4 of the Draft Decision for its 2024 review of Subchapter 7.3 and 7.4 and proposed a standardised risk assessment framework to address them. ISO notes EPWA is proposing reforms to the outage coordination regime that would address these concerns.
3	PNR 166, 181(2)	**Develop list of equipment for which planned outages must be notified and coordinated through the PNR** i. EPWA to expedite rule changes and associated reforms under proposal 10 (outage planning and timing) of the EPNR consultation paper concerning development of a list of equipment for which planned outages must be notified and coordinated through the PNR. ii. The equipment list should include at least the following items: - Black-start systems - Dual fuel enabling systems - Equipment presenting a single point of failure for a registered generating facility or registered storage facility iii. Details of tests for the types of equipment to be included on the list are to be advanced during detailed design of the relevant rules and procedure, in consultation with rules participants. iv. The equipment list should be developed in a way that does not require facility operators to provide a full component list, or to undergo the outage management process for every maintenance task.	As above, the Factual Report found that work was being undertaken on a power station's subsystem that presented a single point of failure for the entire power station. Such systems and related maintenance activities present an elevated risk of significant contingencies that may threaten system security. ISO raised similar points in Section 6.4 of the 2024 Draft Decision for its review of Subchapter 7.3 and 7.4, proposing an equipment list to which the outage assessment process would apply. The Draft Decision addresses single points of failure specifically (see Case study 4). ISO notes that EPWA is proposing reforms to the outage coordination regime that would address these concerns. The Factual Report also highlights that planned-outage coordination is critical to maintaining the availability of black-start systems and dual-fuel capability across the NWIS, helping minimise restoration times. These systems should be explicitly managed under the PNR outage coordination regime.

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
4	PNR 166, 181(2)	**Develop mechanism to reclassify non-credible contingencies to credible contingencies during certain planned outages** i. EPWA to expedite rule changes and associated reforms under proposal 10 (outage planning and timing) of the EPNR consultation paper concerning development of an outage assessment procedure and outage risk assessment framework. ii. The outage assessment procedure and relevant PNR rules are to include a mechanism enabling the ISO to re-classify non-credible contingencies to credible contingencies for planned notifiable events (outages or testing) that alter the risk profile of the non-credible contingencies. iii. The outage risk assessment framework is to be developed so as to enable formulation of the risk profiles of the relevant contingencies with and without planned notifiable events. iv. Reclassification decisions by ISO must be supported by risk assessments made under the outage risk assessment framework.	EPWA's proposed outage assessment procedure and outage risk assessment framework in the EPNR consultation paper contemplate 'outage plans' submitted by the outage owner for ISO approval, setting out how outage risks will be mitigated. While detailed design is still to commence, ISO expects outage plans to apply a clear hierarchy of risk mitigations. For example, an outage plan for a planned outage affecting one of two redundant gas pressure skids at a large power station may consider the following mitigations (in order of preference): 1. Shift load from the power station to another facility. 2. Where dual fuel capability exists, operate on the alternative fuel for the duration of the outage. 3. Procure additional ESS to cover the contingency risk associated with the remaining gas skid (e.g. equipment fault or operator error). 4. If sufficient ESS is not available, issue constraint directions. Mitigations 3 and 4 could be supported by reclassifying the loss of the entire power station from non-credible to credible during the planned outage of the redundant gas pressure skid. Because these measures may impose costs on other participants, their use should be supported by robust risk assessments demonstrating that residual risk is commensurate with the exercise of those powers under the PNR (e.g. ESS limited to single credible contingencies). Reclassification decisions should therefore be governed by the same outage risk assessment framework that underpins outage plan approvals. Alternatively, mitigations 3 and 4 could be hard-coded in the Rules as permissible measures for planned outages. However, a reclassification mechanism is a cleaner approach: it enables the risk scenario to be managed using the full suite of tools under the PNR and HTR, applies existing guardrails, and avoids duplicating powers.
5	Interim Registration and Standing	**Generator black-start and dual fuel capabilities to become standing data**	The Factual Report demonstrates the importance of ISO Control Desk awareness of black-start and dual fuel capabilities across the NWIS.

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
	Data Procedure 3.5.1	i. ISO to add black-start and dual fuel capabilities to required standing data for registered generating facilities, update Registration and Standing Data Procedure accordingly. ii. ISO to provide standing data relating to black-start capabilities to ISO Control Desk for the purposes of system restoration.	Extending the list of standing data to include black-start and dual fuel capability will improve the ISO's ability to coordinate outages.
9	Operational practice – managing interconnector overloads	**Operational practice to manage interconnector overloads** i. EPWA to expedite proposed rule changes to – - enable the ISO to retrospectively classify non-credible contingency events as protected events; - mandate NSPs to investigate special protection schemes for protected event; - grant NSPs the discretion to invest in such schemes; and - require the ISO to publish the NSPs' decisions whether or not to invest in a special protection scheme.	ISO considers post-contingent protection schemes can be an effective way to mitigate low-probability, high-impact non-credible contingencies, where they can be implemented at reasonable cost without materially reducing reliability. However, the PNR does not currently provide a clear function or power for ISO or NSPs to investigate and implement special protection schemes. ISO understands EPWA is drafting rule changes to: - enable the ISO to retrospectively classify non-credible contingency events as protected events; - mandate NSPs to investigate special protection schemes for protected event; - grant NSPs the discretion to invest in such schemes; and - require the ISO to publish the NSPs' decisions whether or not to invest in a special protection scheme. ISO supports this initiative and considers it the appropriate pathway to introduce special protection schemes in the NWIS. The Factual Report suggests interconnector stability may be at risk during severe non-credible contingencies. Designing an effective scheme would require integrated consideration of generator and storage droop response, UFLS and UFIS settings, overcurrent protection, dispatch patterns, network reinforcement options, and related interactions.
10	PNR 192	**Introduce head of power in PNR for System Restart Procedure** i. ISO to propose rule to change to insert new rule requiring the ISO to develop and publish a System Restart Procedure to govern oversight of registered NSPs' System Restart Arrangements developed under	ISO considers effective black-start capability and testing are critical to system restoration. In ISO's view, this incident indicates gaps in the maintenance and testing regimes applied to black-start resources on the covered networks.

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
		Rule 192. The System Restart Procedure is to deal with the following matters: - Roles and responsibilities in System Restart Arrangements - Review and reporting requirements with respect to NSP System Restart Arrangements - Other minimum criteria for System Restart Arrangements ii. Consequential rule changes to Rule 192 integrating the System Restart Procedure. iii. Capture synchronisation points in the new procedure	System restart is governed by PNR 192, which requires each registered NSP to develop, maintain and be able to implement operational arrangements ("Network Restart Arrangements") to restart its network or any island following a shutdown. Rule 192 applies GEIP as the standard and gives ISO a review role to ensure the arrangements are interoperable and adequate and where they are not, ISO may direct changes. The ISO Control Desk coordinates system restart activities for the power system. Before this event, ISO had reviewed the arrangements and found them interoperable and adequate. The progressive restoration - from the Rio Tinto network to the Horizon Power network and then to the APA DEWAP network - demonstrates effective NSP coordination and restoration at a satisfactory pace. However, restoration was delayed in returning customers to pre-event load due to failures of black-start systems on the covered networks. ISO considers a stronger framework to manage and regulate system restart resources is warranted. Specifically: 1. ISO considers the Factual Report indicates black-start capabilities are not being maintained and tested to an adequate standard, increasing the risk of delayed restoration and extended outages. 2. ISO has no direct function to inquire into the maintenance and testing regimes for existing black-start facilities. ISO's system restoration functions are limited to reviewing NSP restart arrangements (Rule 192) and coordinating restart efforts (Rule 187). ISO proposes a stronger framework that recognises NSPs' central role in system restart while leveraging the existing Rules. This will be achieved by requiring ISO to publish a System Restart Procedure. The Procedure will clarify ISO's expectations for System Restart Arrangements, including: - the roles and responsibilities within Restart Arrangements, - timeframes and other requirements for reviews of restart arrangements, and - criteria for restart arrangements, including minimum requirements for maintenance and testing.

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
			One option to improve black-start performance would be to introduce a centrally procured and administered black-start ESS. However, at this stage ISO prefers to strengthen the existing arrangements in a way that is fit for the Pilbara by providing clearer guidance and expectations while leveraging existing facilities, skills and experience.
11	PNR 8 "equipment"	**Clarify role of gas supply infrastructure in PNR outage coordination regime** i. Update the definition of "equipment" in the PNR to explicitly include gas supply infrastructure (e.g. pipes, valves, skids) of a generating facility, if that gas supply infrastructure is owned or controlled by the same Rules Participant that owns or controls the other types of equipment within the generating facility.	The NWIS is supplied predominantly by gas-fired power stations. Since December 2024, all three underfrequency load shedding (UFLS) events on covered networks were initiated by issues with power station gas supply infrastructure. As a result, gas supply infrastructure plays a material role in NWIS security and reliability. PNR obligations to notify planned and unplanned events affecting power stations hinge on whether the relevant assets fall within the definition of "equipment": "*… wires, apparatus, equipment, plant and buildings used, or to be used, for or in Connection with, or to control, the generation, transportation, storage or consumption of electricity*." ISO considers this definition is open to differing interpretations as to whether power station gas supply infrastructure is included, and therefore whether it is subject to the PNR outage coordination regime. This ambiguity can create gaps where a Rules Participant owns gas supply infrastructure dedicated to a power station but outsources its operation and maintenance (i.e. control) to a third party (e.g. a local gas distribution network operator). In those circumstances, planned maintenance that affects power station reliability may not be notified to the outage coordination group. Similar risks arise where a registered controller concludes that gas supply infrastructure dedicated to its power station falls outside the definition of "equipment" and, as a result, does not notify its NSP of planned maintenance. Comparable issues arise in other jurisdictions. Gas supply infrastructure dedicated to a power station may sit outside the relevant electricity rules, leaving no rules participant responsible for coordinating its outages unless a direct impact is anticipated. ISO understands this may be addressed in

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
			some jurisdictions by seeking maintenance information directly from gas infrastructure operators (e.g. during low reserve events). In the Pilbara context, ISO considers registered controllers of generating facilities are best placed to notify planned maintenance and unplanned events relating to gas supply infrastructure within their ownership or control. The proposed change aims to achieve this without expanding the PNR to multi-user gas distribution infrastructure or introducing new Rules Participants.
12	PNR 196, 197	**Include procedural fairness processes in PNR relating to publication of informal discussion notes and investigation reports** i. ISO to propose rule change to amend PNR 196 and 197 to require ISO to conduct procedural fairness processes with rules participants named in publications prior to distributing or publishing a thing under these rules, offering those rules participants the opportunity to comment on the accuracy, completeness and fair representation of information relating to their organisations.	The PNR requires ISO to consult information owners on publications to identify and minimise the disclosure of confidential information. However, the PNR does not explicitly require ISO to give named Rules Participants an opportunity to correct factual errors, omissions or misrepresentations (procedural fairness). Publications under Rules 196 and 197 can affect the interests of named Rules Participants (specifically their reputations). ISO considers established common law principles support consulting with those participants and considering their input before publication, as occurred for this investigation. Embedding procedural fairness in Subchapter 7.6 of the PNR would increase transparency and confidence in ISO's publication processes and help set realistic expectations for investigation timeframes.

NWIS BLACKOUT 22 NOVEMBER 2025

INVESTIGATION REPORT

Published: 20 May 2026

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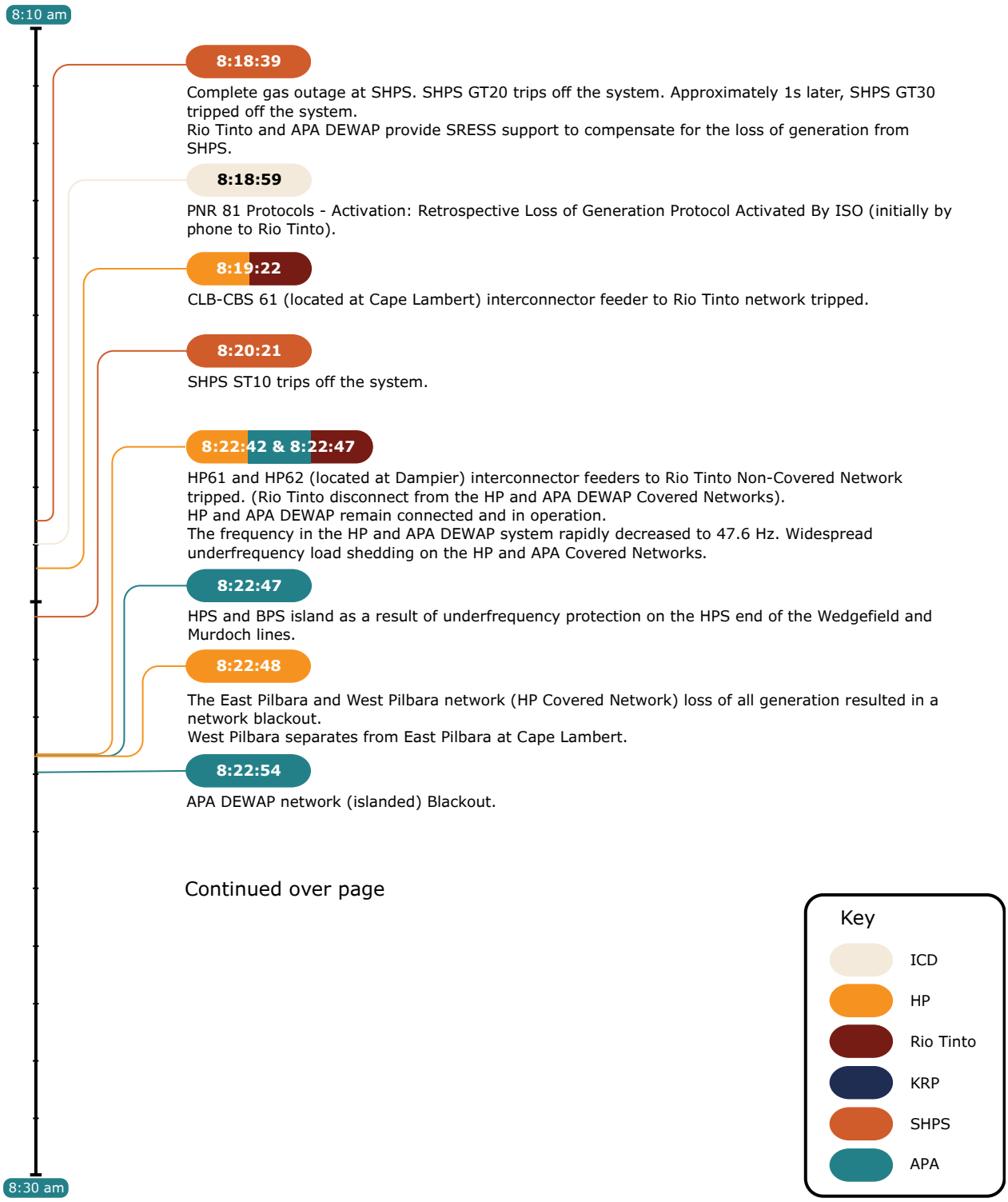
1. Executive Summary

1.1.1 At approximately 8:18 am on Saturday 22 November 2025, the North West Interconnected System (NWIS) experienced widespread underfrequency load shedding and islanding events, resulting in a total blackout of the East and West Pilbara covered networks. Supply was progressively restored and the system returned to normal operation by 3:15 pm.

1.1.2 ISO commenced a formal investigation under the Pilbara Networks Rules (PNR) on 25 November 2026. The investigation included engagement of an independent consultant (Future Grid Consultants Pty Ltd, FGC), collection of data and interviews with relevant Rules Participants (including the ISO Control Desk), preparation of a Detailed Report and a Factual Report, pre-disclosure of confidential information in accordance with PNR r197(7), (8) and r303, and a procedural fairness process consistent with common law principles. ISO provided an unredacted copy of its investigation report (including the Factual Report) to the Coordinator of Energy and the Economic Regulation Authority, and is publishing this report.

1.1.3 A high-level timeline of the event is given as follows:

Timeline of NWIS blackout event 22 November 2025



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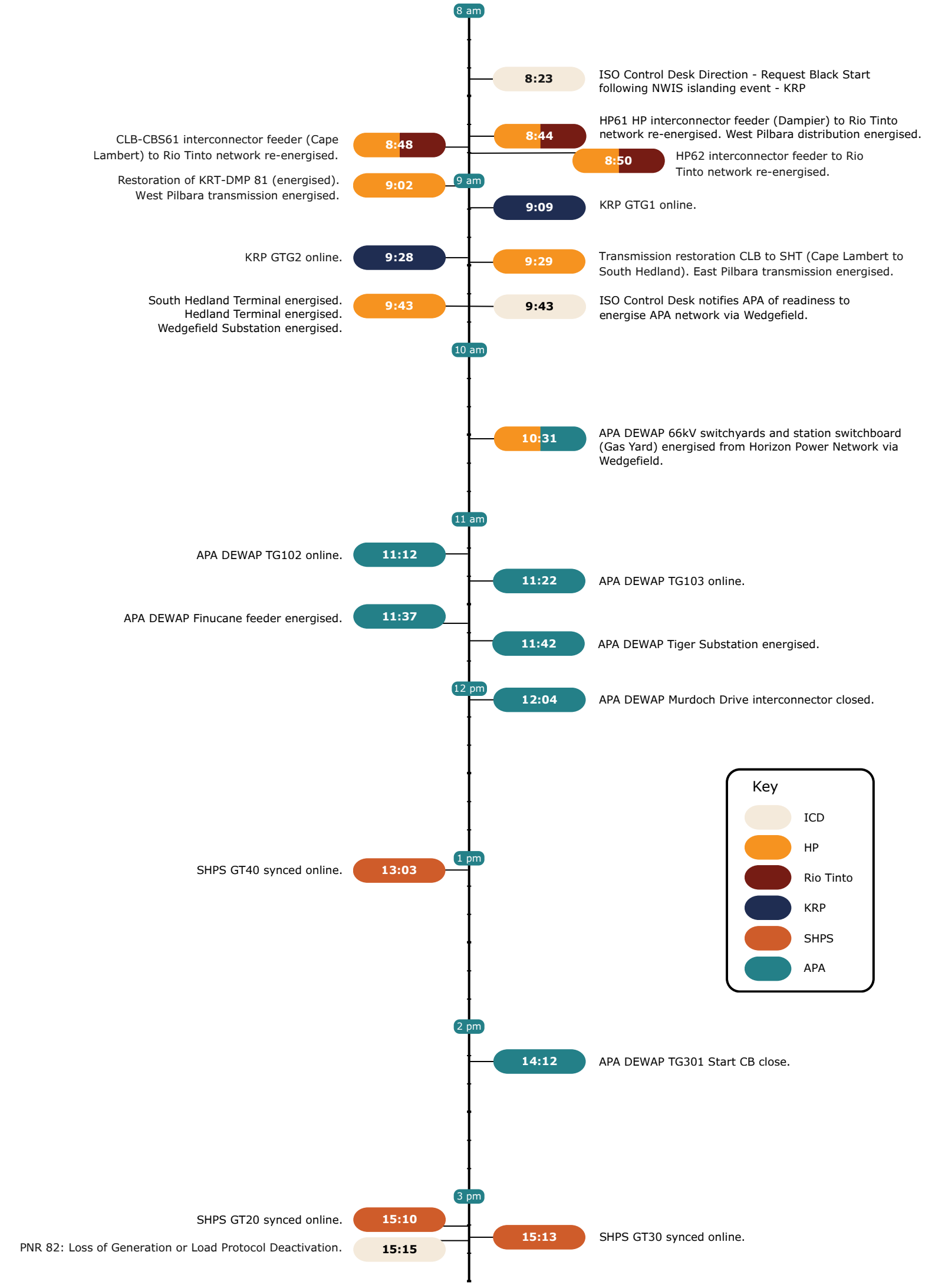
8 am
8:23
ISO Control Desk Direction - Request Black Start following NWIS islanding event - KRP
HP61 HP interconnector feeder (Dampier) to Rio Tinto network re-energised. West Pilbara distribution energised.
8:44
CLB-CBS61 interconnector feeder (Cape Lambert) to Rio Tinto network re-energised.
8:48
8:50
HP62 interconnector feeder to Rio Tinto network re-energised.
Restoration of KRT-DMP 81 (energised). West Pilbara transmission energised.
9:02
9 am
9:09
KRP GTG1 online.
KRP GTG2 online.
9:28
9:29
Transmission restoration CLB to SHT (Cape Lambert to South Hedland). East Pilbara transmission energised.
South Hedland Terminal energised. Hedland Terminal energised. Wedgefield Substation energised.
9:43
9:43
ISO Control Desk notifies APA of readiness to energise APA network via Wedgefield.
10 am
10:31
APA DEWAP 66kV switchyards and station switchboard (Gas Yard) energised from Horizon Power Network via Wedgefield.
11 am
APA DEWAP TG102 online.
11:12
11:22
APA DEWAP TG103 online.
APA DEWAP Finucane feeder energised.
11:37
11:42
APA DEWAP Tiger Substation energised.
12 pm
12:04
APA DEWAP Murdoch Drive interconnector closed.
Key
ICD
HP
Rio Tinto
KRP
SHPS
APA
SHPS GT40 synced online.
13:03
1 pm
2 pm
14:12
APA DEWAP TG301 Start CB close.
3 pm
SHPS GT20 synced online.
15:10
15:13
SHPS GT30 synced online.
PNR 82: Loss of Generation or Load Protocol Deactivation.
15:15

1.1.4 Under PNR r197(6), ISO must publish a report on its investigation that includes –

(a) any reports provided under r195(b)(i) (after removing information that should not be released under Subchapter 11.2),

(b) any occasions where a person purported to rely on r172 to not comply with a Protocol or System Operations Direction or Pre-Contingent Direction during the incident, and

(c) a description of changes to the Rules, Procedures or operating practices that ISO considers necessary or desirable.

1.1.5 ISO's recommended changes to the rules, procedures and operational practice are summarised in the following table. More detail on these recommendations is set out in Table 2.

Recommendations - Rules/Procedures/Operating Practices	
1	Develop outage assessment procedure
2	Develop outage risk assessment framework
3	Develop list of equipment for which planned outages must be notified and coordinated through the PNR
4	Develop a mechanism to reclassify non-credible contingencies to credible contingencies during certain planned outages
5	Generator black-start and dual fuel capabilities to become standing data
6	NSPs to review UFLS arrangements with large consumers
7	Review technical standards for underfrequency load shedding and islanding
8	Review overcurrent protection settings and power transfer capacity of HP-RTIO interconnectors
9	Operational practice to manage interconnector overloads
10	Introduce head of power in PNR for System Restart Procedure
11	Clarify role of gas supply infrastructure in PNR outage coordination regime
12	Include procedural fairness processes in PNR relating to publication of informal discussion notes and investigation reports

1.1.6 ISO is inviting stakeholder submissions by 25 June 2026. Submissions will be used to inform ISO's rule and procedure change proposals and to guide other actions arising from the investigation. ISO will publish all public stakeholder submissions alongside this report on ISO's website.

2. Investigation Scope and Process

2.1.1 At approximately 8:18 am on the morning of Saturday 22 November 2025, the NWIS experienced widespread underfrequency load shedding and islanding events resulting in a total black out of the East and West Pilbara covered networks. Supply was progressively restored and the system returned to normal operation by 3:15 pm.

2.1.2 On 25 November 2026 ISO commenced a formal investigation under the PNR. The scope of the investigation is to:

(a) Determine the causes, consequences, surrounding and antecedent circumstances

(b) Assess compliance with PNR, Harmonised Technical Rules and Procedures (particularly the Protocol Framework Procedure), including:

i. assess the appropriateness of communications between Network Service Providers (NSPs), the ISO Control Desk and the ISO

ii. load shedding requirements and droop response under the Harmonised Technical Rules

iii. whether operational and maintenance practice aligned with Good Electricity Industry Practice (GEIP) as defined in the PNR

(c) Review the availability and suitability of the ISO's arrangements for Essential System Services (ESS) at the time of the incident

(d) Understand the impact to consumers of electricity

(e) Highlight potential mitigation strategies available to NSPs, ISO and network participants to prevent such incidents in the future, or to reduce their impact on the security and/or reliability of the power system

(f) Recommended changes to the Rules, Procedures or operating practices.

2.1.3 The investigation process consisted of the following steps:

(a) Procure a consultant (Future Grid Consultants or "FGC") to conduct an independent investigation.

(b) Data collection and interviews between the consultant and relevant rules participants, including the ISO and ISO Control Desk. The rules participants that were consulted in the investigation are listed in Table 1.

(c) Development of a detailed investigation report by the independent consultant, including a comprehensive statement of facts, analysis, findings and recommendations ("Detailed Report").

(d) Development of a factual report by the independent consultant, including a comprehensive statement of facts, analysis, and objective findings, but excluding the consultant's subjective findings and recommendations ("Factual Report").

(e) Pre-disclosure process with information owners on the Factual Report in accordance with PNR r197(7), (8) and r303.

(f) Procedural fairness process with information owners in accordance with principles established at common law. The purpose of this process is to afford rules participants

the opportunity to respond to statements that may adversely impact a rules participant's interests (including reputation) prior to publishing.

(g) Provide an unredacted copy of ISO's investigation report including the independent consultant's Factual Report (this report) to the Coordinator of Energy[1] and the Authority[2].

(h) Publish this report.

(i) Invite stakeholders to make public submissions, and publish those submissions alongside ISO's investigation report.

Table 1 - Rules participants consulted in the investigation

Rules Participant	Role
APA DEWAP Pty Ltd (APA DEWAP)	Registered controller of the APA DEWAP covered network and Port Hedland Power Station (PHPS)
ATCO Pty Ltd (ATCO)	Owner and operator of Karratha Power Station (KRP)
BHP Iron Ore Pty Ltd (BHP)	Registered controller of the Finucane Island and Nelson Point port operations and associated excluded network in Port Hedland
Fortescue Ltd (FMG)	Registered controller of the Fortescue Port Network and associated excluded network in Port Hedland
Hancock Iron Ore Pty Ltd (HIO)	Registered controller of the Roy Hill Port and associated excluded network in Port Hedland
Pilbara Iron Pty Ltd (Rio Tinto)	Registered controller of the Rio Tinto non-covered network and various facilities connected to it
Pilbara ISOCo Ltd (ISO)	Independent System Operator of the NWIS
Regional Power Corporation (t/a Horizon Power), networks business (HP Networks)	Registered controller of the Horizon Power Pilbara covered network and delegate for the ISO Control Desk
Regional Power Corporation (t/a Horizon Power), generation business (HP Generation)	Registered controller of the Karratha Power Station
TEC Hedland Pty Ltd (TransAlta)	Registered controller of the South Hedland Power Station (SHPS)

2.1.4 An overview of the investigation process is given in Figure 1.

2.1.5 This report does not deal with suspected non-compliance breaches. Any suspected non-compliance breaches that may arise in connection with this incident investigation will be dealt with through the processes established in the Compliance Procedure.

[1] Currently appointed to Energy Policy WA (EPWA), a group within the Department of Energy and Economic Diversification of the State Government of Western Australia.

[2] The Economic Regulation Authority (ERA) of Western Australia.

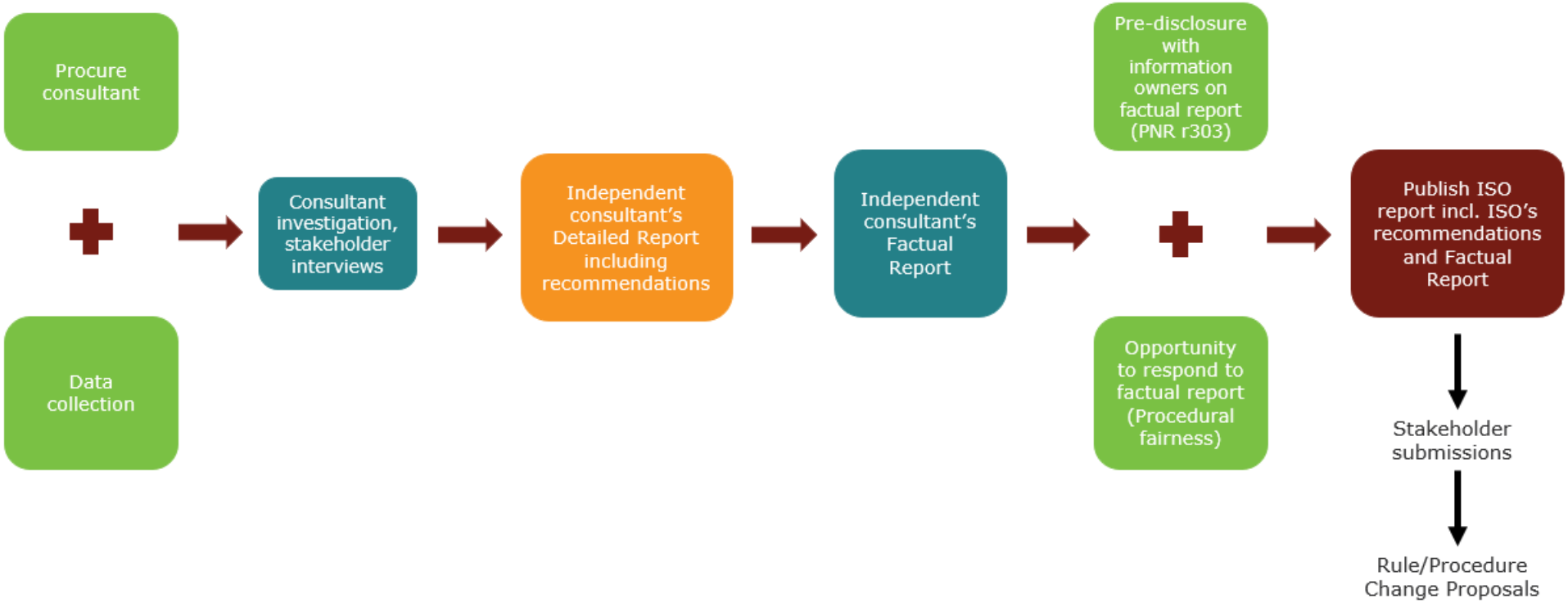

Figure 1 - Investigation process overview

3. Relevant Rules

3.1.1 Subchapter 7.6 {Post-incident discussion and investigation} of the Rules deals with the informal discussions and formal investigations relating to power system incidents.

3.1.2 Rule 193 of the Rules sets out the objectives of informal discussions and investigations as follows:

3.1.3 The primary objective of Subchapter 7.6 {Post-incident discussion and investigation} of the Rules is to enable and promote –

(a) continuous improvement of these Rules, the Procedures, and the operation of the Power System; and

(b) appropriate accountability for Rules Participants,

with a view to maintaining and improving security and reliability.

3.1.4 The secondary objective is to pursue the primary objective —

(a) as efficiently as possible, having regard to the compliance burden and cost of post-incident discussion and investigation for both the ISO and other Rules Participants; and

(b) having regard to rule 5; and

(c) in a manner which balances transparency with candour.

3.1.5 Rule 197 details the powers and obligations with respect to formal investigations. Most importantly, this rule provides (amongst other things) that –

(a) An investigation under this rule 197 is to be a more formal and thorough examination of the incident, its consequences and its surrounding and antecedent circumstances, than the informal process under rule 196;

(b) ISO must consult with registered NSPs and any rules participant or other person materially affected by the incident;

(c) Following the investigation, the ISO must Publish a report detailing its findings, conclusions and recommendations and including at least –

i. Any reports provided to it by rules participants, after removing confidential information; and

ii. Any occasion on which a person relied on Rule 172 to not comply with a direction from an NSP or ISO Control Desk; and

iii. A description of any changes to the Rules, Procedures or operating practices that the ISO considers necessary or desirable.

(d) If the ISO determines that a report under rule 197(6) needs to contain confidential information, then –

i. it must give the Coordinator and the Authority an unredacted copy of the report; and

ii. it must Publish a version of the report which complies with Subchapter 11.2 {Confidential Information}.

(e) If ISO proposes to disclose confidential information, it must first comply with rule 303 {Pre-disclosure process} but for the purposes of the balancing in rule 303(2), it may disregard any detriment to the Information Owner by way of reputational harm or embarrassment.

3.1.6 Rule 198 requires ISO to submit a suitable Rule Change Proposal or Procedure Change Proposal, as applicable, if following discussions or an investigation under Subchapter 7.6 ISO considers that a change to the Rules or a Procedure is necessary or desirable, including if ISO determined that a system operations direction or pre-contingent direction constituted, or resulted in, an unnecessary or unwarranted intrusion by the Incident Coordinator in another person's operations.

4. Overview of Event

4.1 Independent Report

4.1.1 The Factual Report developed by independent consultants FGC is provided at Attachment 1: Factual Report.

4.1.2 The Factual Report has been redacted to remove information that information owners identified as confidential through the r303 pre-disclosure process. In deciding what to redact, ISO complied with r197(8) by balancing the benefits of disclosure against any likely detriment to information owners, excluding detriment arising solely from reputational harm or embarrassment (r197(8)(b)).

4.1.3 In publishing the consultant's report, ISO has sought to preserve as much information as possible. ISO considers that maximising transparency of the objective facts, with minimal regard to reputational harm, is essential to achieving the Primary Objective of Subchapter 7.6 in r193(1) (i.e. continuous improvement of the Rules/Procedures and power system operations, and appropriate accountability for Rules Participants), while remaining consistent with the Secondary Objective in r193(2) (i.e. efficiency, regard to r5, and balancing transparency with candour).

4.2 Event Timeline

4.2.1 A high-level timeline of the event is given in Section 1 of this report.

4.2.2 The pre-event network configuration can be found in Section 3, and the detailed sequence of events is available in Section 4, of the Factual Report.

5. Findings, Conclusions and Recommendations

5.1 ISO Report

5.1.1 Following the investigation, the ISO must publish a report (this report) detailing its findings, conclusions and recommendations and including at least –

(a) any reports provided to it under rule 195(b)(i), after the ISO has removed any information that the ISO considers under Subchapter 11.2 should not be released; and

(b) any occasions on which a person purported to rely on rule 172 to not comply with a Protocol or a System Operations Direction or Pre-Contingent Direction; and

(c) a description of any changes to the Rules, Procedures or operating practices that the ISO considers necessary or desirable.

5.1.2 The following sections contain the information required to be published by ISO under the Rules.

5.2 Reports Received

5.2.1 To fulfil its functions under Subchapter 7.6 of investigating power system incidents, ISO may under r195(b)(i) direct a rules participant to provide a report on the incident.

5.2.2 When publishing its report under r197(6), ISO must include any reports provided to it under rule 195(b)(i), after the ISO has removed any information that the ISO considers under Subchapter 11.2 should not be released.

5.2.3 ISO did not request or direct a report to be provided under r195(b)(i).

5.2.4 Any information obtained from rules participants was collected under r195(b)(ii) and r306.

5.3 Reliance on Rule 172

5.3.1 When publishing its report under r197(6), ISO must include any occasions on which a person purported to rely on r172 to not comply with a Protocol or a System Operations Direction or Pre-Contingent Direction during the incident.

5.3.2 ISO has not been made aware of any instances considered by r197(6)(b) relating to this event.

5.4 Recommended Changes to Rules, Procedures and Operational Practices

5.4.1 Table 2 lists the changes to rules, procedures and operational practice that ISO considers necessary, alongside commentary from the ISO explaining the rationale for its recommendations.

5.4.2 Many of the changes listed have already been flagged for reform by EPWA in the Evolution of the Pilbara Networks Rules consultation paper ("EPNR consultation paper") and will be progressed as part of the broader Evolution of the PNR ("EPNR") reforms. For these changes, ISO is of the view that the

Pilbara Electricity Objective would be better achieved if they were progressed by EPWA in a manner that is coordinated with the broader reforms rather than by ISO in an isolated fashion. ISO therefore proposes to support and participate in the existing reform process rather than commence rule change proposals itself. As such, the relevant recommendations are for EPWA to pursue those changes as a matter of priority.

5.4.3 ISO will reconsider the development of its own rule change proposals for these matters should any further information about the EPNR (including scope and timelines) impact ISO's assessment of which approach would better achieve the Pilbara Electricity Objective.

Table 2 - ISO recommendations

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
1	PNR 166, 181(2)	**Develop outage assessment procedure** i. EPWA to expedite rule changes and associated reforms under proposal 10 (outage planning and timing) of the EPNR consultation paper concerning development of an outage assessment procedure.	ISO considers the PNR places adequate legal obligations on controllers of registered facilities to notify their NSP of planned outages affecting the facility (however, see recommendation 2 and its rationale). The Protocol Framework Procedure further clarifies roles and responsibilities for unplanned outages. However, ISO notes the PNR does not expressly empower the development of a procedure for coordinating planned outages. A dedicated procedure would provide clearer, more practical guidance on Rules Participants' roles, responsibilities and expectations for planned-outage coordination. ISO has raised similar comments in its Issues Paper and Draft Decision for its review of Subchapter 7.3 and 7.4 conducted in 2024. ISO notes that EPWA is proposing reforms to the outage coordination regime that would address these concerns.
2	PNR 166, 181(2)	**Develop outage risk assessment framework** i. EPWA to expedite rule changes and associated reforms under proposal 10 (outage planning and timing) of the EPNR consultation paper concerning development of an outage risk assessment framework.	The Factual Report found that TransAlta did not notify its NSP of the planned works at SHPS because it had successfully completed the works on numerous occasions previously without incident and so therefore the works were not classified as a Notifiable Event, i.e. that it was not the case that the works "might credibly be expected to adversely affect… security or reliability" (r166). The Factual Report further found that even though the works had occurred without incident previously, it would be reasonable to expect that a failure would represent a single point failure mode with a potential to initiate a Non-Credible Contingency. ISO's view is also that, even if the works had been notified, the lack of guidance within the regime regarding risks associated with particular notified works means it is uncertain whether any mitigations would have been identified as necessary. ISO considers the PNR provides insufficient guidance for registered facility controllers, registered NSPs and ISO to determine when a planned outage presents enough risk - if uncoordinated or unmitigated - to warrant coordination under the PNR outage

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
			coordination regime. The lack of a risk assessment criteria undermines both the effectiveness of the requirement to notify as well as the system coordination regime's ability to adequately manage works once notified. ISO raised similar issues in Section 6.4 of the Draft Decision for its 2024 review of Subchapter 7.3 and 7.4 and proposed a standardised risk assessment framework to address them. ISO notes EPWA is proposing reforms to the outage coordination regime that would address these concerns.
3	PNR 166, 181(2)	**Develop list of equipment for which planned outages must be notified and coordinated through the PNR** i. EPWA to expedite rule changes and associated reforms under proposal 10 (outage planning and timing) of the EPNR consultation paper concerning development of a list of equipment for which planned outages must be notified and coordinated through the PNR. ii. The equipment list should include at least the following items: - Black-start systems - Dual fuel enabling systems - Equipment presenting a single point of failure for a registered generating facility or registered storage facility iii. Details of tests for the types of equipment to be included on the list are to be advanced during detailed design of the relevant rules and procedure, in consultation with rules participants. iv. The equipment list should be developed in a way that does not require facility operators to provide a full component list, or to undergo the outage management process for every maintenance task.	As above, the Factual Report found that work was being undertaken on a power station's subsystem that presented a single point of failure for the entire power station. Such systems and related maintenance activities present an elevated risk of significant contingencies that may threaten system security. ISO raised similar points in Section 6.4 of the 2024 Draft Decision for its review of Subchapter 7.3 and 7.4, proposing an equipment list to which the outage assessment process would apply. The Draft Decision addresses single points of failure specifically (see Case study 4). ISO notes that EPWA is proposing reforms to the outage coordination regime that would address these concerns. The Factual Report also highlights that planned-outage coordination is critical to maintaining the availability of black-start systems and dual-fuel capability across the NWIS, helping minimise restoration times. These systems should be explicitly managed under the PNR outage coordination regime.
4		**Develop mechanism to reclassify non-credible contingencies to credible contingencies during certain planned outages** i. EPWA to expedite rule changes and associated reforms under proposal 10 (outage planning and timing) of the EPNR	EPWA's proposed outage assessment procedure and outage risk assessment framework in the EPNR consultation paper contemplate 'outage plans' submitted by the outage owner for ISO approval, setting out how outage risks will be mitigated. While detailed design

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
		consultation paper concerning development of an outage assessment procedure and outage risk assessment framework. ii. The outage assessment procedure and relevant PNR rules are to include a mechanism enabling the ISO to re-classify non-credible contingencies to credible contingencies for planned notifiable events (outages or testing) that alter the risk profile of the non-credible contingencies. iii. The outage risk assessment framework is to be developed so as to enable formulation of the risk profiles of the relevant contingencies with and without planned notifiable events. iv. Reclassification decisions by ISO must be supported by risk assessments made under the outage risk assessment framework.	is still to commence, ISO expects outage plans to apply a clear hierarchy of risk mitigations. For example, an outage plan for a planned outage affecting one of two redundant gas pressure skids at a large power station may consider the following mitigations (in order of preference): - Shift load from the power station to another facility. - Where dual fuel capability exists, operate on the alternative fuel for the duration of the outage. - Procure additional ESS to cover the contingency risk associated with the remaining gas skid (e.g. equipment fault or operator error). - If sufficient ESS is not available, issue constraint directions. Mitigations 3 and 4 could be supported by reclassifying the loss of the entire power station from non-credible to credible during the planned outage of the redundant gas pressure skid. Because these measures may impose costs on other participants, their use should be supported by robust risk assessments demonstrating that residual risk is commensurate with the exercise of those powers under the PNR (e.g. ESS limited to single credible contingencies). Reclassification decisions should therefore be governed by the same outage risk assessment framework that underpins outage plan approvals. Alternatively, mitigations 3 and 4 could be hard-coded in the Rules as permissible measures for planned outages. However, a reclassification mechanism is a cleaner approach: it enables the risk scenario to be managed using the full suite of tools under the PNR and HTR, applies existing guardrails, and avoids duplicating powers.
5	Interim Registration and Standing Data Procedure 3.5.1	**Generator black-start and dual fuel capabilities to become standing data** i. ISO to add black-start and dual fuel capabilities to required standing data for registered generating facilities, update Registration and Standing Data Procedure accordingly.	The Factual Report demonstrates the importance of ISO Control Desk awareness of black-start and dual fuel capabilities across the NWIS. Extending the list of standing data to include black-start and dual fuel capability will improve the ISO's ability to coordinate outages.

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
		ii. ISO to provide standing data relating to black-start capabilities to ISO Control Desk for the purposes of system restoration.	
6	Operational practice – UFLS arrangements with large customers	**NSPs to review UFLS arrangements with large consumers** i. Registered NSPs to review and, if necessary, update and test the UFLS arrangements, including with major customers if applicable. ii. Registered NSPs to confirm compliance with HTR cl. 2.4.1 by notice to ISO supported with evidence in accordance with GEIP, within 3 months of publication of this report.	HTR cl. 2.3.1 places the responsibility of installing and maintaining UFLS schemes with the registered NSPs. Subclause (c) empowers the NSP to require commercial and industrial consumers to make a portion of their load available for automatic under-frequency or undervoltage load shedding (or both) and to require a commercial or industrial consumer to provide control and monitoring equipment for the load shedding facilities.
7	HTR 2.4.1, 2.4.2, 2.4.4(b), 2.4.4(c)	**Review technical standards for underfrequency load shedding and islanding** i. ISO to undertake power system studies to investigate the following potential rule changes: - Remove HTR cl. 2.4.4(c); and/or - Expand HTR cl. 2.4.4(b) to apply to all UFLS stages; and/or - Increase the time delays of UFIS settings in HTR cl. 2.4.2 and 2.4.4, to allow more time for the operation of UFLS schemes prior to islanding; and/or - Reduce time delays of UFLS settings in HTR cl. 2.4.1, causing UFLS schemes to operate faster when activated; and/or - Remove UFIS requirements of HTR cl. 2.4.2.	HTR 2.4.4(c) requires an NSP (other than the Horizon Power coastal network) to island its network in preference to implementing UFLS Stage 2, where it is capable of islanding in accordance with GEIP. In ISO's view, the Factual Report provides strong evidence that islanding interconnected networks in preference to UFLS (as required by HTR 2.4.4(c)) reduces their ability to share system security support during severe non-credible contingencies. Instead, it concentrates the impacts on the network experiencing the contingency. ISO considers a key benefit of interconnection in the Pilbara is the ability for networks to share characteristics that deliver mutual system security benefits, including: - common UFLS settings, - frequency droop settings, - generation/storage headroom (contingency reserve), and - system inertia. Technical standards and protection settings that force network islanding during incidents—when these benefits are most needed—undermine the effective use of interconnection and are inconsistent

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
			with the System Security Objective[3] (SSO) and Pilbara Electricity Objective[4] (PEO). ISO also questions whether the UFIS schemes align with the Essential System Services (ESS) regime in the NWIS. Given the radial network and shallow ESS market, efficient procurement may concentrate contracted ESS on a single network, as occurs currently. It would be inappropriate for that network to island itself during a non-credible contingency and thereby cut off ESS support to other networks when it is most needed. ESS procurement rules prevent ISO from basing procurement decisions on the risk of non-credible contingencies[6], which limits ISO's ability to geographically diversify contracted ESS solely to avoid ESS becoming unavailable behind legacy UFIS schemes. The UFIS requirements in HTR 2.4.2 and 2.4.4 likely reflect an earlier operating context, when each registered network largely supplied its own load and managed security independently. These legacy arrangements may not be fit for purpose given: - centralised procurement and socialised cost recovery of essential system services, - a light-handed regulation regime that promotes 3rd party access and customer churn on covered networks, - increased complexity in managing system security with the advent of intermittent, fast-acting inverter-based generation and storage, and - an Independent System Operator responsible for maintaining and improving system security and reliability. ISO recognises that changes to UFLS and UFIS may have wide-ranging and unintended consequences. ISO will therefore proceed cautiously, using power system studies and stakeholder consultation before pursuing any changes to UFLS or UFIS standards. As part of

[3] The System Security Objective is defined in Rule 162 of the PNR.

[4] The Pilbara Electricity Objective is defined in sections 3A and 119 of the *Electricity Industry Act 2004*.

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
			this work, ISO will assess (among other things) whether the covered networks could have survived the incident without the UFIS scheme at the APA DEWAP–HP interconnectors.
8	Operational practice – Review of overcurrent protection settings Operational practice – Determination of power transfer limits	**Review overcurrent protection settings and power transfer capacity of HP-RTIO interconnectors** i. Rio Tinto and Horizon Power to review the overcurrent protection settings for the CBS-CLB 61, KHBS-DMP 61 and KHBS-DMP 62 interconnectors, and explore other operational adjustments, with a view to maximising the short-term power transfer capability between the two networks. ii. Following the review, Rio Tinto and/or Horizon Power to implement settings and operational changes (if any) and notify ISO. iii. ISO to request Rio Tinto under HTR 2.3.8 to determine, in consultation with the ISO and Horizon Power, the power transfer limits of the above interconnectors considering credible generation dispatch patterns.	The Factual Report shows that maintaining system integrity after non-credible contingencies is critical to managing frequency using the intended tools—generator droop response and UFLS. Maximising transmission backbone transfer capability is central to preserving that integrity. The RTIO-HP interconnectors are part of the NWIS transmission backbone and enable security benefits to be shared between the covered and non-covered networks, including the delivery of contracted ESS. The HTR places responsibility on registered NSPs to identify (HTR 2.3.8) and maximise (HTR 2.6.1(a)) transfer capability[7]. The HTR also contemplates that transfer limits may be exceeded and network elements may trip during non-credible contingencies, as occurred in this incident. ISO notes active power flows on the HP-RTIO interconnectors were concentrated on CLB-CBS 61 (the lower thermal-capacity line), causing it to trip on overcurrent protection while the other interconnectors remained well below their thermal limits. Given how the HP-RTIO interconnectors performed in this event—and their potential to contribute to future non-credible contingencies—ISO considers this incident an opportunity for: - Rio Tinto as the asset owner, in consultation with the ISO and Horizon Power, to re-assess the power transfer capability of the RTIO-HP interconnectors, to ensure the power transfer capability is properly understood and maximised in accordance with the HTR. - Horizon Power and Rio Tinto to review overcurrent protection settings on the HP-RTIO interconnectors, and explore other operational adjustments, with a view to maximising the short-term power transfer capability between the two networks.

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
9	Operational practice – managing interconnector overloads	**Operational practice to manage interconnector overloads** i. EPWA to expedite proposed rule changes to – - enable the ISO to retrospectively classify non-credible contingency events as protected events; - mandate NSPs to investigate special protection schemes for protected event; - grant NSPs the discretion to invest in such schemes; and - require the ISO to publish the NSPs' decisions whether or not to invest in a special protection scheme. ii. ISO, in consultation with registered NSPs, explore procedures to manually disconnect load to avoid cascading interconnector overloads.	ISO considers post-contingent protection schemes can be an effective way to mitigate low-probability, high-impact non-credible contingencies, where they can be implemented at reasonable cost without materially reducing reliability. However, the PNR does not currently provide a clear function or power for ISO or NSPs to investigate and implement special protection schemes. ISO understands EPWA is drafting rule changes to: - enable the ISO to retrospectively classify non-credible contingency events as protected events; - mandate NSPs to investigate special protection schemes for protected event; - grant NSPs the discretion to invest in such schemes; and - require the ISO to publish the NSPs' decisions whether or not to invest in a special protection scheme. ISO supports this initiative and considers it the appropriate pathway to introduce special protection schemes in the NWIS. The Factual Report suggests interconnector stability may be at risk during severe non-credible contingencies. Designing an effective scheme would require integrated consideration of generator and storage droop response, UFLS and UFIS settings, overcurrent protection, dispatch patterns, network reinforcement options, and related interactions. Pending implementation of the protected events framework (and associated NSP investment pathway), ISO will work with registered NSPs to improve operational practices, including developing procedures for the ISO Control Desk and registered NSPs to disconnect load where interconnectors are at risk of overloading during non-credible contingencies.
10	PNR 192	**Introduce head of power in PNR for System Restart Procedure** i. ISO to propose rule to change to insert new rule requiring the ISO to develop and publish a System Restart Procedure to govern oversight of registered NSPs' System Restart	ISO considers effective black-start capability and testing are critical to system restoration. In ISO's view, this incident indicates gaps in the maintenance and testing regimes applied to black-start resources on the covered networks.

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
		Arrangements developed under Rule 192. The System Restart Procedure is to deal with the following matters: - Roles and responsibilities in System Restart Arrangements - Review and reporting requirements with respect to NSP System Restart Arrangements - Other minimum criteria for System Restart Arrangements ii. Consequential rule changes to Rule 192 integrating the System Restart Procedure. iii. Capture synchronisation points in the new procedure	System restart is governed by PNR 192, which requires each registered NSP to develop, maintain and be able to implement operational arrangements ("Network Restart Arrangements") to restart its network or any island following a shutdown. Rule 192 applies GEIP as the standard and gives ISO a review role to ensure the arrangements are interoperable and adequate and where they are not, ISO may direct changes. The ISO Control Desk coordinates system restart activities for the power system. Before this event, ISO had reviewed the arrangements and found them interoperable and adequate. The progressive restoration - from the Rio Tinto network to the Horizon Power network and then to the APA DEWAP network - demonstrates effective NSP coordination and restoration at a satisfactory pace. However, restoration was delayed in returning customers to pre-event load due to failures of black-start systems on the covered networks. ISO considers a stronger framework to manage and regulate system restart resources is warranted. Specifically: - ISO considers the Factual Report indicates black-start capabilities are not being maintained and tested to an adequate standard, increasing the risk of delayed restoration and extended outages. - ISO has no direct function to inquire into the maintenance and testing regimes for existing black-start facilities. ISO's system restoration functions are limited to reviewing NSP restart arrangements (Rule 192) and coordinating restart efforts (Rule 187). ISO proposes a stronger framework that recognises NSPs' central role in system restart while leveraging the existing Rules. This will be achieved by requiring ISO to publish a System Restart Procedure. The Procedure will clarify ISO's expectations for System Restart Arrangements, including: - the roles and responsibilities within Restart Arrangements,

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
			- timeframes and other requirements for reviews of restart arrangements, and - criteria for restart arrangements, including minimum requirements for maintenance and testing. One option to improve black-start performance would be to introduce a centrally procured and administered black-start ESS. However, at this stage ISO prefers to strengthen the existing arrangements in a way that is fit for the Pilbara by providing clearer guidance and expectations while leveraging existing facilities, skills and experience.
11	PNR 8 "equipment"	**Clarify role of gas supply infrastructure in PNR outage coordination regime** i. Update the definition of "equipment" in the PNR to explicitly include gas supply infrastructure (e.g. pipes, valves, skids) of a generating facility, if that gas supply infrastructure is owned or controlled by the same Rules Participant that owns or controls the other types of equipment within the generating facility.	The NWIS is supplied predominantly by gas-fired power stations. Since December 2024, all three underfrequency load shedding (UFLS) events on covered networks were initiated by issues with power station gas supply infrastructure. As a result, gas supply infrastructure plays a material role in NWIS security and reliability. PNR obligations to notify planned and unplanned events affecting power stations hinge on whether the relevant assets fall within the definition of "equipment": "*… wires, apparatus, equipment, plant and buildings used, or to be used, for or in Connection with, or to control, the generation, transportation, storage or consumption of electricity*." ISO considers this definition is open to differing interpretations as to whether power station gas supply infrastructure is included, and therefore whether it is subject to the PNR outage coordination regime. This ambiguity can create gaps where a Rules Participant owns gas supply infrastructure dedicated to a power station but outsources its operation and maintenance (i.e. control) to a third party (e.g. a local gas distribution network operator). In those circumstances, planned maintenance that affects power station reliability may not be notified to the outage coordination group. Similar risks arise where a registered controller concludes that gas supply infrastructure dedicated to its power station falls outside the definition of "equipment" and, as a result, does not notify its NSP of planned maintenance.

Item	Relevant Rule/ Procedure clauses	Recommendation	Rationale
			Comparable issues arise in other jurisdictions. Gas supply infrastructure dedicated to a power station may sit outside the relevant electricity rules, leaving no rules participant responsible for coordinating its outages unless a direct impact is anticipated. ISO understands this may be addressed in some jurisdictions by seeking maintenance information directly from gas infrastructure operators (e.g. during low reserve events). In the Pilbara context, ISO considers registered controllers of generating facilities are best placed to notify planned maintenance and unplanned events relating to gas supply infrastructure within their ownership or control. The proposed change aims to achieve this without expanding the PNR to multi-user gas distribution infrastructure or introducing new Rules Participants.
12	PNR 196, 197	**Include procedural fairness processes in PNR relating to publication of informal discussion notes and investigation reports** i. ISO to propose rule change to amend PNR 196 and 197 to require ISO to conduct procedural fairness processes with rules participants named in publications prior to distributing or publishing a thing under these rules, offering those rules participants the opportunity to comment on the accuracy, completeness and fair representation of information relating to their organisations.	The PNR requires ISO to consult information owners on publications to identify and minimise the disclosure of confidential information. However, the PNR does not explicitly require ISO to give named Rules Participants an opportunity to correct factual errors, omissions or misrepresentations (procedural fairness). Publications under Rules 196 and 197 can affect the interests of named Rules Participants (specifically their reputations). ISO considers established common law principles support consulting with those participants and considering their input before publication, as occurred for this investigation. Embedding procedural fairness in Subchapter 7.6 of the PNR would increase transparency and confidence in ISO's publication processes and help set realistic expectations for investigation timeframes.

6. Next Steps

6.1 Invitation for Stakeholder Submissions

6.1.1 ISO invites stakeholders to make submissions on this investigation report and the power system incident.

6.1.2 Stakeholders are encouraged to address the following queries in their submissions.

Table 3 - Queries for stakeholder submissions

Item	Query
1	Does the ISO's investigation report, including the independent consultant's factual report, provide stakeholder with sufficient transparency and clarity of the events that transpired during the incident?
2	Do stakeholders agree with ISO's recommendations? Why/why not?
3	Do stakeholders recommend any other changes to rules, procedures or operational practice?
4	Do stakeholders have any feedback on ISO's investigation process?

6.1.3 ISO will use stakeholder submissions to inform its rule and procedure change proposals and give direction to other actions arising from this investigation report.

6.1.4 All public stakeholder submissions will be published alongside this report on ISO's website.

6.1.5 Submissions must be made via the consultation page on the ISO website.

6.2 Rule and Procedure Changes

6.2.1 Rule 198(a) requires ISO to submit a suitable Rule Change Proposal or Procedure Change Proposal if ISO considers a change to the Rules or a procedure is necessary or desirable.

6.2.2 After publication of this report, the ISO will prepare rule and procedure change proposals for the recommendations detailed in Table 2 of Section 5.4 that state ISO will commence changes for. In doing so ISO will have regard to stakeholder submissions and EPWA's EPNR reform activities.

6.2.3 Where ISO recommendations interact with EPWA's EPNR reform initiatives, rather than commencing duplicative rule/procedure changes the ISO will seek to include those recommendations through the established rule/procedure change processes and other reform consultation processes to achieve the outcomes detailed in ISO's recommendations.

Attachment 1: Factual Report

22 NOVEMBER OUTAGE FACTUAL REPORT

NWIS – INCIDENT INVESTIGATION REPORT

DOCUMENT NO.: FGC0277-RP-002

15 MAY 2026

FUTURE GRID CONNECT CONSULTING PTY LTD

Client Name:	Pilbara ISOCo
Document Title:	22 NOVEMBER OUTAGE FACTUAL REPORT - NWIS – INCIDENT INVESTIGATION REPORT
Project No:	FGC0277
Document No.:	FGC0277-RP-002
Revision:	5
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Revision	Date	Description	Author	Reviewed	Approved
A	19/02/2023	Client Comments Incorporated	H De Wet	D Campbell	S Verma
0	24/04/2026	Stakeholder comments incorporated	H de Wet	D Campbell	S Verma
1	11/05/2026	Updated per feedback	H de Wet	D Campbell	S Verma
2	11/05/2026	Updated per feedback	H de Wet	D Campbell	S Verma
3	14/05/2026	Updated per feedback	H de Wet	D Campbell	S Verma
4	15/05/2026	Updated per feedback	H de Wet	D Campbell	S Verma
5	15/05/2026	Updated per feedback	H de Wet	D Campbell	S Verma

Executive Summary

This report was issued to ISOCo based on information supplied and interviews with stakeholders, without considering the disclosure requirements agreed with those stakeholders. FGC expects that other parties will perform the necessary amendments in consideration of disclosure constraints.

The initiating incident which precipitated events that ultimately led to the system blackout event on the HP and APA DEWAP networks was the loss of all generation at South Hedland Power Station. The loss was associated with the shutdown of both trains of the site's gas pressure regulation skid, as train 2 of the skid was being brought into service following maintenance on the slam-shut valve's overpressure shut-off (OPSO). The root cause investigation conducted by TransAlta determined that an overpressure condition was caused by the isolation valves being opened too quickly during the restoration procedure, resulting in the downstream gas pressure rising to 5.27MPa, exceeding the slam-shut valves setpoint of 5.25MPa.

In the lead-up to the Event, the management of South Hedland Power Station did not advise the NSP of a planned Notifiable Event for the proposed works which ultimately caused the gas supply shut down.

During the Event, it was found that the measures in place to mitigate the impact of such a loss of system generation (such as under frequency load shedding schemes) were not compatible with the designed system behaviour to prevent overloaded equipment from being damaged. The loss of generation resulted in additional power flow through the Cape Lambert interconnection cables (owing to the generation balance and physical transmission network configuration) to the point where they exceeded a thermal limitation and tripped, This limited the effectiveness of the other protection systems designed to prevent escalation of network outages.

Following the disconnection of the Rio Tinto network, an additional island condition occurred between the HP network and the APA DEWAP network, ultimately resulting in a blackout of both APA DEWAP and HP systems.

In the aftermath of the Event, it was found that black start facilities were unable to function as intended for a variety of reasons resulting in a longer-than-expected restoration period.

The key findings from the Event are as follows:

- ISOCo were not informed of the planned Notifiable Event prior to its commencement;
- The maintenance procedure governing the work in TransAlta's gas yard has a number of anomalies;

- A Non-Credible contingency event (multiple individual generators) triggered Phase 1 of the event;
- The system frequency immediately after the loss of generation from South Hedland Power Station remained stable above the first under frequency load shedding stage;
- The Non-Covered Rio Tinto Network was disconnected as a result of the thermal overloading of the three interconnectors between Rio Tinto and HP, without any under frequency load shedding stages having been triggered, as the system frequency had been maintained above the Stage 1 setting;
- The Rio Tinto Non-Covered Network was able to sustain its generation after being separated from the HP and APA DEWAP Covered Networks;
- The HP Covered Network and APA DEWAP Covered Network were disconnected owing to islanding off of the APA DEWAP Covered Network;
- The HP Network blacked out due to the absence of online generators on the system;
- APA DEWAP's generation was not able to be sustained after separating from the HP Covered Network due to generator governor control behaviour;
- Three off LM6000 gas turbines, which were connected prior to the start of the Event, were unable to be prevented from entering a four-hour lockout;
- Black start facilities (black start diesel generators) capable of starting larger generators were unable to restart their respective facility gas turbine generators in a timely manner, nor prevent formerly online LM6000 gas turbine generators from going into lockout in the first instance; and
- Black starting of power stations required intervention by onsite personnel.

This report documents the sequence of events, the root cause of the initiating the sequence of events leading to the blackout, the system restoration process and identifies critical factors that led to the system blackout.

Contents

Abbreviations and Definitions

AGC	Automatic Generation Control
APA	APA Group
BPS	Boodarie Power Station
BSDG	Black Start Diesel Generator
CB	Circuit Breaker
CLBSS	Cape Lambert Bulk Supply Substation
CLPS	Cape Lambert Power Station
CPDS	Constant Power Dispatch Setpoint
ESD	Emergency Shut Down
FCESS	Frequency Control Essential System Service
FGC	Future Grid Connect Consulting Pty Ltd
GT	Gas Turbine
GTG	Gas Turbine Generator
HMI	Human Machine Interface
HP	Horizon Power
HPCC	Horizon Power Control Centre
HPS	Hedland Power Station
HPTR	Horizon Power Technical Rules
ISO	Independent Service Operator
ISOCo	Pilbara ISOCo Limited
KHBSS	Kangaroo Hill Bulk Supply Substation
KRP	Karratha Power Station
MDR	Murdoch Drive Substation
NSP	Network Service Provider

NWIS	North West Interconnected System
OES	Operations Engineering Station
OPSO	Over Pressure Shut Off
OTSG	Once Through Steam Generator
PHTR	Pilbara Harmonised Technical Rules, Version 1
PNR	Pilbara Networks Rules
RFI	Request for Information
RTIO	Rio Tinto Iron Ore
SF	Solar Farm
SHPS	South Hedland Power Station
SRESS	Spinning Reserve Essential System Service
ST	Steam Turbine
STG	Steam Turbine Generator
UFIS	Under Frequency Islanding Scheme
UFLS	Under Frequency Load Shedding
YMPS	Yurralyi Maya Power Station

1 Introduction

On 22 November 2025 at 8:18 am, a gas outage occurred in the gas yard for TransAlta's South Hedland Power Station (SHPS). The instantaneous loss of 96.13MW of generation at SHPS (2 x LM6000 units and a steam turbine) was subsequently followed by system islanding events and widespread underfrequency load shedding, culminating in a total blackout of the NWIS East and West Pilbara Covered Networks. Rio Tinto's Non-Covered Network remained in operation, with no load losses recorded and no under-frequency load shedding.

Pilbara Network Rules (PNR), Subchapter 7.6 rule 194, requires incidents to be investigated for the following: (a) a Contingency or other Event which in the ISO's opinion jeopardised, or had the potential to jeopardise, the System Security Objective to a significant extent; or (b) an unplanned Outage of a Facility or Network Element for which a planned Outage would be a Notifiable Event; or (c) a Protocol being activated or the ISO referring any other matter under rule 84.

Relevant to the above PNR, the Pilbara ISOCo (ISO) has commenced a formal investigation under Subchapter 7.6 of the Pilbara Networks Rules (PNR). Under Rule 197, Pilbara ISOCo (ISO) engaged FGC Consulting to commence a formal investigation into the incidents and to provide a high-level report.

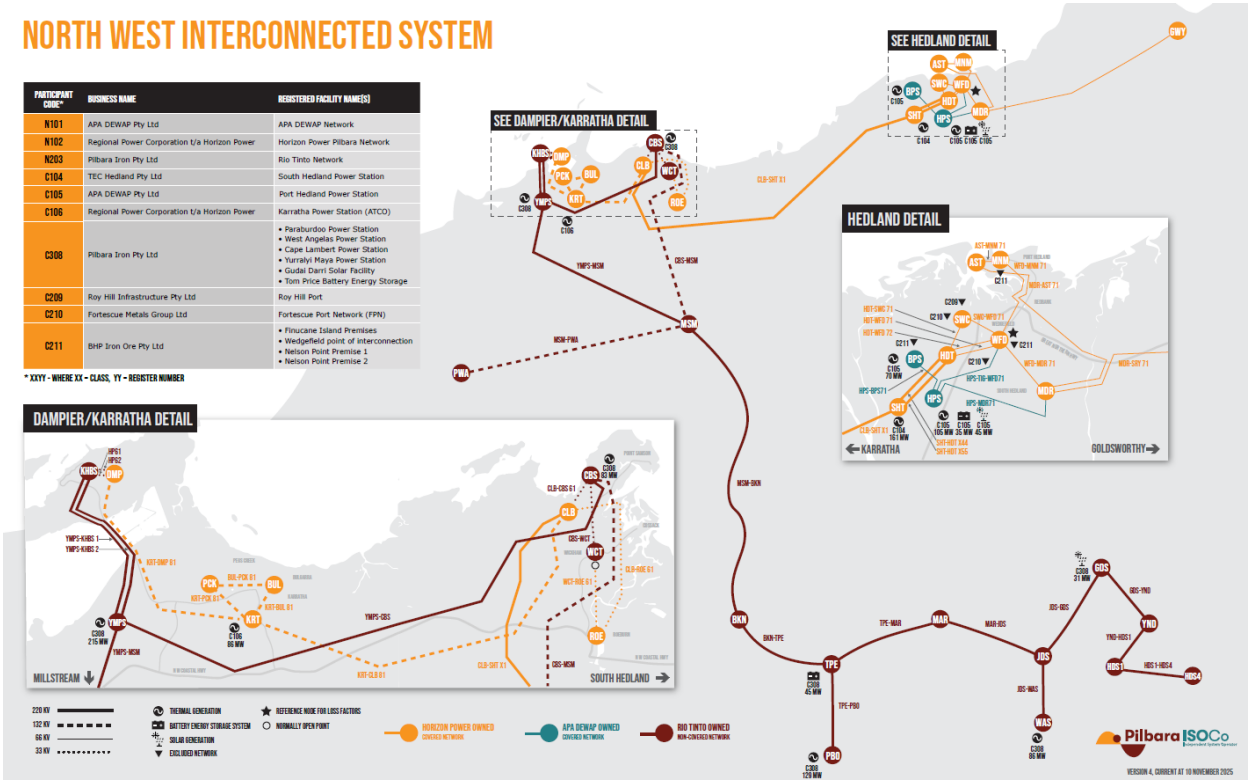
This high-level report has been prepared based on information from requests for information (RFI) sent to Regional Power Corporation (trading as Horizon Power), APA DEWAP Pty Ltd (APA) and Pilbara Iron Pty Ltd (trading as Rio Tinto Network) as the Network Service Providers (NSPs), Regional Power Corporation (trading as Horizon Power), TEC Hedland Pty Ltd (TransAlta) as the Generators and selected customers Roy Hill Infrastructure Pty Ltd, Pilbara Ports Authority (PPA), Fortescue Ltd and BHP Iron Ore Pty Ltd. While this report centres on the specifics of the NWIS Black System event, it also highlights several challenges related to the transient response of a transitioning power system. This report examines initial observations on the pre-event conditions, event sequence and subsequent restoration process and identifies critical factors that led to the system blackout.

2 NWIS System Configuration

The North-West Interconnected System (NWIS) is located in the Pilbara region and comprises a number of interconnected electricity networks owned by Horizon Power (Covered Network), APA DEWAP (Covered Network) and Rio Tinto (Non-Covered Network). The current electricity system in the Pilbara is comprised of transmission systems with three main transmission voltages (66kV, 132kV and 220kV).

This section outlines the electrical interconnection configuration of the NWIS power system in the normal operating scenario and in the period immediately prior to the events that resulted in a NWIS Blackout of the System on Saturday, 22 November 2025, at 08:22 am. This resulted in a loss of supply to all customers in NWIS Covered Networks (Horizon Power and APA DEWAP). The Rio Tinto Non-Covered Network islanded from the Covered Network and did not experience the blackout.

Representations of the NWIS Covered and Non-Covered Networks (33kV, 66kV, 132kV and 220kV) are shown in Figure 1, Figure 2 and Figure 3 below. See the ISOCo website link for additional info (https://pilbaraisoco.com.au/wp-content/uploads/2024/05/Listed-Network-Elements-v0.1.pdf).



PARTICIPANT CODE*	BUSINESS NAME	REGISTERED FACILITY NAME(S)
N101	APA DEWAP Pty Ltd	APA DEWAP Network
N102	Regional Power Corporation t/a Horizon Power	Horizon Power Pilbara Network
N203	Pilbara Iron Pty Ltd	Rio Tinto Network
C104	TEC Hedland Pty Ltd	South Hedland Power Station
C105	APA DEWAP Pty Ltd	Port Hedland Power Station
C106	Regional Power Corporation t/a Horizon Power	Karratha Power Station (ATCO)
C308	Pilbara Iron Pty Ltd	• Paraburdoo Power Station • West Angelas Power Station • Cape Lambert Power Station • Yurralyi Maya Power Station • Gudai Darri Solar Facility • Tom Price Battery Energy Storage
C209	Roy Hill Infrastructure Pty Ltd	Roy Hill Port
C210	Fortescue Metals Group Ltd	Fortescue Port Network (FPN)
C211	BHP Iron Ore Pty Ltd	• Finucane Island Premises • Wedgefield point of interconnection • Nelson Point Premise 1 • Nelson Point Premise 2

* XXYY - WHERE XX = CLASS, YY = REGISTER NUMBER

Figure 1: North West Interconnected System

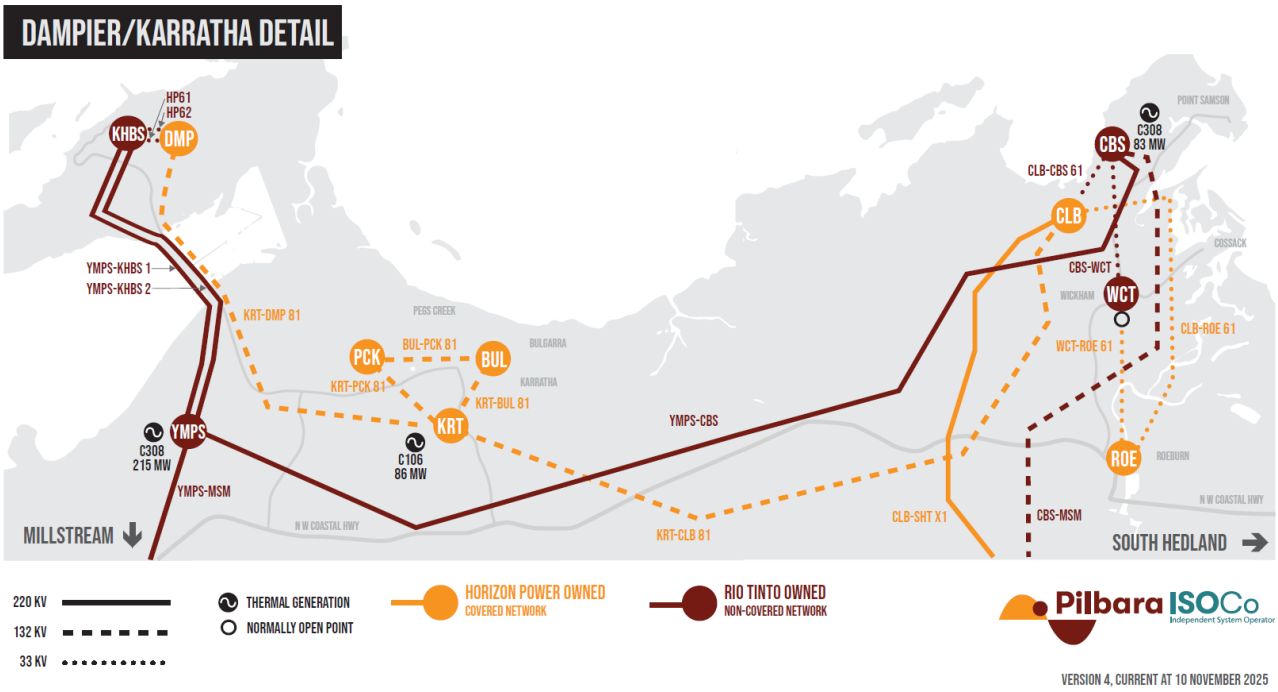


Figure 2: NWIS Interconnections Network between Karratha and Port Hedland

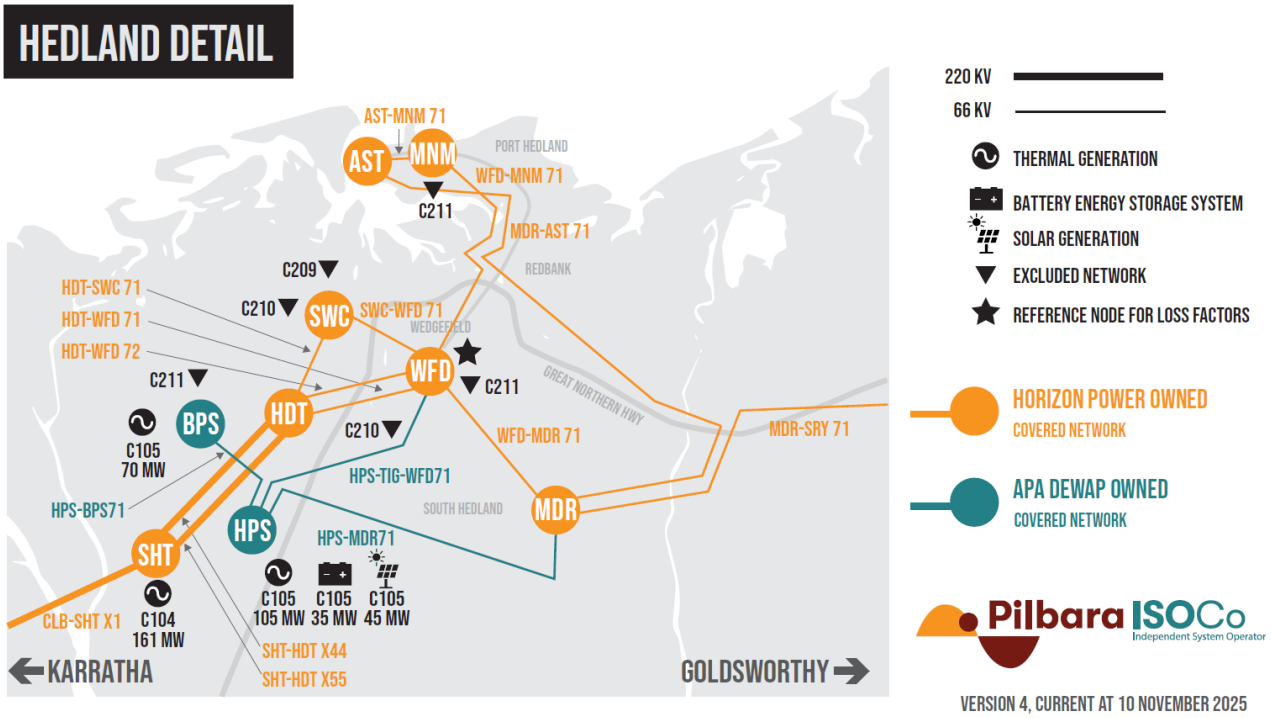


Figure 3: NWIS Interconnections Network at Port Hedland

3 Pre-Event Network Configuration

Pilbara ISOCo through the ISO Control Desk (currently delegated to Horizon Power) operate the NWIS power system in accordance with the Pilbara Networks Rules, with complete visibility over the HP Covered Network with RTIO and APA as independent NSPs in control of their own Networks.

Pre-event operational electricity demand in the NWIS was met by a combination of thermal (synchronous), BESS and solar generation across the Horizon Power, Rio Tinto and APA DEWAP networks.

A summary of the generation mix before the Event is presented in the figure below.

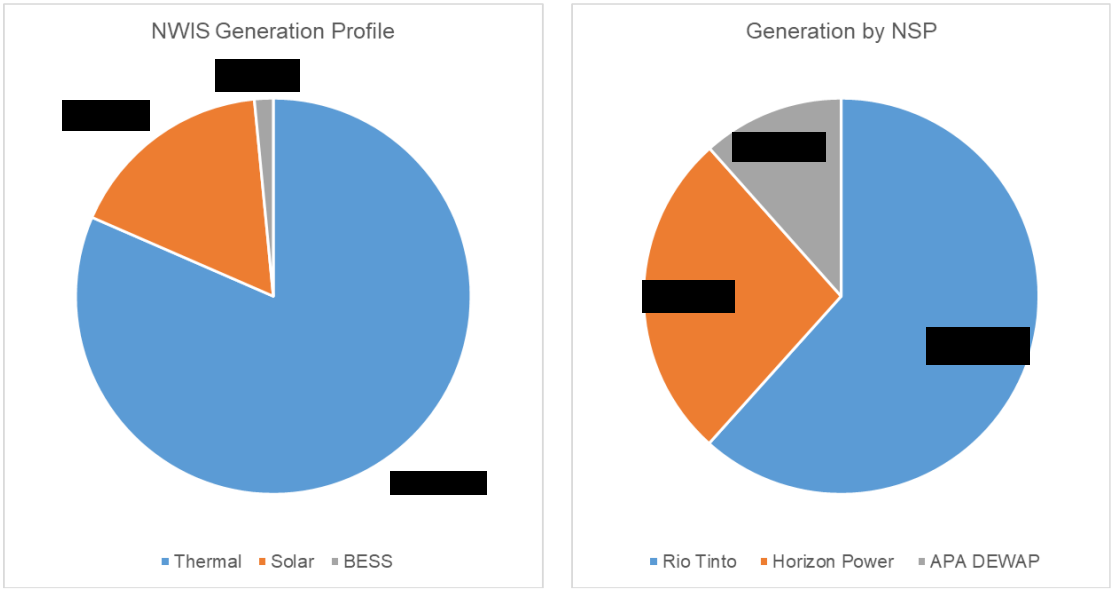


Figure 4: NWIS generation mix pre-event

Generation on the Horizon Power network was limited to South Hedland Power Station, with the generators at Karratha Power Station (KRP) offline in compliance with dispatch instructions for that time of day.

All Rio Tinto generators were dispatched in accordance with Rio Tinto's operating protocol, with selected generators on Automatic Generation Control (AGC) and others on Constant Power Dispatch Setpoint (CPDS) outputs. The output of one of Cape Lambert Power Station's generators was restricted due to gas turbine maintenance. Rio Tinto's solar farm was operational, as was their BESS, however, only 50% of the BESS capacity was available due to maintenance.

APA DEWAP generation comprised of a single unit online at both Boodarie (BPS) and at Hedland Power Stations (HPS), with the solar farm in operation and the BESS at a 40% reduced capacity (limited to 14MW) due to maintenance.

The online generating units prior to the Event are presented in the table below.

Table 1: Generators online pre-event

Generator	Type	Output (MW)	Power Station	Governor Control
GTG1	Thermal	[redacted]	YMPS (Rio Tinto)	[redacted]
GTG2	Thermal	[redacted]	YMPS (Rio Tinto)	[redacted]
GTG5	Thermal	[redacted]	YMPS (Rio Tinto)	[redacted]
GTG7	Thermal	[redacted]	YMPS (Rio Tinto)	[redacted]
WAG1	Thermal	[redacted]	West Angelas (Rio Tinto)	[redacted]
CLG1	Thermal	[redacted]	Cape Lambert (Rio Tinto)	[redacted]
CLG2	Thermal	[redacted]	Cape Lambert (Rio Tinto)	[redacted]
TPBESSR	Battery	[redacted]	Tom Price (Rio Tinto)	[redacted]
GDSF	Solar	[redacted]	Gudai-Darri (Rio Tinto)	[redacted]
GT30	Thermal	37.5	SHPS (Horizon Power)	(CPDS)/F Droop
GT20	Thermal	36.7	SHPS (Horizon Power)	(CPDS)/F Droop
ST10	Thermal	21.9	SHPS (Horizon Power)	(CPDS)/F Droop
TG102	Thermal	4.7	HPS (APA DEWAP)	(CPDS)/F Droop
TG301	Thermal	10	BPS (APA DEWAP)	(CPDS)/F Droop
SF APA	Solar	32.6	Port Hedland (APA DEWAP)	(CPDS)/F Droop
BESS APA	Battery	-5.7	Port Hedland (APA DEWAP)	F Droop

The ISOCo procured both frequency control essential system services (FCESS) and spinning reserve essential system services (SRESS) from Pilbara Iron (Rio Tinto) and APA DEWAP. Under Subchapter 8.1 of the PNR, base SRESS of 20MW and 20MW of FCESS (also counted as SRESS under Rule 214(3)) was procured from Rio Tinto, 20MW of base

SRESS was procured from APA DEWAP amounting to an effective headroom of 60MW. The West Pilbara effectively maintained 40MW of SRESS (including provisions under 214(3) and the East Pilbara maintained 20MW of SRESS. ISOCo did not Enable additional generating units due to Network constraints under Rule 215(b) of the PNR since the ISO Control Desk was unaware of any circumstances warranting such a precaution, nor were Network configuration or system constraints present.

4 Sequence of Events

The high-level sequence of events on 22 November culminating in the Blackout is outlined in the table below.

Table 2 Sequence of events leading to the Blackout

Time (hh:mm:ss)	High-Level Events Description
08:17	SHPS Gas pressure regulating skid train 2 was being re-pressurised for return to service. An overpressure condition detected by the system protection devices initiated an emergency gas shutdown, resulting in a complete plant gas outage.
08:18:39 HPCC	SHPS GT20 trips off the system. Approximately 1s later, SHPS GT30 tripped off the system. Rio Tinto and APA DEWAP provide SRESS support to compensate for the loss of generation from SHPS.
08:18:59 ISO	PNR 81 Protocols – Activation: Retrospective Loss of Generation Protocol Activated By ISO (initially by phone to Rio Tinto).
08:19:22 HPCC	CLB-CBS 61 (located at Cape Lambert) interconnector feeder to Rio Tinto network tripped.
08:20 ISO Control Desk	ISO Control Desk called APA and directed them to provide 50MW of generation due to the loss of generation. APA acknowledged the request but indicated it would take time to start another unit. The ISO Controller desk confirmed that formal notification of the direction would follow.
08:20:21 HPCC	SHPS ST10 trips off the system.

Time (hh:mm:ss)	High-Level Events Description
08:22:42 and 08:22:47 HPCC	HP61 and HP62 (located at Dampier) interconnector feeders to Rio Tinto Non-Covered Network tripped. (Rio Tinto disconnected from the HP and APA DEWAP Covered Networks). HP and APA DEWAP remain connected and in operation. The frequency in the HP and APA DEWAP system rapidly decreased to 47.6 Hz. Widespread underfrequency load shedding on the HP and APA Covered Networks.
08:22:47 HPCC	APA DEWAP's network islands as a result of underfrequency protection on the HPS end of the Wedgefield and Murdoch lines.
08:22:48 HPCC	The East Pilbara and West Pilbara network (HP Covered Network) loss of all generation resulting in a network blackout. West Pilbara separates from East Pilbara at CLB—Network between Cape Lambert and South Hedland Terminal.
08:22:54 APA DEWAP	APA DEWAP generation reverse power protection operated—disconnection of TG102 at HPS. Approximately 8s later, APA DEWAP BESS and solar farm (SF) tripped on over-frequency protection. Approximately 2s later, APA DEWAP TG301 at BPS tripped due to over-frequency protection. APA DEWAP network (islanded) Blackout.
8:23 ISO Control Desk	ISO Control Desk Direction - Request Black Start following NWIS islanding event - KRP
08:44:07 HPCC	HP61 HP interconnector feeder (Dampier) to Rio Tinto network re-energised. West Pilbara distribution energised.
08:48:45 HPCC	CLB-CBS 61 interconnector feeder (Cape Lambert) to Rio Tinto network re-energised.

Time (hh:mm:ss)	High-Level Events Description
08:50:41 HPCC	HP62 interconnector feeder to Rio Tinto network re-energised.
09:02:55 HPCC	Restoration of KRT-DMP 81 (energised). West Pilbara transmission energised.
09:03:00 HPCC	KRP back energised. GTG1 start initiated (fast start enabled).
09:09:41 HPCC	KRP GTG1 online. GTG1 control transferred to remote (HPCC in control).
09:19:21 HPCC	KRP GTG2 start initiated.
09:26 APA DEWAP	HPS APA DEWAP TG102 start initiated.
09:28:00 HPCC	KRP GTG2 online.
09:29:35 HPCC	Transmission restoration CLB to SHT (Cape Lambert to South Hedland). East Pilbara transmission energised.
09:31:10 HPCC	South Hedland Terminal energised.
9:35:20 HPCC	Hedland Terminal energised.
9:43:25 HPCC	Wedgefield Substation energised.
9:43 ISO Control Desk	ISO Control Desk call HPS and advise of 66KV restoration to HPS, ready for synchronisation of 1 generator and to start with reenergise feeders.
09:49 APA DEWAP	APA DEWAP advised by Fortescue Ltd that plant configuration preparations being undertaken ready to receive supply.
09:55 APA DEWAP	APA DEWAP, BHP advised that supply had been returned at Finucane Island (Horizon Power Network Energisation and Wedgefield Substation Energised) and that black start was not required from APA.

Time (hh:mm:ss)	High-Level Events Description
10:16 APA DEWAP	APA DEWAP HPS TG102 Trips – HPS Blackout Maloperation of the unit's reverse power relay is the most probable cause – TBC.
10:25 APA DEWAP	ISO control desk – Informed APA DEWAP circuit breaker (CB) 7109.0 closed (Wedgefield Substation line to Hedland Power Station) and APA DEWAP permitted to energise the bus and one transformer from the Wedgefield line.
10:31 APA DEWAP	APA DEWAP 66kV switchyards and Gas Sub 2 energised from Horizon Power Network via Wedgefield.
11:12 APA DEWAP	APA DEWAP TG102 online.
11:22 APA DEWAP	APA DEWAP TG103 online.
11:37 APA DEWAP	APA DEWAP Finucane feeder energised.
11:40 APA DEWAP	APA DEWAP Fortescue Ltd advised ready for the return of supply.
11:42 APA DEWAP	APA DEWAP Tiger Substation energised.
11:54 APA DEWAP	ISO control desk confirms with APA – Murdoch Drive (MDR) 7107.0 closed.
12:04 APA DEWAP	APA DEWAP Murdoch Drive interconnector closed.
12:51 ISO Control Desk	ISO Control Desk called APA DEWAP HPS and requested 20MW additional generation to assist with restoring the Network. ISO Control Desk confirmed that load and spinning reserve obligations would be maintained. HPS started TG301 to provide an initial additional 10MW, and subsequently a further 10MW if required.

Time (hh:mm:ss)	High-Level Events Description
12:54 ISO Control Desk	ISO Control Desk Direction - APA to provide 20MW Generation to Horizon Power.
13:03:59 HPCC	SHPS GT40 synced online.
13:04 ISO Control Desk	ISO Control Desk Direction - Horizon Power direct APA to reduce HP MW Export to 10MW to support system load.
13:24 ISO Control Desk	ISO Control Desk Direction - APA no longer required to provide HP with 10MW generation offset
14:12 APA DEWAP	APA DEWAP TG301 Start CB close.
15:10:53 Trans Alta	SHPS GT20 synced online.
15:13:38 Trans Alta	SHPS GT30 synced online.
15:15:59 ISO	PNR 82: Loss of Generation or Load Protocol Deactivation.

5 Initiation Of System Event

The initiating event of the outage to the Horizon Power and APA DEWAP networks was the loss of the entire fuel gas supply to South Hedland Power Station. This resulted in the tripping of two online combined cycle gas turbines (GT20 and GT30) almost immediately at 08:18:39am and the steam turbine (ST10) at 08:20:10am as a consequence of the loss of steam supply generated by the exhaust from the gas turbines passing through their once through steam generators (OTSGs). This loss of generation resulted in a reduction of 96.4MW from the HP Covered Network.

The gas outage occurred while returning one of the two station gas pressure-regulating skid trains to service after maintenance work. The works performed were necessary to ensure calibration and proper functioning of the overpressure shutoff device (OPSO) integral to the slam shut valves, a critical safety device for the skid. The day prior to the Blackout, the OPSO of train 1 underwent the same process, which was completed and returned to service successfully without incident.

The root cause investigation performed by TransAlta determined that the isolation valves were opened too quickly during the restoration procedure, resulting in the downstream gas pressure rising to 5.27MPa, with a slam-shut setpoint of 5.25MPa.

The loss of the entire combined cycle block to the Network exceeded the normally accepted credible contingency and is classified as a Non-Credible contingency (loss of multiple generators as outlined in the Protocol Framework Procedure). However, in the context of 2.2.1 of the Protocol Framework procedure, it should be noted that “normal operating conditions” for the gas yard would require both trains of the station gas pressure regulating skid to be in operation.

Under PNR 166 "A Notifiable Event for a Power System is any planned or anticipated system event (including a planned Outage, commissioning or testing of a Facility or Network Element) which might credibly be expected to adversely affect –

(a) Security or Reliability; or

(b) the ability of any part of a Covered Transmission Network to benefit from Essential System Services; or

(c) the ability of a Covered NSP to provide Transmission Voltage contracted Network services."

Under PNR 181(2) "If a Registered Facility is Connected to a Covered Network, then the Registered Controller must keep the Covered NSP sufficiently informed about Notifiable Events affecting the Registered Facility, to Enable Registered NSPs and the ISO to comply with their obligations under Subchapter 7.3 and this Subchapter 7.4."

The South Hedland Power Station is a Registered Facility with ISOCo (see below).

The works involving the calibration of the OPSO in the slam shut valves is non-discretionary, had been successfully completed by TransAlta at South Hedland Power Station on numerous occasions previously without incident and was therefore not considered to be classified as a Notifiable Event by TransAlta prior to the commencement of the work.

Table 3 Registered Facilities copied from ISOCo Registration List

Business Name	Facility Name(s)	Registration Class	Website link
APA DEWAP Pty Ltd APA	DEWAP Network	N1	https://www.apa.com.au/our-services/other-energyservices/electricity-interconnectors/north-westinterconnected-system-nwis/
Regional Power Corporation t/a Horizon Power	Horizon Power Pilbara Network	N1	https://nwis.com.au/
Pilbara Iron Pty Ltd	Rio Tinto Network	N2	
TEC Hedland Pty Ltd	South Hedland Power Station	C1	
APA DEWAP Pty Ltd	Port Hedland Power Station	C1	
Regional Power Corporation t/a Horizon Power	Karratha Power Station (ATCO)	C1	
Pilbara Iron Pty Ltd	Paraburdoo Power Station West Angelas Power Station Cape Lambert Power Station Yurralyi Maya Power Station Gudai Darri Solar Facility Tom Price Battery Energy Storage	C3	
Roy Hill Infrastructure Pty Ltd	Roy Hill Port	C2	
Fortescue Metals Group Ltd	Fortescue Port Network (FPN)	C2	
BHP Iron Ore Pty Ltd	Finucane Island Premises Wedgefield point of interconnection Nelson Point Premise 1 Nelson Point Premise 2	C2	

Furthermore, PNR 183(3) requires a generator that suffers an unplanned outage that credibly constitutes a Notifiable Unplanned Event to promptly notify all Registered NSPs and the ISO Control Desk. TransAlta provided notification to the Horizon Power Control Centre (HPCC), representing both the ISO Control Desk and the Horizon Power NSP; however, the other two NSPs were not notified (Rio Tinto and APA DEWAP).

Report Observation 1:

During the interviews, HPCC advised that they were not made aware of the works on the TransAlta site that were planned to be undertaken and initiated the incident which precipitated events ultimately leading to the Blackout of the Network. FGC notes that while it is acknowledged that these same works had occurred without incident in the past, it would be reasonable to expect that a failure of this nature represented a single point failure mode with potential to initiate a Non-Credible Contingency (loss of multiple generators).

6 System Behaviour Following the SHPS Multiple Unit Trip

This report contains frequency and voltage data provided by various involved parties. Raw recorded data from the NSPs, Generators and Customers were analysed for the report. As the nature of the event data was varied (differing recording sources, resolutions and methods), this report reflects an assortment of data analysed from various devices.

6.1 Initial Phase Of The Event (Phase 1)

At 08:18:39am, Phase 1 of the system disturbance is initiated when both online SHPS gas turbines(GT20 and GT30) trip. The system frequency transiently reduced from around 50Hz to 49.17Hz after South Hedland Power Station's gas turbine generation ceased exporting power to the system. System frequency then recovered to 49.55 Hz and settled, with the remainder of the pre-event system generation connected and the generation shortfall met by Rio Tinto facilities and APA DEWAP's generators. The Karratha Power Station (KRP) generators were not in service at the time of the Event, but were on standby for remote starting from HPCC.

The high-speed frequency recorder on APA DEWAP generator TG102 at Port Hedland Power Station is converted from shaft-speed measurements. This recording showed that the system frequency at the time of SHPS generators tripping was not depressed sufficiently to trigger the system's 49Hz Stage 1 under-frequency load shedding (UFLS). The frequency reduction and the rate of change of frequency are related to the system inertia, droop responses from remaining generators and the system load remaining on both the Covered and Non-Covered Networks. According to the Pilbara Harmonised Technical Rules (PHTR) Section 2.4.1 (Under-frequency load shedding schemes), the under-frequency load shedding philosophy requires that consumers connected to either the Covered or Non-Covered Networks reduce their load by 17% when the UFLS Stage 1 (49.00Hz, 0.5s delay) protection schemes activate.

The figure below illustrates the frequency trajectory immediately after the SHPS gas turbines tripped.

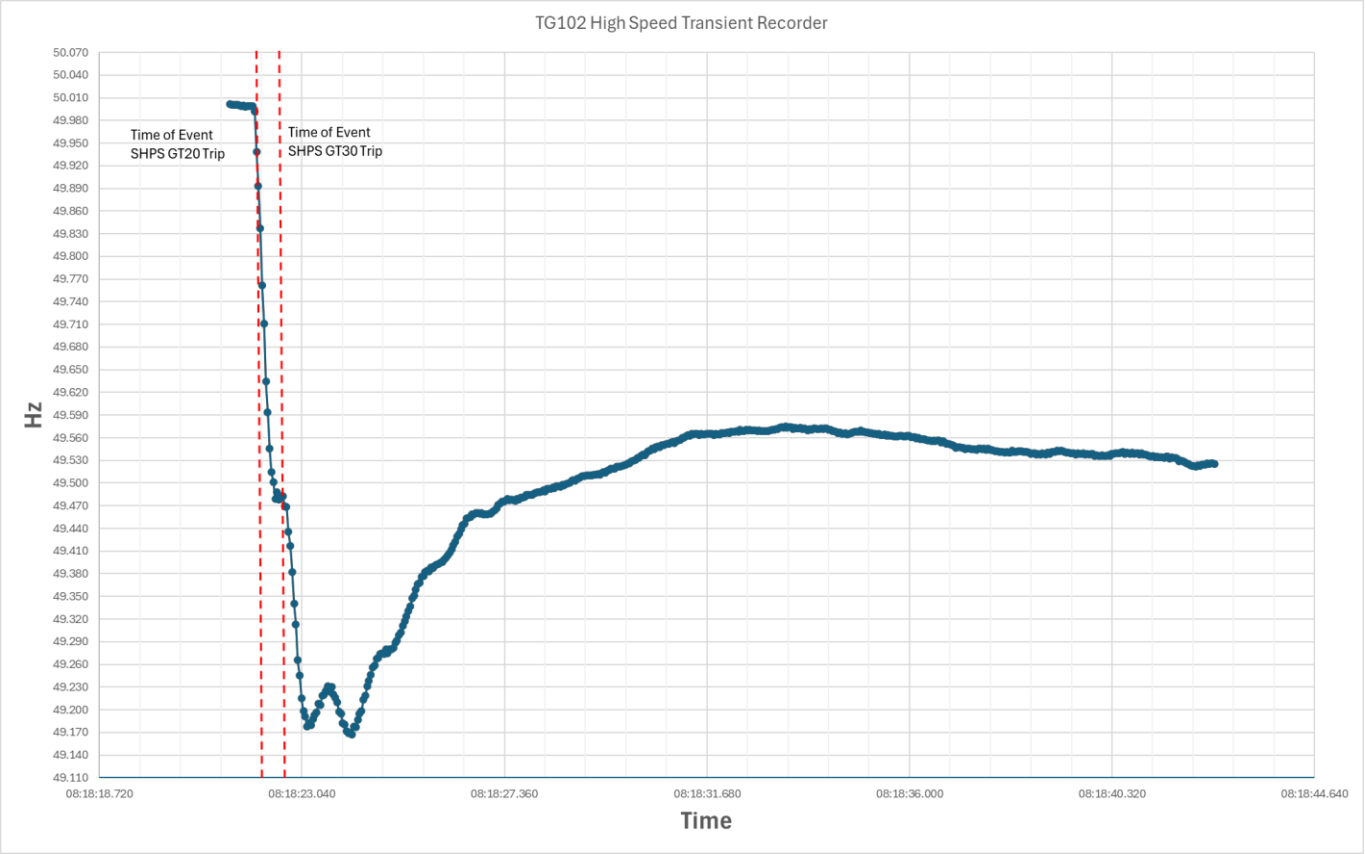


Figure 5 TG102 Shaft speed recording when GT20 and GT30 tripped

At 08:19:21am, SHPS ST10 (steam turbine) tripped off the system due to the prior loss of the two gas turbines which operate in closed-cycle mode and provide heat to the once-through steam generator (OTSG), which in turn supplies the ST10. The system frequency momentarily ranged from 49.32Hz to 49.64Hz and recovered to 49.52Hz. Thus, the system continued to maintain a frequency above the UFLS Stage 1 level throughout the initial stage (Phase 1) of the event, with both Rio Tinto and APA DEWAP generators remaining connected. The figure below shows the frequency after the steam turbine was disconnected.

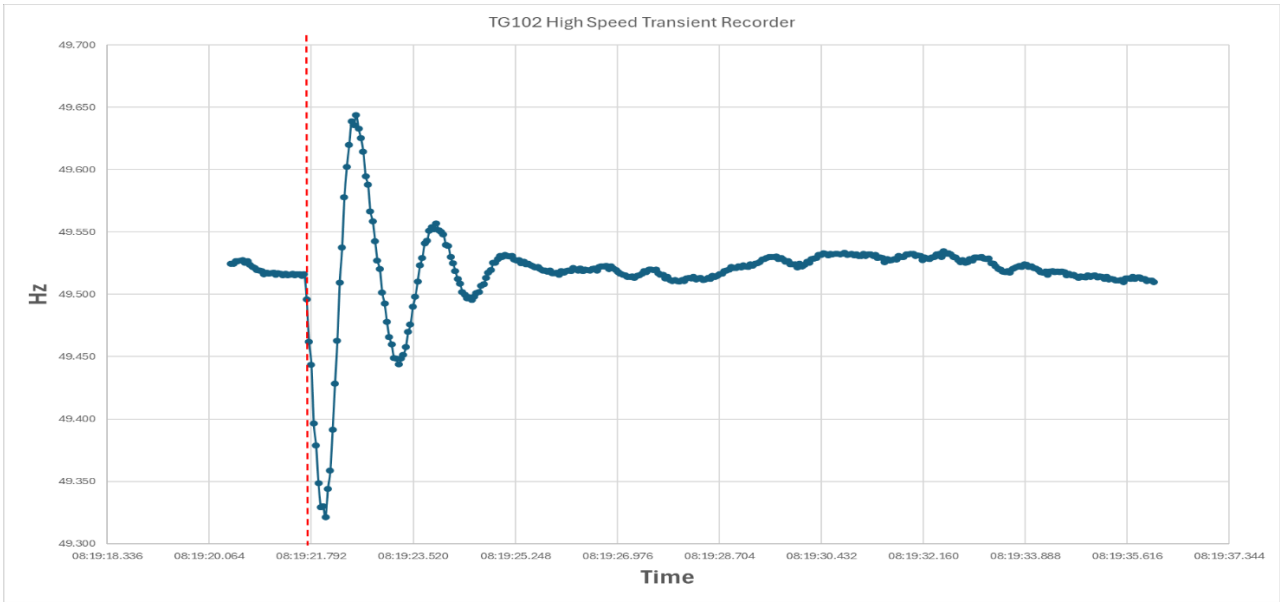


Figure 6 TG102 Shaft speed recording when ST10 tripped.

The Non-Covered Rio Tinto network is connected to the Covered Horizon Power system via three 33kV cable circuits, a single circuit (CLB-CBS 61) at Cape Lambert and two connections (HP61 and HP62) at HP's Dampier substation. As the generation balance and physical generation supply configuration changed on the NWIS system following the loss of generation at SHPS, thermal limitation was exceeded due to additional power flow through the Cape Lambert interconnected cables between the Horizon Power and Rio Tinto networks. For approximately 57 seconds, the Cape Lambert feeder circuit exceeded its thermal capacity, prompting overload protection to disconnect the CLB-CBS 61 interconnector at 08:19:22 am.

The figures below represent the system frequency that remained as recorded on the HP network.

The loss of the Cape Lambert 33kV cable interconnected circuit resulted in a further power flow limitation (thermal limit) to be exceeded on the remaining two Dampier interconnected circuits (HP61 and HP62). These interconnectors also disconnected under overload protection at around 08:22:46am, 3 minutes and 24 seconds later. The system frequency tracings during the first stage of the event are shown in the figures below.

Although the frequency trajectory recorded on the Rio Tinto system at any time must be similar to HP's system frequency, once the second of the two Dampier lines disconnects, the two systems are separated, and their frequency responses differ.

The overload conditions on the above-mentioned feeders were observed by HPCC and RTIO control centres. The respective operators did not take action at the time of the Event.

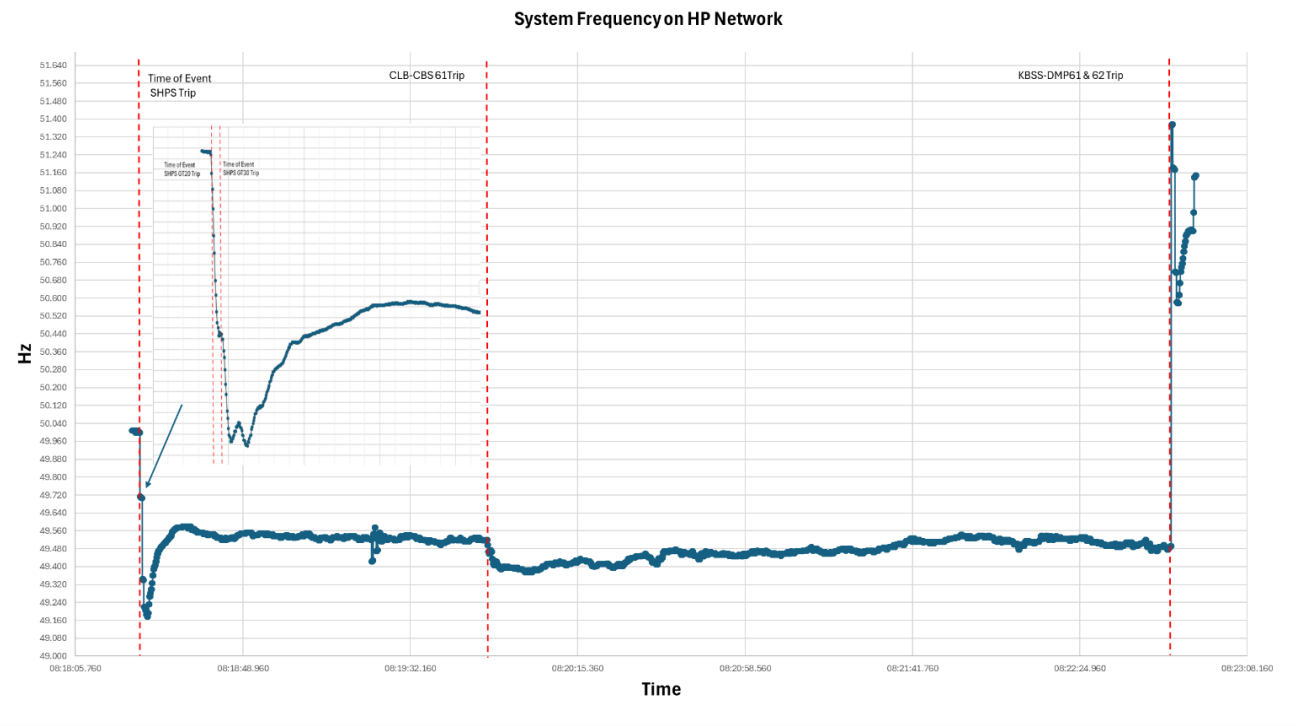


Figure 7 Horizon Power System Frequency

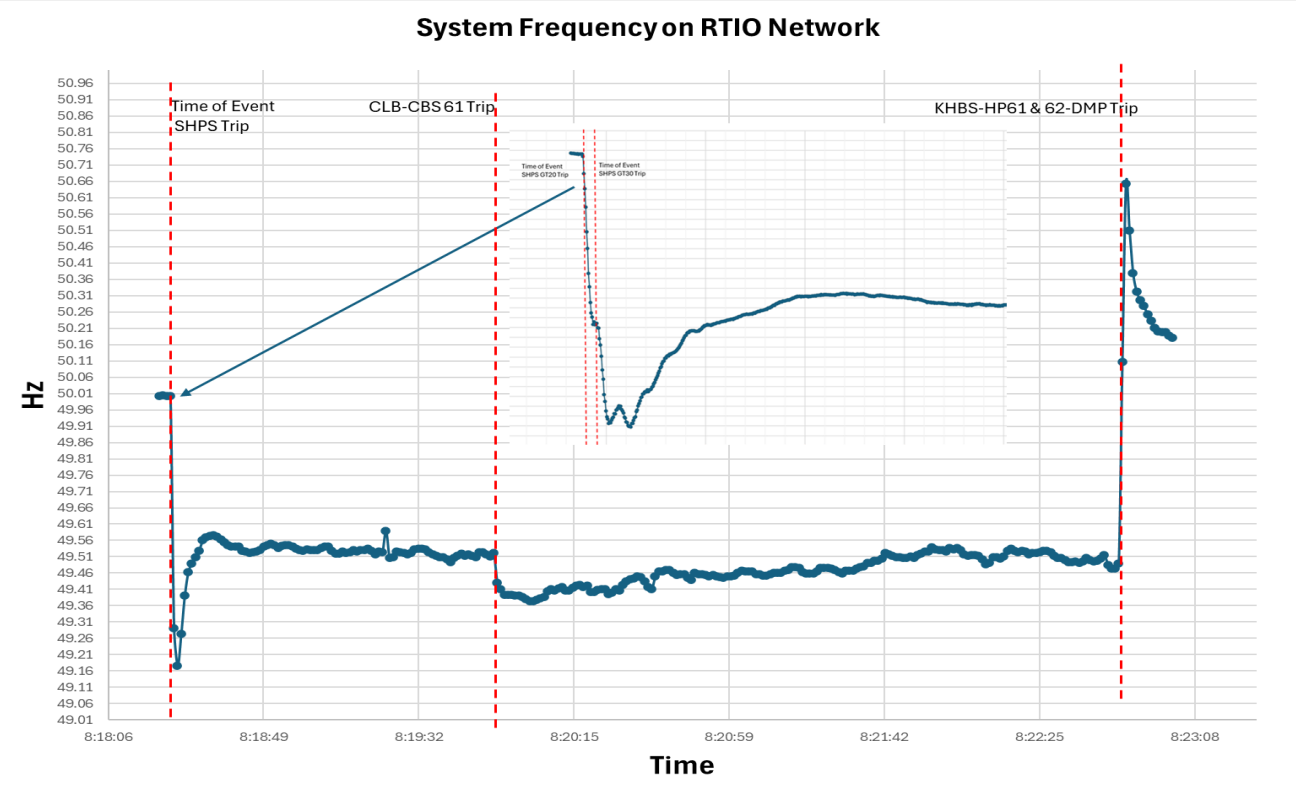


Figure 8 Rio Tinto System Frequency

Report Observation 2:

a) ***The quantum of spinning reserve essential system services (SRESS) secured by ISOCo and the additional Headroom carried by network participants prior to the initial stage (Phase 1) of the event maintained the power system within the technical envelope, as per Subchapter 8.1 rule 199 of the PNR,. However, the SRESS and additional headroom provisions failed to return the Network to a secure state as the interconnected cable between the Rio Tinto and the Horizon Power networks disconnected, thereby islanding the respective networks. Under PNR, rule 211 "Spinning reserve – The Contingency Reserve Standard" the quantity of Headroom within the Power System (or, if applicable, a Credible Island) at any time must be sufficient to Enable the Power System (or Credible Island) to remain within the Frequency Operating Standards following the largest single Credible Contingency which could cause a shortfall between generation and load on a Covered Network. A Non-Credible contingency event (multiple individual generators) triggered Phase 1 of the event.***

b) ***PHTR Section 2.4.1 (Under-frequency load shedding schemes): the under-frequency load shedding philosophy requires that consumers connected to networks reduce their load by 17% when the UFLS Stage 1 protection schemes activate, as shown in Table 2.9 of the PHTR. The system frequency reduced from around 50Hz to 49.17 Hz, then recovered to 49.55 Hz. During Phase 1 of the event, consisting of a Non-Credible contingency event, no load was shed because the ESS and additional Headroom provided adequate spinning reserve through the generators' headroom responses.***

c) ***The system configuration during phase 1 of the event showed that higher levels of generation were present on the Rio Tinto network after the disconnection of multiple generator units at SHPS, leading to overloading of the interconnector circuits. The removal of the Cape Lambert 33kV cable interconnected circuit imposed a thermal limitation on the remaining two Dampier interconnected circuits (HP61 and HP62), which also disconnected under overload protection 3 minutes and 24 seconds later. HPCC attempted to start an additional two generators at the Karratha power station when the first two units at SHPS tripped, but the generators have a normal start time of around 10 minutes (comprised in part of enclosure and turbine casing purge cycles), which would not have prevented the tripping of the interconnectors.***

d) ***Upon Activation of a Protocol at 08:18:59 and first contact by ISO of a Generator at 08:20am (ISO directed APA to provide 50 MW), limited time remained before the system Blackout which occurred at 8:22:48. The majority***

of generation on the Network is gas-fired synchronous generators which, although largely having fast start capabilities, are required to go through time consuming purge cycles necessary for safety resulting in a starting time of ~10 minutes.

e) ***TG301 at BPS did not respond with a frequency droop characteristic during the under-frequency Event. The generator output increased linearly at approximately 6.5MW/min to 24MW and remained at this output. It is unknown whether TG301's response was driven by the BPS operator responding to the ISO's direction to provide an additional 50MW or whether the TG301 control system initiated the active power output ramp.***

6.2 HP and APA DEWAP System Behaviour Following the Rio Tinto Network Separation (Phase 2a)

Following the initial generation disconnection at SHPS and the disconnection of the Rio Tinto network at 08:22:46 am, the shortfall in generation on the Horizon Power and APA DEWAP Covered Networks resulted in a rapid decrease in frequency to 47.6Hz at approximately 3.13Hz/s. The predicted UFLS settings currently provided in the PHTR rely on a slower frequency reduction rate of less than 1Hz/s.

The total generation remaining on the APA DEWAP system at the time of the Rio Tinto network split was around 78MW (as shown in the table below for APA DEWAP generators just prior to the split), with unverified total load connections of around 137MW.

Table 4: APA generation at the time of Rio Tinto network disconnection

Generator	Type	Output (MW)	Power Station	Control
TG102	Thermal	17	Hedland PS	F Droop
TG301	Thermal	23	Boodarie PS	F Droop
SF APA	Solar	33	Port Hedland	F Droop
BESS APA	Battery	5	Port Hedland	F Droop

Immediately after the second interconnector at Dampier tripped, an HP and APA DEWAP network island was created, the system's under-frequency load shedding (UFLS) threshold was triggered for Stages 1, 2, 3 and 4 and the protection scheme's 0.5 second delay was activated due to a system frequency reduction to 47.6Hz in 0.64 seconds. The frequency reduction and the rate of change of frequency are shown in the Figure 9 below.

Islanding of the APA DEWAP system from the HP system occurred via underfrequency protection relays acting at 48Hz at the HPS end of the Wedgefield and Murdoch interconnectors, around 0.64 seconds after the Rio Tinto system separation.

According to the Pilbara Harmonised Technical Rules (PHTR) Section 2.4.1 (Under-frequency load shedding schemes), the under-frequency load shedding philosophy requires that NSPs reduce their load by 68% when all four stages of UFLS are triggered. Although the rate of change of frequency at this Phase of the Event was 3.13Hz/s, load shedding protection stages 1 and 2 had operated before the APA DEWAP network and associated generators were disconnected from the system. A 0.56 second window was available for the stage 1 protection and 0.53 seconds for stage 2 to operate. Due to the rapid rate of change of frequency, insufficient time was afforded for NSPs' circuit breakers to open before the APA DEWAP system separated from the HP system.

PHTR section 3.3.3.3 (9) requires generators to remain connected to the system at 47.5Hz for 20 seconds. However, PHTR section 2.4.4 (c) states, "*If the frequency threshold for UFLS Stage 2 is reached, and a network is: d capable of islanding itself safely in accordance with GEIP, then the NSP must island the network in preference to implementing UFLS Stage 2*", then, (d) "*If a network is islanded, the NSP may manage the under-frequency event as it sees fit in accordance with GEIP within its own network, and clause 2.4.1 does not apply to the network.*"

The figure below shows the frequency trajectory following the Rio Tinto disconnection and subsequent HP and APA DEWAP islanding event, as well as the frequency after the APA DEWAP island has been formed.

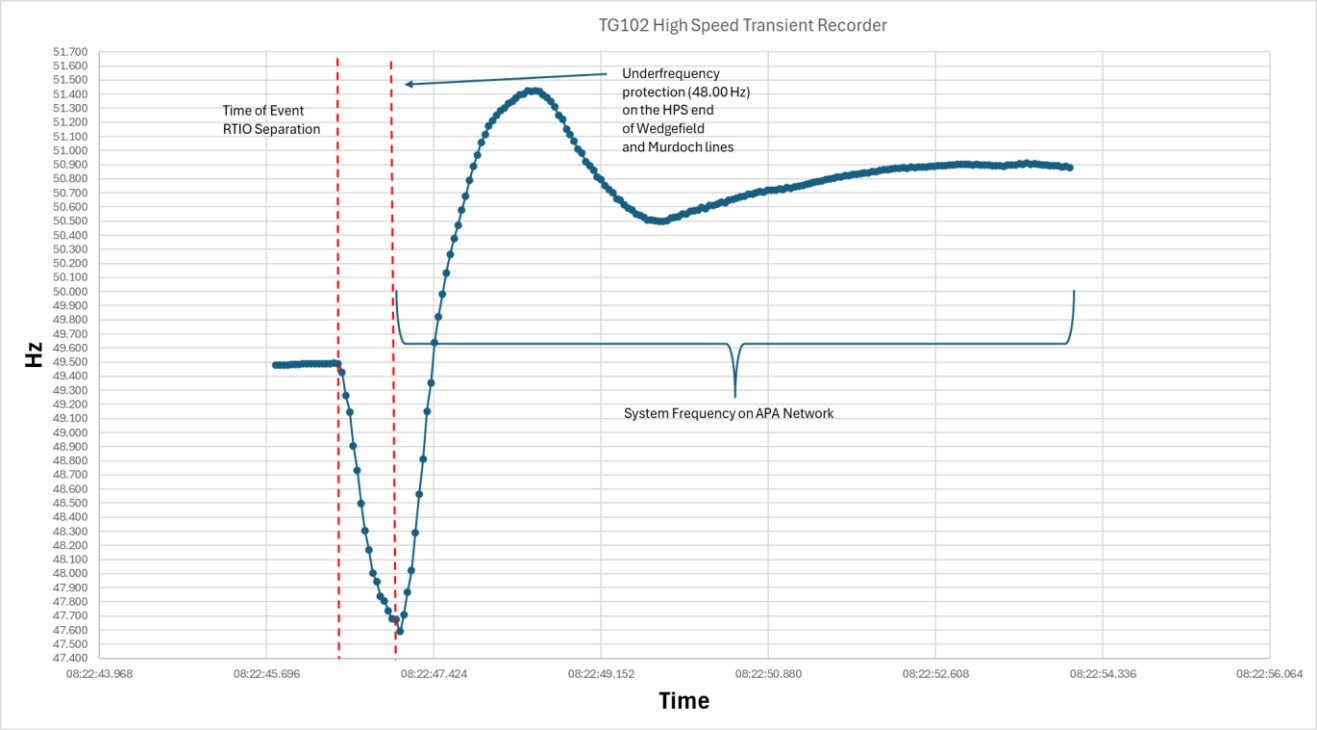


Figure 9 TG102 Shaft speed recording when HPS islanding occurred.

The total generation remaining on the APA DEWAP system at the time of the split from the HP network was around 105MW, with total load connections of 43MW (25.0MW at Finucane). The generation dispatch profiles of the APA DEWAP generators are provided in the table below.

Table 5 APA DEWAP generation at the time of the split from the HP network.

Generator	Type	Output (MW)	Power Station	Control
TG102	Thermal	35	Hedland PS	F Droop
TG301	Thermal	23	Boodarie PS	
SF APA	Solar	32	Port Hedland	F Droop
BESS APA	Battery	15	Port Hedland	F Droop

An excess of APA DEWAP generation after islanding from the HP network caused the disconnection of generator TG102 from the system due to reverse power protection, with the frequency remaining high at around 50.8Hz. The system frequency increased and the TG102 frequency droop function reacted as required; however, TG102 was driven into reverse power and the reverse power protection relay operated, disconnecting the Generator from the system.

Despite the loss of TG102 from the island, the APA DEWAP system frequency remained high at around 51.3Hz, with the Solar Farm responding to frequency droop and decreasing active power to 0MW before tripping from the system due to an overfrequency protection operation, with the system frequency at 52.7Hz.

The BESS responded to the frequency trajectory as shown in the figure below after the RTIO disconnection event: first increasing active power to around 15.6MW as the frequency dropped (47.6Hz) in the initial stage and then importing active power to around -14.8MW as the frequency increased (51.4Hz). Thereafter, the BESS was disconnected from the system due to overfrequency protection.

Generator data received from APA DEWAP revealed that TG301 was exporting around 23MW after the Rio Tinto separation from the HP and APA DEWAP system. It is unknown whether TG301's response was as a result of APA DEWAP's operator following the instructions from ISO Control Desk, requesting an increased generation output or whether the TG301 generator control system initiated the increase in output. The Generator remained at an output of around 23MW as shown in Figure 12 below, including during the HP system split and APA DEWAP islanding conditions. TG301 generator tripped from the system due to overfrequency protection (57.6Hz). Analysis of the received data indicates that the TG301 governor control system did not respond to the high system frequency as per the control philosophy (frequency droop) currently reflected in the Network's PowerFactory model. The output data received for TG301 generator indicated that the Generator remained in a constant-power mode. This resulted in sustained high system frequency on the APA DEWAP system after islanding from the HP network, ultimately reaching extremely high levels until all remaining generators, including TG301, tripped from the system.

The APA DEWAP generators' disconnecting sequence is shown below, along with the system frequency trajectory overlayed with the Generators' active power outputs.

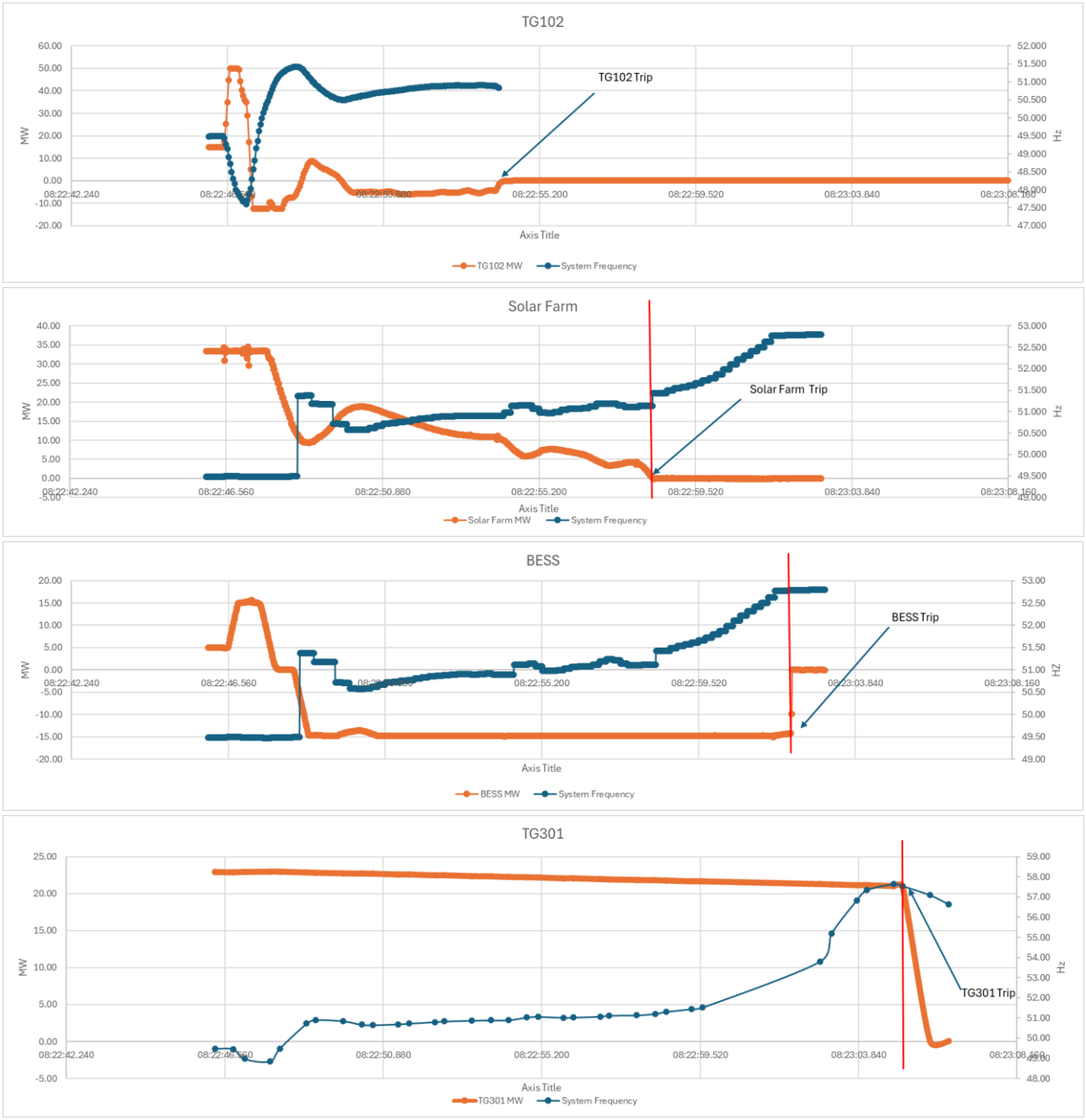


Figure 10 APA DEWAP TG102, Solar Farm, BESS and TG301 Generation disconnection sequence.

Report Observation 3:

a) The APA DEWAP system was islanded from the HP system due to underfrequency protection relay action at 48Hz on the HPS end of the Wedgefield and Murdoch interconnectors occurring approximately 0.64 seconds after the Rio Tinto system separation. PHTR section 2.4.4 9 (c) permits system islanding if the system can safely island itself in accordance with GEIP, rather than implementing

UFLS Stage 2. Following an islanding event, the NSP may manage the under-frequency event as it sees fit, in accordance with GEIP, within its own Network.

The following observation resulted from APA DEWAP underfrequency protection operation:

- **Due to the rapid rate of change in frequency, insufficient time was available for the NSPs' or major customer's feeder circuit breakers to open before the APA DEWAP system separated from the HP system.**
- **The HP network went black due to a total loss of generation on this system.**
- **As a result of the HP network islanding event, all generators and loads were disconnected from the APA DEWAP network, resulting in its blackout.**
- **The frequency increased to high levels outside the power system's technical allowable frequency envelope as per *PHTR section 3.3.3.3 (b)* Figure 3.4 – Off nominal frequency operation capability requirement for generating units.**

b) Analysis of the submitted data indicates that the TG301 governor control system was not responding to the high system frequency, as indicated by its frequency droop characteristic; the APA DEWAP system frequency remained high following islanding from the HP network ultimately attaining extremely high levels, at which point all remaining generators disconnected from the APA network, resulting in its blackout.

6.3 Rio Tinto System Behaviour Following the HP System Separation (Phase 2b)

Prior to the Event, the total generation and load on the Rio Tinto system was around [redacted] and the synchronous spinning reserve was [redacted], with an additional [redacted] of asynchronous spinning reserve from the BESS.

Following the islanding of the HP network event, the Rio Tinto system generation exceeded the local [redacted] load remaining on the system as the total generation at the time of disconnection was [redacted]. The Rio Tinto generation profile just before the Event is shown in the table below.

Table 6: Rio Tinto system generation before the islanding event.

Generator	Type	Output (MW)	Power Station	Control
GTG1	Thermal	[redacted]	YMPS	[redacted]
GTG2	Thermal	[redacted]	YMPS	[redacted]

Generator	Type	Output (MW)	Power Station	Control
GTG5	Thermal	[redacted]	YMPS	[redacted]
GTG7	Thermal	[redacted]	YMPS	[redacted]
WAG1	Thermal	[redacted]	West Angelas	[redacted]
CLG1	Thermal	[redacted]	Cape Lambert	[redacted]
CLG2	Thermal	[redacted]	Cape Lambert	[redacted]
TPBESSR	Battery	[redacted]	Tom Price	[redacted]
GDSF	Solar	[redacted]	Gudai-Darri	[redacted]

When islanding initiated, surplus generation on Rio Tinto's system temporarily increased the system frequency, which was subsequently reduced by generator and BESS frequency droop responses. After initially settling at 50.2Hz, Rio Tinto's system frequency eventually settled around 50Hz.

The Rio Tinto network remained within the frequency operating standards despite multiple contingency events, with no load interruptions during or after the events.

The frequency response at the time of the islanding event, and after the system islanding, is shown in the figure below.

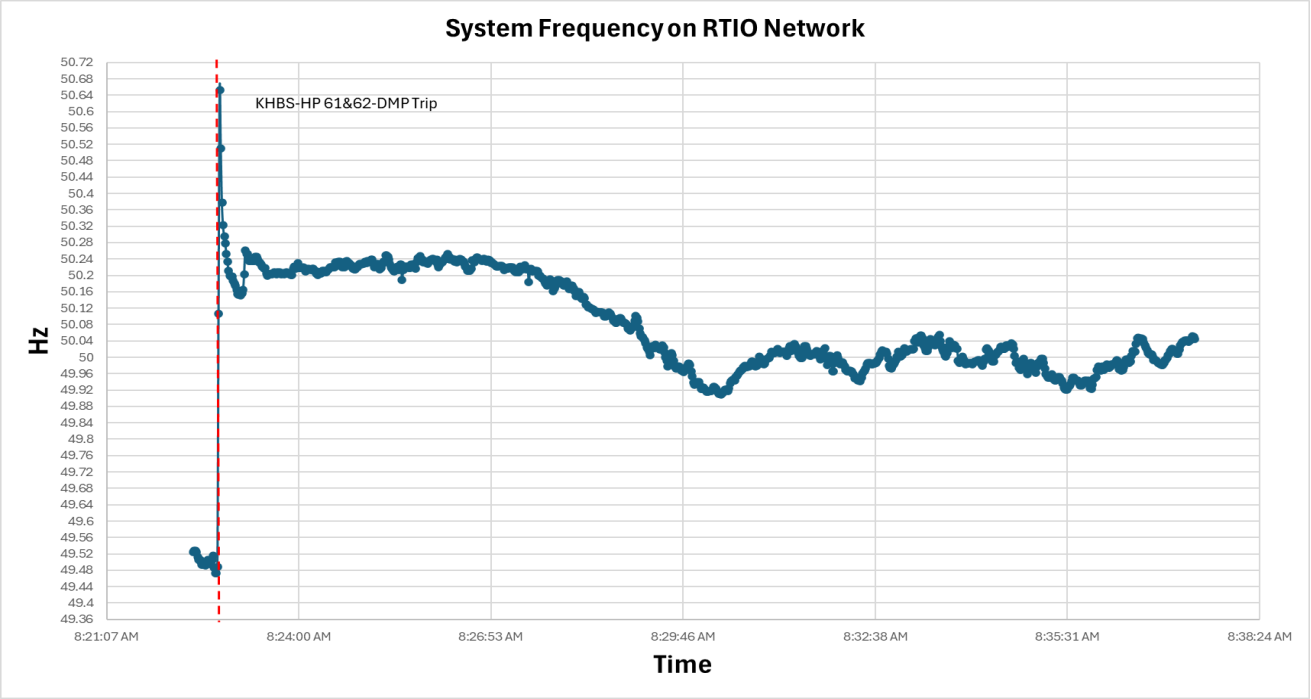


Figure 11 Rio Tinto System frequency response at the time of the system islanding.

Report Observation 4:

The system configuration during Phase 1 of the event included synchronous spinning reserve of [redacted], with an additional [redacted] of asynchronous spinning reserve from the BESS on the Rio Tinto network. The loss of the Cape Lambert 33kV cable interconnected circuit imposed an additional thermal limitation on the remaining two Dampier interconnected circuits. As the overload on the interconnector cable circuits was not reduced, these interconnectors subsequently tripped, the APA DEWAP network islanded, and the HP system blackout occurred due to the absence of generation on the remainder of the HP system.

7 Power Station and System Restoration

7.1 Power Station Restoration

Black-start capability in the NWIS is provided by KRP, SHPS, APA DEWAP's power stations and Rio Tinto's power stations which can black start individual generators and/or sustain generators which were online at the time of a network interruption in the absence of grid power.

General feedback from the power stations following the HP and APA DEWAP system blackout was that the black-start generators at all four power stations connected to the Covered Network were unable to return the main gas turbine generators to service in a timely manner and/or failed to operate as intended. The blackstart diesel generators at the various sites suffered the following failures:

- KRP - black start generator started, however the circuit breaker failed to close and the unit experienced a protective shutdown;
- SHPS - black start generator overloaded and tripped;
- BPS - the site's diesel generator did not operate; and
- HPS - black start generator overloaded and tripped.

In all instances, the sites required local site operator intervention before the site's gas turbine generators could attempt a black start, after several attempts to achieve a successful start of the black-start diesels.

7.1.1 Karratha Power Station

Following the TransAlta South Hedland Power Station tripping event, HPCC initiated a remote start on GTG2 and GTG1 at the Karratha Power Station. The GTG1 and GTG2 starting sequence was interrupted when the Rio Tinto network disconnected from the HP network. The Karratha Power Station black start diesel generator (BSDG) did not start following the system blackout. Production specialists were called to the site, where the BSDG was found to be in a faulted state but was able to be reset from the SCADA system. An attempt was then made to start the BSDG from the SCADA system. This resulted in a failure to start, after which it was put into local mode and started from the local panel. The BSDG local breaker was closed, allowing the gas turbine auxiliaries to be energised. GTG1 auxiliaries were reset, and the start command was issued at 08:57:00am, fast start enabled, and GTG1 proceeded with its starting sequence.

The GT starting sequence was interrupted at 08:58:06am when HPCC configured the 132kV breaker and a half-switchyard, which, as a result, led to a GTG 11.5kV supply loss. KRP generator transformers were subsequently back-energised by the HP network, and at

09:03:00am, GTG1 start was initiated again, with fast start enabled. Synchronisation occurred at 09:09:41am. GTG2 was started thereafter and reached 5MW online around 09:30:00am.

7.1.2 APA Generators BPS and HPS

After the APA DEWAP system blackout, TG302 at Boodarie failed to restart owing to the site's diesel generator failing to operate. Hedland Power Station's black-start generator started at 08:25am, but issues with simultaneous motor starts caused the genset to overload and trip. In the meantime, APA DEWAP configured its Network to reduce the inrush current experienced by TG102 when connecting to the system. At 09:23am, the BSDG was back online and in stable operation and TG103 auxiliary power was established. At 09:26am, generator TG102 start signal was initiated and the gas turbine ran up to full speed with no load.

At 09:56am, TG102 energised the 66kV switchyard and the Gas Yard. APA DEWAP proceeded with the energisation of transformers T103a, T104a and T302a to facilitate the start of several generators (TG102, TG103 and TG104) respectively. At the time of T301a energisation, TG102 gas turbine tripped (most probable cause: maloperation of the reverse power relay – APA continues to investigate this incident), resulting in a blackout at Hedland Power Station.

HPCC restored the system to the East Pilbara South Hedland terminal (SHT), then energised the Hedland terminal up to the Wedgefield terminal. At 9:43am, ISO Control Desk called HPS to advise of the successful restoration of 66kV to HPS ready for synchronisation of a single generator and to start reenergising feeders. Following the trip of TG102 mentioned above, at 10:31am, the 66kV switchyard and Gas Yard were energised from the Horizon Power network via the Wedgefield interconnectors. At 10:43am, transformer T102a was back energised and gas turbines TG102 and TG103 were online at 11:12 and 11:22 am, respectively.

7.1.3 South Hedland Power Station

Following the system blackout event at SHPS, the black start diesel generator (BSDG) started and energised the essential services board. The second BSDG at SHPS was not operable at the time of the event, as the HMI was not powered due to a battery issue. GT40 was not operating at the time of the Event and therefore had not experienced a lockout. TransAlta closed and energised the essential services circuits from the BSDG at 08:34:33am and configured the auxiliary supplies to attempt to start GT40. At 08:49:40am, the BSDG overloaded and tripped. On the second attempt to get the BSDG online, an overload trip occurred again before the BSDG returned online at 09:39:07am. Both GT20 and GT30 (LM6000 units) entered a 4-hour lockout due to the loss of auxiliary supplies for

turbine equipment rundown and cooling. At around 09:32am, the 11kV backfeed from HP on the GT20 11kV bus (SHP._20CJA80GH001) and the ST10 11kV bus (SHP._10CJA80GH001) was established.

Instrument air compressors were able to start and raise the station's air pressure but were unable to sustain pressure resulting in subsequent loss of system pressure over several (4) attempts. It was subsequently determined that the air compressors required an additional reset on the operator engineering station (OES) to fully reinstate the compressors' duty cycle. On each occasion, as the air pressure was restored, the gas yard Emergency Shut Down (ESD) would reset. However, as the OES latch for the instrument air compressors had not been cleared, the instrument air pressure would bleed off over time and the (ESD) would trip again. This occurred on four occasions before the OES latch for the air compressors was properly reset.

After the instrument air pressure was restored, high-pressure gas downstream of the ESD was required to be bled off at the gas turbine and the main line pressure reduced to a sufficiently low level to achieve a start permissive. This process was repeated 3 times, lowering the regulator pressure each time until train 2 gas pressure (4.4MPa) was sufficiently below train 1 (4.8MPa).

At 12:22:03pm, the GT20 and GT30 lockout cleared, and at 12:52:24pm, GT40 was started and synchronised online at 13:02:59pm. At 14:02:08pm, GT20 was started, synchronising at 15:10:53pm. At 14:07:53pm, GT30 started, synchronising at 15:13:38pm. At 16:44:14pm, ST10 was online.

Report Observation 5:

a) **The black-start generators at all four power stations were unable to return the main gas turbine generators to service promptly and/or failed to operate as intended.**

b) **Many of the gas turbine generators in the NWIS are LM6000 units (Paraburdoo Power Station, Yurralyi Maya Power Station, West Angelas Power Station, Cape Lambert Power Station, Karratha Power Station and TG301 at Boodarie Power Station), which must have auxiliary power provided to "motor" the unit after tripping within 10 minutes of shutting down. Otherwise, the units experience a 4-hour lockout (as experienced by TransAlta GT20 and GT30 and APA DEWAP's TG301 during this event) to prevent turbine blades from rubbing against the turbine casing upon restart. In the event of a blackout, the role of the BSDG is, in part, to provide auxiliary power to "motor" the LM6000 units to prevent this lockout.**

8 System Restoration

The HP system was reenergised by the Rio Tinto system via the Dampier interconnection cables at 08:44:07am, with the 132kV lines to Karratha Power Station energised thereafter. Restoration of KRP occurred simultaneous to separate attempts to restart GT1 using the BSDG at 08:57:00am, resulting in an interruption to the GT starting sequence at 08:58:06am when HPCC configured the 132kV breaker and a half switchyard. KRP generator transformers were subsequently back energised and, at 09:03:00am, GT1 start was initiated with fast start enabled, ultimately synchronising with the system at 09:09:41am. GT2 was started thereafter and was online at 5MW around 09:30:00am.

At 09:29:35am, HPCC restored the system to the East Pilbara South Hedland terminal (SHT), completing the process at 09:31:10am. HPCC then energised the Hedland terminal at 9:35:20am and up to the Wedgefield terminal at 9:43:25am. At 9:43am, ISO Control Desk called HPS to advise of 66kV restoration to HPS and state of readiness for synchronisation of a single generator and reenergisation of feeders.

Whilst HPCC was energising the system from Rio Tinto to Wedgefield, APA DEWAP proceeded with restoration of the internal generation plant using the BSDG at Hedland power station. At 09:26am, generator TG102 start was initiated and the gas turbine run up to full speed with no load. Feedback was received from APA DEWAP that indicated that they had not noticed completion of restoration of the Wedgefield line at HPS and proceeded with the current restoration plan. However, ISO Control Desk log confirmed that ISO advised HPS of the 66kV restoration to HPS at 9:43am. At 09:56am, TG102 energised the 66kV switchyard and the Gas Yard. APA DEWAP proceeded with the energisation of transformers T103a, T104a, and T302a to facilitate the start of several generators (TG102, TG103 and TG104) respectively. At the time of T301a energisation, TG102 gas turbine tripped (most probable cause: maloperation of the reverse power relay– APA continues to investigate this incident), resulting in a blackout at Hedland Power Station.

At 10:25am, the ISO control desk informed APA DEWAP that CB 7109.0 was closed and APA was advised to energise the bus and one transformer from the Wedgefield line. At 10:31am, the 66kV switchyard and Gas Yard were energised from the Horizon Power network via the Wedgefield line. At 10:43am, T102a transformer was back energised, and gas turbines TG102 and TG103 were online at 11:12am and 11:22am, respectively. At 11:37am, APA DEWAP energised the Finucane Island feeder and advised Fortescue Ltd that the system was ready to energise their facility. Around 11:42am, APA DEWAP energised the Tiger substation, and at 12:04pm, the Murdoch drive interconnector was closed.

At 13:00pm, ISO requested APA DEWAP to supply 20MW, with 10MW initially supplied until another unit started. SHPS synchronised GT40 to the Network at 13:03pm, and ISO

requested that APA DEWAP restore the previously requested offset to 0MW. At 14:12pm, TG301 synchronised with the APA DEWAP system at BPS, followed by the synchronising of GT20 and GT30 at SHPS to the Horizon Power system at 15:10pm and 15:13pm, respectively. With the East and West Pilbara generation and system restoration completed, ISO deactivated the Loss of Generation or Load Protocol initiated at the start of the event (PNR 82) at 15:15pm.

9 References

Reference	Version	Title
[1]	18 June 2025	Pilbara Networks Rules
[2]	Version 1	Pilbara Harmonised Technical Rules
[3]	3 - 2 September 2022	Horizon Power Technical Rules (HPC-9DJ-01-0001-2012)
[4]	3	Pilbara ISOCo Protocol Framework Procedure
[5]		Information received from ISOCo in response to requests for information (RFI) sent to Horizon Power, APA DEWAP, ISO control desk, Rio Tinto, BHP, Fortescue Ltd, Hancock Iron Ore, Pilbara Ports Authority, ATCO, and TransAlta.

Department of Energy and Economic Diversification

GOVERNMENT OF WESTERN AUSTRALIA

Energy Policy WA

Agenda Item 6: EPNR Update on Working Group Meetings

Pilbara Advisory Committee (**PAC**) Meeting 2026_07_23

1. Purpose

Energy Policy WA (EPWA) to provide an update on the Evolution of the Pilbara Networks Rules (EPNR) Working Group meetings in June and July 2026.

2. Recommendation

That the PAC discusses the feedback from recent Working Group meetings on 18 June, 2 July and 9 July.

3. Background

- The PAC's Evolution of the Pilbara Networks Rules Working Group has been contributing to the evolution of the Pilbara Networks Rules.

4. Update

- This update provides a summary of the outcomes of the 18 June 2026 and 9 July 2026 PNR Workstream meetings, including further details on an NSP-to-NSP connection framework, new PNR entity taxonomy, an information management framework, long term planning and essential system services cost allocation.
- This update also provides a summary of the outcomes of the 2 July 2026 HTR Workstream meeting, including discussions and considerations about grandfathering arrangements for proposed draft technical rules.

5. Attachment

(1) Agenda Item 6 – Attachment 1 – Presentation slides

Department of
Energy and Economic Diversification

GOVERNMENT OF WESTERN AUSTRALIA

Pilbara Advisory Committee – EPNR Update

23 July 2026

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1	Grandfathering arrangements for the HTR amendments	10 min
2	NSP to NSP connections	20 min
3	Information management framework	20 min
4	Long term planning	10 min
5	ESS cost recovery	20 min
6	Next steps	10 min

EPNR activity since the last PAC meeting

- The EPNR working group has met three times since the last PAC meeting:
  - 18 June (NSP to NSP connection framework, PNR entity taxonomy)
  - 2 July (HTR rule amendments)
  - 9 July (information management framework, long term planning, ESS cost recovery)
- Meeting materials are published online.
- The initial rule change tranche is complete, and ready for external consultation.

Grandfathering arrangements for the HTR amendments

HTR working group discussion

On 2 July, the HTR working group discussed grandfathering arrangements.

- Members were concerned that existing equipment should not be forced to upgrade to meet a newly introduced standard, as this could deter investors.
- One member advocated for flexibility, suggesting that modern systems may require facilities to adapt and renegotiate some settings.
- EPWA considers that some aspects of the rules must apply to everyone (e.g. requirement to provide updated models, or having the same operational obligations on a battery whether it is charging or discharging), but acknowledges that requiring changes to that impose an administrative burden or impact facility design or hardware may need to be compensated appropriately.
- Discussion that introducing a minimum standard and negotiation framework to the HTR will help.
- Next steps: EPWA will review specific draft clauses and suggest whether they should be grandfathered.

Do PAC members have any other comments on the way grandfathering is managed under the PNR?

NSP-to-NSP connections

Drivers for change to the way PNR organises and categorises entities

Drivers from EPNR Implementation Plan:

- 3.6 Storage participation – includes adding “Energy Production System” concept
- 3.17 NSP to NSP connections – including broadening CPC options
- 3.20 Self-Contained Network concept

Additional drivers/factors:

- Reducing conflation of physical facility attributes with compliance approach
- Moving closer to consistency with ESM Rules
- Uniqueness of Pilbara & NWIS arrangements
- Commitment not to materially change CPC Facility scope
- Providing a new option for Connection Point Compliance for Non-Covered Networks

Proposed PNR taxonomy – Facilities

- **Energy Producing System (EPS)** – expands on “Generating Unit” to include storage systems and combination resources
- **Facility** – covers generation, storage, large loads, but does not include networks (ESM Rules do)
- **Facility Components** – include single or multiple EPSs, associated loads and network elements

All the above apply irrespective of registration requirements or status.

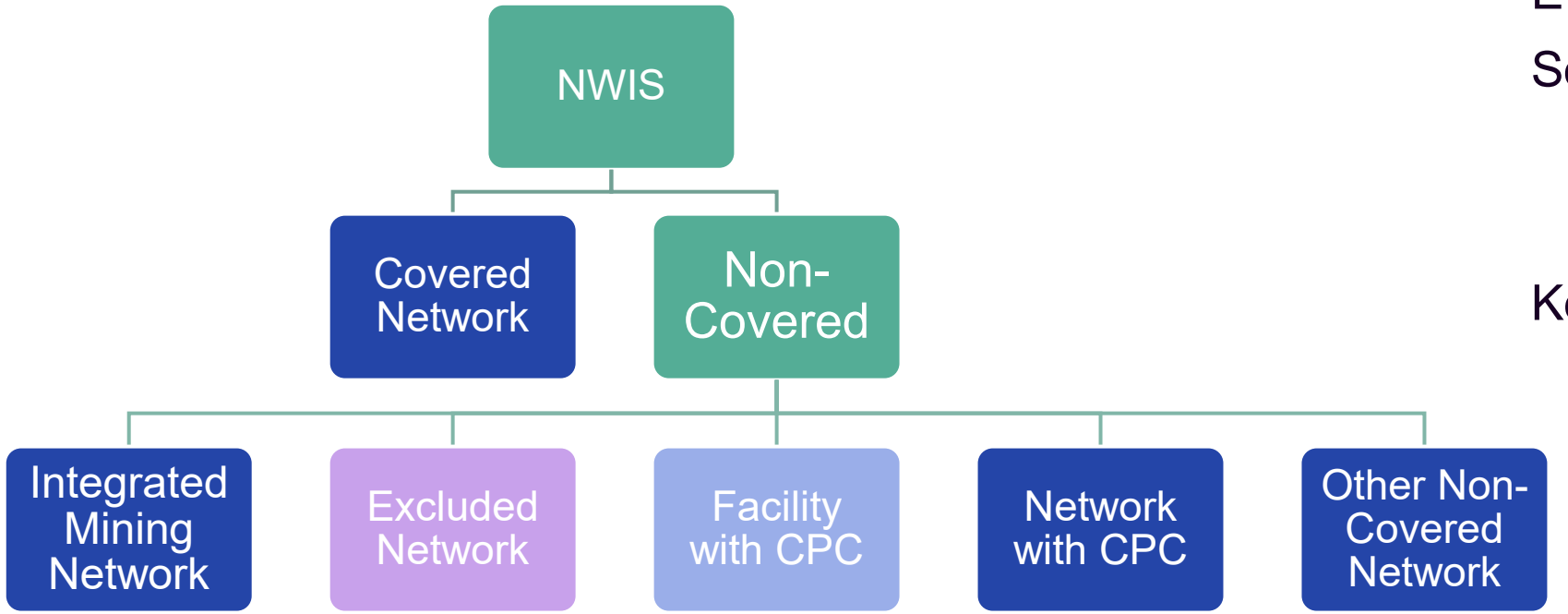
- **Registered Facility** – a Facility for which the Controller is required to register, and must provide data to the ISO
- **Registered Facility Classes** – reflect the role and type of obligations placed on Facilities:
  - Registered Energy Producing Facility
  - Registered Consumer Facility (large loads connected to Excluded Networks, or certain CPC Facilities)
  - ESS Facility (may also be in one of the first two classes)
  - CPC Facility (will also be in one of the first two classes)

Working group discussion

- Members supported simplifying the Rules but noted that categorising networks in this way would require extensive amendments throughout the Rules.
- Members wanted additional clarity around the purpose and intent of the proposed changes, and this was discussed. Accommodating emerging technologies and services while simplifying the rules and providing clarity on which rules apply and when were identified as key drivers of the changes.
- Some members suggested a paper outlining the purpose, summarising the changes and the impacts on the rules.

Do PAC members have any other comments on the way entities are defined in the PNR?

Proposed NWIS Network registration requirements



Every Network has an NSP.

Some NSPs must register.

Key to NSP registration:

- Register as NSP
- Register as Controller
- Not Required

Excluded Networks, CPC Facilities, and CPC option for Networks

	Purpose	Eligibility	Implications
Excluded Network	Networks that connect large loads to NWIS	• No EPS > 10 MW • No PSSR risk	• Network exempt most network rules • Loads registered as Consumer Facilities
CPC Facility	Self-contained networks that want CPC	• No third-party access • Single connection point • PSSR risk addressed by CPC Measures • Either no material transmission, or no intention to export	• Treated as a Facility with NSP as Controller • Network treated as an Excluded Network • CPC Measures
CPC option for Networks	Non-Covered Networks that want CPC	• PSSR risk addressed by CPC Measures	• NSP registers • Export registers as separate Facility • Monitoring/control equipment as required by ISO • Visibility as required by ISO

Working group discussion

- The ISO had concerns regarding complexity and potential increase to the ISO's resourcing requirements. The Chair clarified that costs are generally met by the connection applicant and that implementation of the proposal will include consideration of cost recovery arrangements.
- Members raised the issue of an existing participant changing registration category. The group agreed that changes to the rules should provide for registration category changes with a process that recognises work already completed in prior registration processes.
- Members views were sought regarding material transmission infrastructure as a determinant of a network owner being required to register as an NSP. One member considered that the key consideration is whether a party has sufficient operational control over the connected assets to participate effectively within the Pilbara system.

Do PAC members have any other comments on network registration and compliance treatment in the PNR?

Information management framework

Information management in the PNR

Transparent access to information is key to efficient operations. If participants have access to data on the power system, they can better plan their operational strategies. Transparency measures should apply to all parties equally to provide a level playing field, and to improve the perception of ISO independence.

Confidential information should be protected in appropriate circumstances, but the existing framework ends up making most information confidential, with limited checks and balances to allow useful information to be reclassified and made more available.

As the power system evolves, the ISO will need access to confidential operational information from all rule participants to effectively operate the power system and maintain PSSR, and participants must be confident that information is managed appropriately.

Proposal: information managers

PNR Information = information or a document that is produced, provided or exchanged under the PNR.

Every piece of PNR Information will have an Information Manager.

The Information Manager is different from the Owner.

The information manager is, in order of priority:

- The party who is required to publish the information
- The party who produces the information
- The party who receives the information
- The party determined by the Coordinator

In most cases the Information Manager will be the ISO, but may be the Coordinator, the ERA, or na NSP (in relation to information provided by connecting parties).

Proposal: confidential and public information

PNR Information must be confidential if it:

- is in a contract that specifies it to be confidential
- could pose a material risk to Power System Security or Power System Reliability if disclosed;
- reveals personal details about an individual (other than name and business contact details)
- could cause commercial detriment to a Rule Participant or another person if disclosed
- is explicitly specified as Confidential Information in the PNR.

Information must public if it is:

- specified as Public Information in the PNR;
- required to be published or otherwise made publicly available under the PNR; or
- available in the public domain, unless unlawfully or through PNR non-compliance

Proposal: challenging classification

A Rule Participant can submit to the information manager that certain information should be confidential.

The participant can only do this if:

- the information explicitly relates to it, its Facilities, activities or contracts, or
- the information was provided to the participant by a third party, and it is under a duty or obligation to that third party to keep the information confidential.

The information manager must consider the submission, but is not bound to agree to every submission.

Participants can dispute the classification, and the outcome will be determined by the Coordinator.

Non-participants who request confidential information can dispute a decision to not release the information, and the outcome will be determined by the Coordinator.

Proposal: other matters

When a prospective connecting party has formally enquired about interconnection:

- They will be entitled to access the NWIS model (rule changes for this will be drafted and consulted on ahead of the rest of the information management framework)
- The ISO will be entitled to request information for use in long term planning (rule 283(2))

No pre-disclosure approval process, except in case of disclosure to the courts etc. In this case, information managers will still have an obligation to notify affected parties and provide an opportunity to dispute.

Confidential Information can be aggregated, arranged or combined with other information to turn it into public information, as long as what is published does not reveal confidential information.

Current PNR confidentiality obligations are mirrored in the PNAC, which would also need to be adjusted to implement new arrangements.

Working group discussion

- ISO highlighted changes to confidential information will flow through to the information that it is required to publish under condition 6 of the ACCC authorisation.
- Members discussed two potential sources of confidential information in the NWIS model:
  - Proprietary OEM information
  - Generation and demand forecasts.
- The PNR can require connected parties to provide a model version that can be shared, and this can be managed in the procedure.
  - This could include only providing encrypted OEM models
  - This could involve omitting forecasts, or limiting forecasts to information which is not commercially sensitive.
- Members agreed that the NWIS model is currently shared with registered NSPs and that a rule change allowing registration of prospective NSPs could facilitate sharing of the model to incoming NSPs.
- ISO information requests must relate to a specific rule function.

Working group discussion (continued)

- Information classification could be held in a published register, so all parties are clear what is and is not confidential.
- There are currently no penalties for not providing information in response to an ISO request.
- The group agreed that making a prospective connection a Rule Participant would give ISO power to request information.

Do PAC members have any other comments on the way information is managed under the PNR?

Long term planning

Planning for the PSP and the PIP

Preparations for the inaugural GenSOO and Transmission Development Plans are underway, and they are scheduled to be published in mid-2027.

The PIP and PSP will replace the GenSOO and TDP in the next long term planning cycle. The only near term PNR amendments will be to provide heads of power for the new planning exercises:

- The Coordinator must develop and consult on a procedure for developing the PIP

  The PIP will explore the future of the Pilbara electricity systems in a range of potential futures. It may designate specific scenarios to be addressed in future PSPs.

- The ISO must develop and consult on a procedure for developing the PSP

  The PSP will consider generation and transmission together, for a range of demand scenarios, including a central case that represents the ISO's best estimate of the most likely future.

- Timing for initial PSP and PIP TBC

Working group discussion

- Some members considered that none of the current or proposed planning documents are useful, and that the effort and expense of creating them is not justified.
- Others considered that a forward-looking plan is useful but questioned the frequency at which it should be published – proposing 2 years (instead of 1) for a projection of known projects and potential constraints, and 10 years (instead of 5) for a blue-sky assessment of the potential future of the Pilbara power systems.
- Some members considered that transmission and generation should be considered together, not as separate exercises.
- Some members considered that two plans are not justified for the Pilbara, and that only one integrated plan should be published by the Coordinator every 7 or 10 years.
- Members discussed the ISO transition to the proposed PSP, noting that a procedure would be required prior to delivering the GenSOO/TDP. EPWA agreed to liaise with ISO to discuss an efficient approach.

Do PAC members have any comments on long term planning for the Pilbara?

ESS cost recovery

Implementation: Contingency raise

In the NWIS, the ISO procures CRR in two ways: a contract for a base quantity that is always available, and supplementary service that can be enabled and disabled by system controllers as needed. We propose to determine a cost per interval as follows:

- Allocate costs of the base quantity evenly across all trading intervals.
- Allocate costs of supplementary services to the trading intervals in which they are used.

To determine the runway shares, we will need to collate half-hour interval generation data for each energy producing facility.

If a part of the NWIS is islanded, then supplementary services may be required solely for that island. It would be possible to calculate a separate runway allocation for each island, but the effort required likely outweighs the avoided distortion to causer allocation.

What implementation issues do members see for this approach?

Implementation: Regulation (1)

The ISO currently contracts for regulation on an annual basis. There is a primary provider, who provides the same quantity all year round, and secondary providers, who only provide service when the primary provider cannot (e.g. if it has an outage, or there is an islanding event).

When responding to frequency changes within a trading interval, a regulation provider may generate more or less energy than it had planned to. This additional energy is accounted for in energy settlement calculations, where participants pay penalty rates for their out of balance energy.

The remaining contract payments must still be recovered. Currently, these costs are allocated to participants based on the difference between their maximum load and their minimum load for the entire three-year reference period. This does not reflect the predictability of the load, and does not reflect what drives the regulation requirement.

Causers of the need for regulation are those whose net generation or consumption varies from their scheduled quantity within a dispatch interval – i.e. those with energy imbalances.

Implementation: Regulation (2)

There are two options to allocate costs based on energy imbalances. Both need interval level scheduling and meter data.

- Per trading interval:
  - divide regulation costs across half-hour intervals so that costs are higher in intervals where the requirement is higher
  - allocate those costs to participants based on the absolute value of the difference between the scheduled quantity and the metered quantity in that interval.
- Per settlement period:
  - Calculate regulation costs for the settlement period as a whole
  - Calculate the difference between the scheduled quantity and metered quantity in each interval
  - Allocate costs based on the sum of the absolute values of per-interval energy imbalances.

What implementation issues do members see for this approach?

Working group discussion

- There was limited time remaining to discuss ESS cost recovery.
- The intention for regulation cost recovery is to use energy imbalances, as calculated in settlement.
- Parties providing regulation would need to be accounted for in the calculations, as they will be out of balance due to providing ESS.
- The ISO does not currently receive meter data for all generation facilities, and not all individual facilities are metered, so access to the data, and alternative sources of data (e.g. SCADA) will need to be considered.

Do PAC members have any comments on ESS cost recovery?

Next steps

Next steps

PNR Workstream

- Discuss ESS regulation
- Consider ISO-led reforms (including outage coordination and control desk move)
- Refine and develop content for initial Consultation Paper and PNR Amendment Rules

HTR Workstream

- Further consider grandfathering arrangements for draft Amendment Rules
- Finalise HTR Amendment Rules for public consultation
- Continue progressing next tier of issues to rule drafting stage

Note. Further working group meetings are currently unscheduled.

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Thank-you