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Department of **Energy, Mines, Industry Regulation and Safety**
Energy Policy WA

Pilbara Networks Rules Design Summary

A report summarising the content and application of the Pilbara Networks Rules

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Working together for a **brighter** energy future.

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Abbreviations

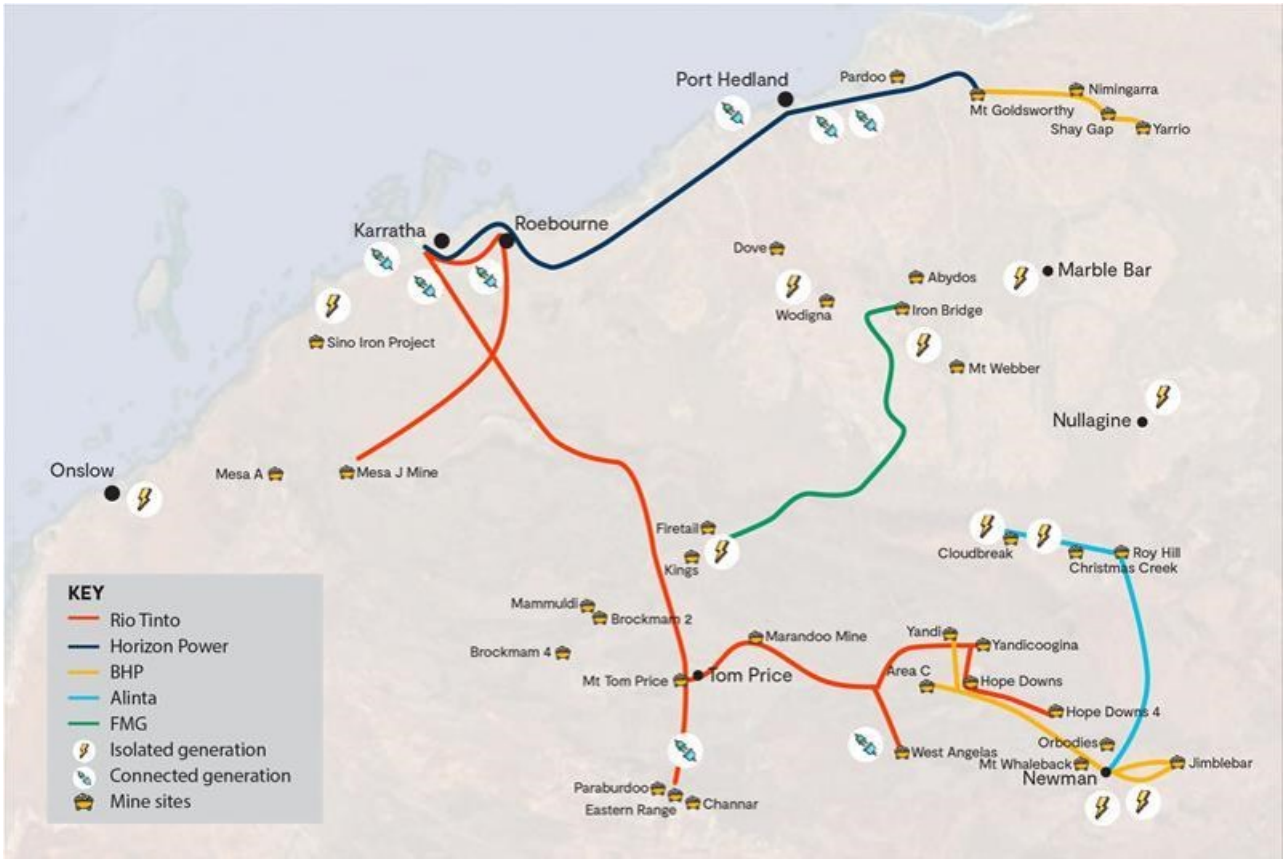
Term	Definition
The Act	*Electricity Industry Act 2004*
AP	Administered Price
APP	Administered Penalty Price
Chair	The Independent Chair
Coordinator	Coordinator of Energy
CPC	Connection Point Compliance
Customer Transfer Code	*Electricity Industry (Customer Transfer) Code 2016*
EBAS	Energy Balancing and Settlement
ENAC	*Electricity Networks Access Code*
EPWA	Energy Policy WA
ERA	Economic Regulation Authority
ERB	Electricity Review Board
ESS	Essential System Services
FCESS	Frequency Control Essential System Services
GEIP	Good Electricity Industry Practice
HTR	*Pilbara Harmonised Technical Rules*
ISO/Pilbara ISOCo	Independent System Operator / Pilbara Independent System Operator Company
Metering Code	*Electricity Industry (Metering) Code 2012*
MT PASA	Medium Term Projected Assessment of System Adequacy
MW	Megawatt
MWh	Megawatt Hours
NBTQ	Negative Balancing Tolerance Quantity
NIQ	Negative Imbalance Quantity
NSP	Network Service Provider
NWIS	North West Interconnected System
PAC	Pilbara Advisory Committee
PBTQ	Positive Balancing Tolerance Quality
Pilbara GenSOO	Pilbara Generation Statement of Opportunities
PIQ	Positive Imbalance Quantity
PNAC	*Pilbara Networks Access Code*
PNR/Rules	*Pilbara Networks Rules*
The Regulations	*Electricity Industry (Pilbara Networks) Regulations 2021*
SRESS	Spinning Reserve Essential System Service
SWIS	South West Interconnected System

1. Introduction

1.1 Pilbara electricity system

The current electricity system in the Pilbara comprises five transmission systems[1] owned by five organisations, three transmission voltages (66kV, 132kV and 220kV), approximately 2,200 megawatts (MW) of installed generation and a number of stand-alone power systems serving islanded mine sites. There are multiple owners of transmission infrastructure in the Pilbara including Horizon Power, APA, Rio Tinto, BHP and Fortescue. The map below provides an illustrative view of existing infrastructure in the region.

Figure 1 – Illustrative map of Pilbara Networks



Source: Horizon Power 2022

1.2 Pilbara Electricity Reform (2017-2021)

On 9 August 2017, the then-Minister for Energy (Hon Ben Wyatt MLA) announced that the State Government would design a fit for purpose regulatory scheme for the Pilbara's North West Interconnected System (NWIS). In parallel to the Pilbara electricity reforms, Horizon Power's coastal network was declared a covered network under the *Electricity Networks Access Code*

[1] A 'transmission system', defined in section 3 of the *Electricity Industry Act 2004* (the Act), means electricity infrastructure used, or to be used, for, or in connection with, or to control, the transportation of electricity at nominal voltages of 66 kV or higher. The term 'transmission network' has the same meaning in the *Pilbara Networks Rules* (the Rules).

(ENAC) by the Minister for Energy on 2 February 2018. Alinta's (now APA's) Port Hedland network became a covered network on 1 July 2021.

On 1 July 2021, the regulatory framework for the Pilbara electricity system commenced. The regulatory framework was established under Part 8A of the *Electricity Industry Act 2004* (the Act) and includes:

- a light-handed access regime to facilitate third party access to designated electricity network assets in the Pilbara, which is codified in the Pilbara Networks Access Code (PNAC); and
- an administratively independent system operator (Pilbara ISOCo), which operates under the Pilbara Networks Rules (the Rules) to provide for the operation, management, security and reliability of the interconnected Pilbara system and other Pilbara networks.

1.3 Purpose of this document

This document aims to provide a high-level understanding of the content and application of the Rules to the Pilbara electricity systems, particularly the NWIS networks.

Acronyms are defined at first use and in the Abbreviations section of this document.

This document is intended for informational purposes only, and while all efforts have been taken to ensure accuracy and consistency with the Rules this document is not a legal instrument and must not be relied upon for any decisions. This document is a simplification of the Rules, and in many cases generalises or omits detail for the sake of brevity and accessibility.

1.4 Structure of this document

This document is not intended to provide a chapter-by-chapter summary and explanation of the Rules.

The document has been structured to summarise the Rules in a manner that presumes no prior exposure to the Rules, introducing preliminary concepts and explaining key features of the Rules by theme.

This document is structured as follows:

Chapters 2, 3 and 4 are intended to summarise some of the 'fundamental' building blocks the Rules rely on to deliver power system security and reliability in the Pilbara networks.

Chapter 5 outline the Rules' approach to ensuring sufficient generation capacity.

Chapters 6 and 7 provide a description of the power system security objective and key features of the Rules intended to support this objective.

Chapter 8 provides an overview of energy balancing and settlement in the NWIS.

Chapter 9 examines network matters, including constrained access provisions and connection and access processes

Chapter 10 describes the approach to long-term planning of the Pilbara networks.

Chapter 11 discusses administrative and governance mechanisms supporting practical implementation of the Rules.

Chapter 12 provides an overview of the Harmonised Technical Rules.

2. Network classes, and roles and functions under the Rules

This section outlines the application of the Rules to the various Pilbara networks and introduces the main bodies, and their roles and functions under the Rules.

2.1 Application of Rules

2.1.1 Determining a network class

A network class is determined by:

- whether it is a covered or non-covered network; and
- whether or not it forms part of the NWIS.

Covered and non-covered Pilbara networks

In the Pilbara regime, a network can be either ‘covered’ (subject to third party access regulation) or ‘non-covered’ (not subject to third party access regulation). A network may be ‘covered’ under either the PNAC or the ENAC.

Two Pilbara networks are currently ‘covered’ networks under the PNAC. These are the Horizon Power coastal network and the APA Port Hedland network.

NWIS and non-NWIS networks

The NWIS refers to the covered Horizon Power coastal network and the APA Port Hedland network, as well as any other interconnected electricity networks. The NWIS presently comprises five interconnected networks, owned and operated by both state (Horizon Power) and private entities.

Non-NWIS networks refer to any other Pilbara networks (which may or may not be interconnected with each other). There are a number of smaller networks to which local generation is connected, which are not connected to the NWIS (non-NWIS networks).

2.1.2 Application of Rules to network class

Table 1. Network Classification Table and Application of Rules[2]

Part of NWIS	Covered Network	Network Class and Application of the Rules
Yes	Yes	Class 1A – all Rules apply.
Yes	No	Class 1B - integrated mining network[3]– all Rules apply, but: • only to the extent necessary to achieve a broad range of purposes in Rule 5(2); and • not when the Rules carve out an explicit exception.
		Class 1C – excluded network[4] - All Rules apply, however, excluded networks are treated as a facility under the Rules.
		Class 1D – All Rules apply, unless the Rules specify they are limited to covered networks.
No	Yes	Class 2 – All Rules apply, with two qualifications: • the Harmonised Technical Rules (HTR) apply in full (except if there is a legacy arrangement or HTR exemption); and • the Rules only apply to the extent necessary to facilitate access to the covered non-NWIS network.
No	No	Class 3 – Rules do not apply, unless explicitly stated.

2.2 Rules participants

A 'rules participant' means any person on whom the Rules confer a function or benefit, but does not include the Minister for Energy ('the Minister'), Economic Regulation Authority (ERA), Electricity Review Board (ERB) or an Arbitrator.

2.3 Roles and functions

Coordinator of Energy

The Coordinator of Energy (Coordinator) is a statutory position established under the *Energy Coordination Act 2004* and has the function of providing advice and support to the Minister on all aspects of energy policy in Western Australia. The Coordinator is supported by Energy Policy WA, a division of the Department of Energy, Mines, Industry Regulation and Safety.

[2] See Rule 4.

[3] An Integrated Mining Network is a network that is part of a system operating an integrated fashion predominantly for the purpose of a carrying on a Pilbara Minerals Business.

[4] Excluded Networks at the commencement of the rules are listed in Rule 23. The ISO, on application of a non-covered network, may determine a network becomes an Excluded Network following strict criteria in Rule 24.

The Coordinator's functions include administering, reviewing and amending the Rules as well as convening and consulting with the Pilbara Advisory Committee (PAC) to progress the evolution of Part 8A[5] of the Act and the Rules.

The Coordinator's annual budget for undertaking its functions under the Rules may be recovered (equally) from registered network service providers (NSPs) in each financial year. The 'Coordinator Fee' is collected by the Independent System Operator (ISO) from the registered NSPs and transmitted to the Coordinator. The Coordinator's annual budget must make an adjustment to account for any over or under-expenditure from the prior year's fees.

The Coordinator's costs and determination of fees are provided for in Rule 128 and Rule 129 respectively.

Economic Regulation Authority

The ERA has functions under the PNAC and the Rules.

Under the PNAC, the ERA's functions include determining an initial rate of return for covered networks, approving ringfencing arrangements, and administering a pool of arbitrators to consider any access disputes.

Under the Rules, the ERA's functions include providing assistance to the ISO for regime effectiveness reviews and supporting the ISO in exemptions to Codes. The ERA is also responsible for compliance investigations and enforcement in situations where an ISO investigation has been referred to the ERA by another person.

Further information on the ERA's functions under the PNAC and Rules are available on the ERA's website.

An 'authority fee' is payable by registered NSPs in a given financial year. The calculation and collection of that fee reflects the approach to the Coordinator's fee outlined above.

Pilbara Advisory Committee

The functions and composition of the PAC are described in Sub-appendix 2.1 of the Rules.

The PAC is made up of industry representatives and is convened by the Coordinator. The PAC's functions are detailed in clause A2.3.1 of the Rules.

The PAC advises the Coordinator on the evolution and development of the regime under Part 8A of the Act, and may advise the Coordinator, the ERA and ISO on rule change proposals and procedure change proposals.

The PAC must comprise the following members:

- An Independent Chair (Chair);
- An ISO representative;
- Representatives of Registered NSPs (one member per registered NSP);
- Representatives of Excluded NSPs (one member per excluded NSP, if the NSP so chooses);
- Contestable customers representative nominated by the Minister (at least one member);
- Small-use customers representative nominated by the Minister (at least one member); and
- Representative of rules participants not otherwise represented (between one and six members).

[5] Part 8A of the Act deals with Pilbara networks, empowering the 'Pilbara regime'. The Pilbara regime refers to the Act itself, and any regulations and subsidiary regulations made under the Act, including the Pilbara Network Access Code and the Rules.

The Chair is appointed by the Minister, while all other members are appointed by the Coordinator following consultation with the Chair. The Coordinator may only appoint members who have been nominated, with nomination requirements varying across member categories. The Minister and the ERA may both appoint representatives to attend meetings of the PAC as observers.

The PAC makes decisions by consensus but if consensus is not possible, the Chair will reflect advice to the Coordinator which represents the majority view of the PAC and includes dissenting views.

If an issue addressed by the PAC is highly technical or specialised, the PAC may decide to establish a working group of experts to investigate and report back on the issue.

Independent System Operator

The ISO is responsible for maintaining and improving system security in any interconnected Pilbara system.[6] Subchapter 2.1 of the Rules provides an overview of the ISO's functions and powers. The ISO's powers are outlined in the Rules and provide for it to perform various functions under the Act, including but not limited to:

- developing and administering various instruments;
- registering entities and facilities;
- managing certain information, including the visibility list and whole-of-NWIS power system model;
- ISO budgetary functions and fee recovery;
- system coordination, outage scheduling and, through the ISO control desk, participation in system operation activities;
- post-incident investigation;
- essential system services (ESS) procurement, and energy balancing and settlement (EBAS);
- providing access and connection services;
- network coordination and planning;
- undertaking rule compliance monitoring and enforcement; and
- developing rule change and procedure change proposals.

The Rules:

- allow the ISO to delegate performance of ISO functions;
- ensure the ISO has all the powers it needs to perform its functions under the Act; and
- clarifies that the ISO may provide directions in connection with dispatch, but is not required to manage dispatch of facilities.

An 'ISO fee' is payable by registered NSPs in a given financial year. The calculation and collection of that fee reflects the approach to the Coordinator's fee outlined above.

Network service providers

An NSP means a Pilbara NSP defined in the Act as a person who:

- owns, controls or operates a Pilbara network or any part of a Pilbara network; or

6 For the purposes of section 120W(2) of the Act, Pilbara ISOCo Limited is the ISO. Accordingly, any references to ISO in this document, can be understood as a reference to Pilbara ISOCo Limited.

- proposes to own, control or operate a Pilbara network or any part of a Pilbara network.

The Minister for Energy

The Minister responsible for the Pilbara regime, including the Rules, is the Minister for Energy.

The Rules confer a number of functions and powers on the Minister. These include:

- suspending the operation of any of the Rules;
- amending the Rules;
- approving the Coordinator's acceptance of a rule change proposal made by the Coordinator; and
- approving a rule change amending or replacing a protected provision, or changing its meaning and effect in the Coordinator's opinion.

The Minister may issue a statement of policy principles with respect to the development of the Pilbara networks regime and may issue that statement to the PAC for comment first. If the Minister has issued such a statement, the Coordinator must have regard to it in making amending rules.

3. Pilbara regime

The Pilbara regime was created by the insertion of Part 8A (Pilbara Networks) into the Act. Part 8A empowers a number of instruments (including the Rules), which may interact. This section describes these instruments and their order of precedence, and the application of the State Electricity Objective in the Pilbara.

3.1 Instruments

3.1.1 Instrument hierarchy

Rule 15 provides a hierarchy between the main instruments governing the Pilbara system.

The hierarchy establishes an order of precedence between the instruments with the effect that, in the event of any inconsistency between provisions in different instruments, the provisions in the instrument higher in the order of precedence will prevail.

The order of precedence for Pilbara-related instruments is as follows:

1. The Act.
2. The Regulations.
3. The Access Code.
4. The Rules, excluding the HTR.
5. The HTR.
6. Procedures.
7. A direction.

3.1.2 Main instruments

The Act

The Act governs the operation and regulation of the electricity industry in Western Australia, including electricity licensing, electricity supply and network access.

The Act delegates much of the governing of the electricity regime to subsidiary instruments to govern aspects of the electricity industry. This includes the Regulations, Rules, Metering Code, Customer Transfer Code and Access Code discussed in this section.

Regulations

The Pilbara system is governed by the *Electricity Industry (Pilbara Networks) Regulations 2021* created under the Act (the Regulations). The purpose of the Regulations is to provide for rules for the operation, management, security and reliability of the Pilbara networks. The Regulations also provide for the functions of the ISO and obligations of NSPs to provide information to the ISO and assist with its functions.

Access Code

Any reference to the Access Code in the Rules typically means the PNAC unless a covered network is regulated by the ENAC, in which case it means the ENAC.

The PNAC is a system of ‘light regulation’ governing third party access to electricity networks, and is only available in the Pilbara region. The regime is light-handed in that it avoids most of the up-front time and costs associated with full regulation (that applies under the ENAC) by deferring various issues from up-front determination to negotiation, and if necessary, arbitration.

The Rules and the HTR

The Rules are made by the Minister under the Act. They are the rules for the operation, management, security and reliability of Pilbara networks and they establish the functions of the ISO. The Rules also set out the governance, essential system services (ESS), and planning and reporting for Pilbara networks.

The Rules include the HTR in Appendix 5 of the Rules. The HTR sets out the technical standards governing power systems in the Pilbara. This includes technical, operational and other requirements, performance standards, obligations of controllers and various technical procedures. It also provides for transmission and distribution-related matters, including systems planning criteria.

A detailed overview of the HTR is provided in section 12 of this document.

Procedures

A Procedure governing certain processes within the Pilbara system may be developed by the ISO, the Coordinator or the ERA where the Rules require them to do so. A Procedure must be developed in accordance with Subchapter 3.6 of the Rules.

Protocols and the Protocol Framework

The ISO must develop a Procedure known as the Protocol Framework Procedure, which establishes protocols. A protocol is a set of instructions governing how the ISO, the ISO control desk, registered NSPs and registered controllers respond to system incidents.

A detailed summary of protocols and the Protocol Framework can be found at section 6.4.2 of this document.

Directions

A direction is a mandatory instruction given under the Rules to a rules participant. The different types of directions (by different entities) include scheduling, applying a constraint, and directions under the Protocol Framework. The different types of, and limits to, directions are explained in subsequent sections.

Other instruments

The Metering Code and Customer Transfer Code

Rules 66 and 67 apply the *Electricity Industry (Metering) Code 2012* (Metering Code) and the *Electricity Industry (Customer Transfer) Code 2016* (Customer Transfer Code) to covered Pilbara networks. Both Codes are subsidiary instruments created under the Act.

The Metering Code contains rules for the provision of meters by network operators at network connection points, metering services, and different forms of metering-related data. The Customer Transfer Code provides rules for the transfer of contestable customers from one energy retailer to another, setting out the obligations and responsibilities of retailers and network operators. The ISO may grant a registered NSP an exemption from these Codes. The ISO must publish and maintain a register of any exemptions.

3.2 Pilbara Electricity Objective

The performance of many functions under the Rules require a person (or entity) to have regard to the Pilbara electricity objective.

Following the commencement of the *Electricity Industry Amendment (Distributed Energy Resources) Act 2024*, the Pilbara electricity objective will be defined as the application of the State electricity objective in the Pilbara.

The State electricity objective is to promote efficient investment in, and operation of, electricity services for the long-term interests of consumers in:

1. The quality, safety, security and reliability of electricity supply.
2. The price of electricity.
3. The environment, including the reduction of the greenhouse gas emissions.

The Regulations and Rules may provide other matters a person (or body) is to have regard to in determining whether the performance of its functions meets the Pilbara electricity objective. For example, Clause 4 of the Regulations require the consideration of the following matters:

- the contribution of the Pilbara resources industry to the State's economy;
- the nature and scale of investment in the Pilbara resources industry;
- the importance to the Pilbara resources industry of a secure and reliable electricity supply;
- the nature of electricity supply in the Pilbara region, including whether regulatory approaches used outside the Pilbara are appropriate for the region's networks and network users; and
- any other matter the person or body considers relevant.

4. Operational information communication and exchange

To perform their functions under the Rules, the ISO and NSPs require access to adequate contact and operational information about network elements and facilities which may impact the security and reliability of a covered network. This section outlines the relevant framework established in the Rules.

4.1 Registration requirements

4.1.1 Certain NWIS participants must register with the ISO

The Rules outline when NSPs and controllers must register with the ISO. These include:

- The NSPs of covered and non-covered NWIS networks, except for excluded NWIS networks;
- The controller (a person who owns, operates, can control or does control equipment or a facility) of:
  - a generation facility on a covered NWIS network;
  - a connection point compliance (CPC) facility;[7]
  - a large consumer facility which is supplied by an excluded network;
  - each facility which provides (or proposes to provide) ESS to covered networks; and
  - any other generation works, storage works or large consumer facilities that the ISO determines must register.[8]

An NSP or controller required to register with the ISO must do so by giving their name and contact details to the ISO. The ISO will maintain and publish a list of registered persons and facilities.

4.1.2 Registered NSPs and controllers must provide standing data

The ISO must also compile, maintain and publish a list of the covered transmission elements, and may elect to include covered distribution elements, for which the ISO considers standing data should be provided.

Registered controllers and facilities must ensure that the ISO holds correct, complete and current standing data. The requirement to provide standing data is to facilitate the real-time operations of the ISO control desk in maintaining power system security and reliability. The content of standing data to be submitted to the ISO is specified in the ISO's Interim Registration and Standing Data Procedure.

4.1.3 ISO publishes a system map

The ISO must maintain and publish on its website a high-level single line diagram of the power system showing registered facilities and transmission elements linking them. This diagram is referred to as the "system map".

[7] CPC facilities are further discussed and explained further in section 9.2.2 of this document

[8] The ISO must make these determinations in accordance with criteria in Rule 93, generally reflecting power system security and reliability concerns.

4.1.4 Communications and systems requirements

The ISO must develop a procedure for notices, communications and system requirements required or contemplated under the Rules. Amongst other things, this procedure will specify communications and control system requirements, as well as data and information management system interface requirements for registered NSPs and controllers.[9]

4.2 Visibility

In the Rules, 'visibility' means that the ISO control desk[10] has access to real-time (or near real-time) information to the extent required by, and in accordance with, the visibility list.[11]

The visibility list specifies the content, characteristics and timing of signals and data from locations within the power system or facilities connected to the power system which must be visible to the ISO control desk. A registered NSP or registered controller must provide and maintain visibility to the ISO control desk.

The ISO's Visibility List Procedure currently includes:

- Standard Visibility List, APA Reduced Visibility List, and the Rio Tinto Iron Ore Reduced Visibility List;
- Static Signal Requirements; and
- Dynamic Signal Requirements.

Adding or removing items from the visibility list is undertaken via a procedure change proposal, assessed under Rule 105 and Appendix 2 {Rule and Procedure Change} of the Rules.

4.3 Power System Model

One of the key functions of the ISO is to create, maintain, manage and operate the whole-of-NWIS power system model under Subchapter 4.4 of the Rules and Interim Power System Modelling Procedure. The ISO develops and maintains the NWIS Full Power System Model and the NWIS Reduced Order Power System Model.

Each registered NSP must develop and maintain an accurate model of its network, and provide it to the ISO to develop and maintain the NWIS Full and Reduced Order Power System Models.

The NWIS Full Power System Model is used by ISO to undertake various power system studies, including managing planning criteria interactions, determining loss factors, determining the generation adequacy objective, undertaking post-incident investigations, determining ESS requirements, developing constraint rules, undertaking due diligence on access and connection processes, and network coordination and planning functions. The NWIS Reduced Order Power System Model is used to facilitate access and connection studies. Distribution of the models is undertaken under the Guide to Confidentiality – Access and Connection.

[9] 'Rule 8 of the Rules defines a 'controller' as, a person who owns, operates or controls (or is in a position to control): equipment; a facility; a generation facility at the connection point; a consumer facility at the connection point, or a CPC facility at the connection point.

[10] The ISO has delegated its real-time functions (functions which require the person to be ready perform on a 24/7 basis) to Horizon Power. Subsequently, a reference in the Rules to the ISO Control Desk means Horizon Power acting as the ISO's Delegate.

[11] The ISO must develop a procedure called the Visibility List (refer to Subchapter 4.3 of the Rules).

5. Generation adequacy

Power system reliability is defined in the Rules as a measure of a power systems' ability to deliver the desired amount of electricity to all points of consumption and receive electricity from all points of supply within accepted standards.

A drafting note in the Rules explains that reliability is best considered as an outcome of a power system having both security and adequacy, and outlines that 'adequacy' consists of both generation adequacy (summarised in this section) and network adequacy (outlined in section 9 of this summary).

5.1 Generation adequacy and electricity supply

Generation adequacy

Generation adequacy is outlined in Chapter 6 of the Rules. Its primary objective is to ensure that the power system has enough installed capacity to provide confidence that the power system will remain secure and reliable at times of peak demand, despite credible contingencies including planned and unplanned outages.

A secondary objective of Chapter 6 is to achieve the primary objective as simply and with as little compliance burden and cost, as practicable.

To achieve this in the NWIS, the Rules place two obligations on exit users (network users with an exit service under which the user may transfer electricity out of the network):

- An exit user must not receive a quantity of energy from a covered network, without having in place a valid Generation Adequacy Certificate; and
- An exit user must operate within its chosen demand cap.

The design of this framework places the onus on network users to provide confidence to the ISO that their energy supply, plus a generation adequacy margin[12], is backed by firm commitments from generators. These firm commitments must be in the form of an allocation notice.

Allocation notice

Generators are not obliged to, but may, self-certify capacity by providing the ISO with a notice (capacity certificate) specifying a quantity in MW as its own 'certified capacity'[13]. The ISO may accept a certificate at face value, but it does not have to. The ISO may, at any time, direct the generator to amend or withdraw the certificate if it has a reason to believe the certified capacity exceeds the generator's actual installed capacity.

A generator may give to the ISO an 'allocation notice' which specifies how many MW in certified capacity is being allocated to one or more exit user.

An allocation must not allocate more than 100% of the generator's certified capacity and must not allocate the same MW of certified capacity to more than one exit user.

[12] The ISO must from time to time determine the margin (generation adequacy margin) by which each exit user's total allocation from generators must exceed its chosen demand cap.

[13] A capacity certificate must not specify a quantity of certified capacity that exceeds a generator's 'actual installed capacity'. Actual installed capacity is a defined in Rule 154(3).

Chosen demand cap

An exit user must calculate its forecast 'peak demand', which is a good faith estimate of its maximum energy withdrawal at times of power system peak demand.[14]

Generation adequacy certificate

An exit user must provide and maintain a valid generation adequacy certificate with the ISO. The generation adequacy certificate must include all allocation notices the exit user holds and its chosen demand cap.[15] The ISO may accept a certificate at face value, but it does not have to. The ISO may, at any time, direct an exit user to amend or withdraw the certificate if it has a reason to believe the demand cap is not credible, or total allocations held are too low.

Monitoring and enforcement

The ISO must reconcile all current allocation notices against all current generation adequacy certificates whenever it receives a new or revised allocation notice or generation adequacy certificate. The ISO has powers to direct a generator, exit user or registered NSP to provide it with reasonable supporting information.

If the ISO detects a breach, it has broad remedial powers. These include the power to direct a person to remedy and/or publish information on a breach, or require an exit user to reduce its receipt of energy, or direct a relevant NSP to curtail energy deliveries to the exit user to a level the ISO determines appropriate to maintain the system security objective.

Generation adequacy in non-covered networks

Generation adequacy rules do not apply to non-covered networks. Instead, the ISO may require the non-covered NSP to confirm to the ISO (with supporting information) that the balance between generation and load in its network is appropriate.

Suspension of requirements in times of surplus capacity

The ISO may suspend or modify the generation adequacy requirements (Chapter 6 of the rules) if it considers that there is sufficient surplus capacity in the NWIS to achieve generation adequacy, regardless of adherence to the processes outlined in Chapter 6.

The ISO published a notice of suspension of Chapter 6 on 22 June 2023, citing a 150 per cent excess of installed generation capacity on covered networks.

[14] The ISO must create a Generation Adequacy Procedure which must identify times of peak demand.

[15] Aggregate allocation notices held must exceed the chosen demand cap by at least the generation adequacy margin.

6. System operations

This section outlines the system security objective and describes the framework created to achieve this objective. Key features of the framework discussed in this section include:

- standards of behaviour;
- approach to system coordination; and
- operation of the power system (including protocols).

6.1 System security objective

Chapter 7 of the Rules defines the system security objective for the power system.[16] The objective provides that the power system should be operated with the intent for it to:

- stay 'inside the technical envelope' where practicable or otherwise promptly return to inside the technical envelope. Inside the technical envelope means keeping the power system within safe operating limits in terms of frequency, voltage, power flow, and fault management;
- remain in a 'secure state' where practicable or otherwise return to a secure state as soon as practicable. A secure state means staying inside the technical envelope and in such a way that it is expected to stay there if a single credible contingency occurred; and
- otherwise, to a good electricity industry practice (GEIP), seek to maintain and improve security and reliability.

6.2 Standards of behaviour

Subchapter 7.2 of the Rules specify four 'standards of behaviour' to support the achievement of the system security objective.

6.2.1 Minimum standard generally

Rule 168 requires that a person or body given a function under the Rules must perform it to a GEIP standard.

6.2.2 Obligation to balance injections and withdrawals

Rule 169 imposes responsibilities on entities involved in the supply of electricity on covered networks to balance injections and withdrawals, both across and within, each 30-minute trading interval.

The balancing obligation reflects the bilateral contract market that currently exists in the Pilbara by requiring that each market participant is responsible for its own load following. The balancing obligation influences several other design elements in the Rules, especially the essential system

[16] Per Rule 162: The "System Security Objective" is to —

(a) Maintain the Power System Inside the Technical Envelope where practicable, and otherwise Promptly return it to Inside the Technical Envelope; and

(b) Maintain the Power System in a Secure State where practicable, and otherwise return it to a Secure State as soon as practicable; and

(c) otherwise — to a GEIP standard Maintain, and to a GEIP standard seek to improve, Security and Reliability.

services requirements, constrained access and EBAS regime. These services are designed to settle minor imbalances and are not designed to be used to provide a load balancing service, or de facto wholesale energy market.

6.2.3 Approach to system coordination

Rule 170 emphasises the importance of cooperation, effective communication, and striving for consensus among the main parties involved in managing and operating the power system, all aimed at maintaining its security and reliability. The inclusion of this provision in the Rules reflects the objective to undertake system coordination in an efficient and informal manner where practicable.

6.2.4 General requirement to treat load shedding as a last resort

Rule 171 makes explicit a requirement that the ISO, registered NSPs and registered controllers must act in good faith, and to use all other means reasonably practicable to achieve the system security objective in response to a contingency, before load shedding.

6.3 System coordination

The primary objective of the system coordination provisions in Subchapters 7.3 and 7.4 of the Rules is to:

- promote communication and collaboration between the ISO and registered NSPs;
- provide the ISO, registered NSPs and ESS providers with the information they reasonably need to perform their obligations under the Rules; and
- promote the collaborative resolution of scheduling conflicts (particularly outages).

The Rules also provide a second objective to carry out the above activities as efficiently and informally as practicable, maximising communication while minimising the compliance burden.

6.3.1 System coordination meetings

System coordination meetings are at the centre of the informal and collaborative approach to system coordination.

The ISO is required to convene a system coordination meeting at least once every fortnight, to be attended by each registered NSP. These meetings are intended to be brief (not normally exceeding 30 minutes), and attendance is limited to one representative from each of the ISO and registered NSPs.

The system coordination meeting is to discuss system coordination matters, especially in the context of notifiable events. A notifiable event is any planned or anticipated event that might affect security or reliability, part of a covered network benefiting from ESS, or the ability of a covered NSP to provide transmission services. A notifiable event can include a planned outage, or the commissioning or testing of a facility or part of a network.

A person who participates in system coordination meetings is to ensure that any confidential information they obtain in the course of the meeting is not disclosed or accessible beyond the person's operational staff; and is not used, stored, analysed or disseminated for any purpose other than the achievement of the system security objective.

A Registered NSP must:

- notify the ISO and other registered NSPs of a notifiable event; and
- each registered NSP must keep sufficiently informed about notifiable events affecting facilities connected to its network.

- If a registered facility is connected to a covered network, the registered controller must keep the covered NSP sufficiently informed about notifiable events affecting the registered facility.

Registered NSPs, the ISO and the ISO control desk must coordinate a response if one of them becomes aware of a notifiable event that is likely to occur or develop before the next system coordination meeting.

After a system coordination meeting, the ISO is to provide a system coordination report to the registered NSPs and ESS providers on any:

- current or anticipated system coordination matters;
- any follow-up actions the ISO considers appropriate, including further discussions and the provision of further information; and
- any other thing the ISO recommends be done or not done, in respect of those matters.

6.3.2 Resolving scheduling conflicts for planned outage

A scheduling conflict arises for a planned outage in Rule 182 if the ISO determines that the outage, taken together with current notifiable events, may cause the power system to be outside of the technical envelope.

Wherever possible, scheduling conflicts are to be resolved by consensus between the registered NSPs, facilitated as necessary by the ISO.

If the ISO determines that consensus will not be reached in time for the relevant notifiable event to be managed appropriately, it may give a direction to one or more of the affected parties.

6.4 Operating the power system

6.4.1 System operations participants and operating states

System operations participants

'System operations participants' are a subset of rules participants, being those entities actively involved in system operation activities relevant to security and reliability. These participants include: the ISO, delegates of the ISO, registered NSPs, registered controllers and ESS providers.

Operating states

Subchapter 7.5 of the Rules delineates the roles, powers and responsibilities of system operations participants in four 'operating states':

- normal operating conditions (the conditions are specified in Rule 165);
- outside normal operating conditions (i.e. post contingency);
- pre-contingent actions;[17] and
- emergencies.

[17] Means an action undertaken or directed by the ISO control desk or a registered NSP to reconfigure the power system in anticipation of a pre-contingent threat. A pre-contingent threat means a credible threat to the system security objective arising from an external threat or impending material equipment failure, or an imminent risk of physical injury or death to any person or material damage to equipment.

Normal operating conditions[18]

Responsibilities of registered NSPs

During normal operating conditions a registered NSP must operate, maintain and monitor its network to keep the power system within the technical envelope.

Responsibilities of the ISO control desk

The ISO control desk must monitor the power system (to the extent it has visibility) and communicate and coordinate with registered NSPs in accordance with the Protocol Framework, including whether and when to activate a protocol.

The ISO control desk is also responsible for determining the required headroom for spinning reserve and whether and when to enable or disable FCESS providers.

The ISO control desk is also responsible for determining whether and when to issue a constraint direction and has a general responsibility to not do anything that will lead to the power system operating outside the technical envelope.

Responsibilities of registered controllers

A registered controller must perform its obligations and may exercise its contractual rights, subject to:

- operating its facility in accordance with the HTR and any applicable equipment limits and security limits;
- communication and coordination in accordance with the Protocol Framework; and
- a general obligation not to do anything that will lead to the power system operating outside the technical envelope.

Outside normal operating conditions (i.e. post-contingency) and pre-contingent actions[19]

Following a contingency (etc.), the ISO is responsible for:

- maintaining the power system within the technical operating envelope or returning it to the technical operating envelope promptly; and
- maintaining the power system in a secure state where practicable, otherwise returning it to a secure state as soon as practicable.

To achieve this, or to take pre-emptive action (pre-contingent actions):

- the ISO may coordinate with registered NSPs, and if appropriate, registered controllers;
- the ISO may request reasonable cooperation from registered NSPs and controllers (who must endeavour to comply with reasonable requests); and
- may issue system operations or pre-contingent direction to registered NSPs and controllers (who must comply) in accordance with an active protocol.

Accordingly, the role of protocols (and the protocol framework) is an integral design feature for the maintenance of reliability and security in the power system. The protocol framework is outlined in detail in section 6.4.2 of this paper.

[18] This sub-section provides a summary of the roles and responsibilities of NSPs, the ISO control desk and registered controllers described in Rule 185.

[19] This sub-section provides a summary of the roles and responsibilities of NSPs, the ISO control desk and registered controllers described in Rules 186 and 187.

Emergencies

A registered NSP or controller may take action to deal with an emergency if it believes such action is necessary in accordance with GEIP, and the extraordinary circumstances are not otherwise dealt with in the Protocol Framework or the Rules.

6.4.2 Protocol Framework

Subchapter 3.7 requires the ISO to prepare and maintain a procedure (Protocol Framework) to assist the ISO control desk and registered NSPs to manage their collective response to system incidents.

The Protocol Framework must include:

- a list of credible contingencies (including credible islanding events); and
- a list of credible network constraints.

The Protocol Framework must include at least the following protocols:

- a protocol to deal with each listed credible contingency;
- one or more protocols to deal with other contingencies including non-credible contingencies, multiple contingencies and an emergency being declared under State legislation;
- (if judged necessary) a protocol to deal with any credible planning criteria interactions; and
- a protocol ('pre-contingent protocol') dealing with pre-contingent threats.

The Protocol Framework may also include a protocol dealing with system restart.

Content of protocols

Each protocol will set out:

- when the protocol may be activated ('activation conditions');
- each of the system operations participant's roles, powers and responsibilities, to cooperate and coordinate with each other to maintain and restore power system security and reliability under the protocol; and
- when the protocol is expected to be deactivated ('deactivation conditions').

Incident coordinator and directions

While a protocol is active, the ISO control desk takes on the function of 'incident coordinator'.

The incident coordinator may (in accordance with the protocol) issue a direction to:

- a registered NSP;
- the controller of any facility connected to a covered network;
- an ESS provider;
- a network user of a covered network;
- if necessary, to the registered NSP of an integrated mining network, or to the controller of a facility connected to an integrated mining network, but only for the purposes of managing the interconnector or to maintain the security or reliability in a covered network; and
- the controller of the Pluto facility (noting that it is not required to follow a direction under certain circumstances; see Rule 188(2)).

7. Essential system services

While energy is the primary commodity bought and sold in the NWIS, other services are needed to support the safe and secure operation of the power system. This section of the document outlines the architecture provided by Subchapter 8.1 of the Rules to equip the ISO, and the ISO control desk, with access to the necessary ESS required to maintain the power system in a secure state (pending contingencies) or return it to a secure state (following a contingency).

The Rules limit the ESS to two types: frequency control essential system services (FCESS) and spinning reserve essential system services (SRESS).

7.1 FCESS

Specification and requirements

FCESS, also referred to as a regulation service in the NWIS, is a service which is contracted to frequently and rapidly raise or lower the output of one or more generating units in order to keep the power system's frequency within the 'frequency tolerance band' defined in Rule 2.2.1 of the HTR.

The ISO must, from time to time, determine the amount of regulation raise reserve and regulation lower reserve required and contract for it with a primary FCESS provider. Regulation raise reserve refers to the capacity in reserve which a generating unit can provide to raise output in order to keep the power system within the frequency tolerance band. Regulation lower reserve refers to the ability of a generator to lower its output to achieve the same outcome for the power system.

Further, the ISO must identify all credible islanding scenarios for the power system and determine the amount of secondary regulation raise reserve and regulation lower reserve required in islanding scenarios. The ISO must identify and select as many generation facilities to provide secondary FCESS as necessary to ensure that there is adequate FCESS for islanding scenarios.

Procurement and pricing

The ISO is responsible for procurement of FCESS services. The procurement of primary FCESS services must be undertaken through a competitive tender process or another transparent process, with the minimum consultation requirements outlined in the Rules. The price and other terms of the primary FCESS contracts are negotiated at the ISO's discretion.

Secondary FCESS providers are identified and selected by the ISO. These providers must propose a price (dollars per hour) to the ISO, which the ISO must accept if it is below the ISO-determined 'administered secondary FCESS price'.[20] The ISO must use the prices proposed by each potential secondary FCESS to develop and maintain a cost-based enablement order of merit for secondary FCESS providers. Secondary FCESS providers may update their proposed price not more than once in any 12-month period.

Enablement (operation)

The primary FCESS provider should be enabled at all times. No more than one FCESS provider should be enabled at any time in an island, or in a non-islanded power system.

Secondary FCESS providers may be enabled if, for any reason, the primary FCESS provider is not maintaining frequency in an island (or the power system as a whole). The ISO must endeavour to minimise the occasions and duration for which a secondary FCESS provider is enabled.

[20] See Rule 206(3).

7.2 SRESS

Specification and requirements

In the NWIS, SRESS is defined by reference to 'headroom' which is the difference between a generating unit's actual output at the time, and its maximum output capability taking into account environmental conditions and equipment limits. SRESS is a service in which a person commits to maintain an amount of headroom in its generating units which equals to or exceeds a specified amount, at a specified level of availability.

SRESS is comparable to contingency raise in the SWIS. There is no equivalent to the SWIS contingency lower service in the NWIS. This is because there is a general obligation for balancing nominees to maintain as close as reasonably practicable, a real-time balance between their injections and withdrawal. SRESS was not designed to be a de facto load following service. Any small energy imbalances are generally managed by the primary FCESS provider.

The ISO is responsible for determining and publishing the 'required headroom', which is the amount of headroom needed in the power system to satisfy the 'contingency reserve standard'. The contingency reserve standard is the quantity of headroom within the power system (or credible island) to remain within the frequency operating standards (set out in the HTR) following the largest single credible contingency.

Procurement, pricing and enablement (operation)

The ISO must procure and ensure sufficient SRESS is contracted and enabled:

- in normal operating conditions, to meet or exceed the required headroom level with a level of availability; and
- outside normal operating conditions, or otherwise where necessary (for example due to network constraints). The ISO control desk can enable a generating unit to provide SRESS to each part of the power system, with an amount of headroom that meets or exceeds the required headroom level.

The ISO may count the regulation raise reserve stipulated in the primary FCESS provider's ESS contract towards the required headroom level.

The procurement of SRESS must be undertaken through a competitive tender process or another transparent process, with the minimum consultation requirements outlined in the Rules.

SRESS – Trial of alternative approach

The Rules provide explicit permission for the ISO to consider, propose and develop trials of alternative SRESS approaches, in consultation with rule participants. The ISO must determine whether there is a support for an alternative approach and if appropriate, develop and submit rule change proposals to implement the alternative approach.

8. Energy balancing and settlement

This section explains the energy balancing and settlement processes in covered NWIS networks outlined in Subchapters 8.2 and 8.3 of the Rules.

8.1 Energy balancing

Balancing applies only on covered networks and refers to the measurement (metering) and allocation of loss-adjusted metered energy entering and leaving the NWIS.

8.1.1 Balancing points

The following are the 'balancing points' on a covered network:

- a connection point with a generation facility;
- a connection point at a contestable customer's facility;
- an interconnection point with a non-covered network; and
- a single notional wholesale meter.[21]

Positive and negative balances

The metered quantity for a balancing point for a trading interval[22] is the loss factor[23] adjusted quantity, with positive balances used to identify energy entering a covered network, and negative balances used to denote energy exiting a covered network.

8.1.2 Balancing nominees

The Rules create a framework that operates to ensure that 100 per cent of the loss-adjusted energy entering and leaving the power system in each trading interval is allocated to a balancing nominee to facilitate settlement.

The framework requires that:

- For each balancing point, there must be a nominator.
- The nominator is authorised to make nominations for the balancing point.
- A nomination must provide an allocation methodology that ensures that 100% of the metered quantity at the balancing point is allocated between one or more persons (who are then called 'balancing nominees').
- In the absence of a valid nomination, the nominator will be deemed the balancing nominee by default.

[21] The notional wholesale meter measures net network load, which comprises losses, plus all of the loads which are not assigned their own balancing point under that Rule 218(2).

[22] The trading interval is 30 minutes, starting on the hour, and every 30-minute period thereafter.

[23] The losses to the network that occurred between any given node and the 'reference node'. The reference node is determined by the ISO in consultation with registered NSPs – see Rule 145.

8.1.3 Balancing nominee's imbalance

For each trading interval, a balancing nominee's imbalance is calculated by summing all of the quantities allocated to it by nominations for the trading interval. If the total is a positive number, the balancing nominee has a 'positive imbalance'. If the total is a negative number, the balancing nominee has a 'negative imbalance'.

Rule 169 creates an obligation for all balancing nominees to use reasonable endeavours to ensure that:

- its imbalance for each trading interval is as close to zero as reasonably practicable (energy); and
- within a trading interval, a real-time balance between the relevant injections and withdrawals is maintained as close as reasonably practicable (power).

8.2 Settlement

The NWIS is a bilateral contract market. Rule 169 provides an obligation on participants to follow their load in the NWIS. The Rules achieve this through the obligation placed on balancing nominees to procure energy to minimise their imbalance both across and within trading intervals.

Bilateral contracts for energy supply are negotiated, executed and settled between private parties in the Pilbara electricity systems without any involvement of the ISO.

It is not always possible for generation and consumption to remain in balance on covered networks. The ISO is required to implement an Energy Balancing and Settlement Procedure to allocate the cost of ESS and address energy imbalances.

8.2.1 Essential system services

FCESS settlement

FCESS – Cost and payees

Primary and secondary FCESS providers are the payees for FCESS services provided (FCESS costs).

In line with the procurement and pricing overview in section 7.1 of this paper, FCESS costs comprise the following components:

- A fixed monthly payment to the primary FCESS provider, reflecting the operational and opportunity cost of providing frequency regulation plus a profit margin. The primary FCESS contract is procured through a competitive process, with the payments set by a confidential contract between the ISO and the primary FCESS provider.
- Variable monthly payments to secondary FCESS providers, based on the number of hours a secondary FCESS provider was enabled and the cost per hour as defined in Rule 206.

FCESS – Payers

FCESS costs, including primary and secondary FCESS costs, are allocated to all balancing points on the covered networks that experienced at least one negative metered quantity in the previous three financial years ('exit balancing points'). By default, nominators of exit balancing points are the payers of FCESS costs. However, nominators may nominate a replacement payer (see section 8.2.3 of this paper).

Rule 227 describes the detailed methodology to calculate the share of the FCESS costs to be allocated to each exit balancing point and the relevant payers. This methodology is summarised as follows:

- For each exit balancing point:

- Compile the set of all trading intervals with negative metered quantities in the reference period.
- Calculate the “maximum load”, which is equal to the largest absolute value in the set.
- Calculate the “minimum load”, which is equal to the smallest absolute value in the set.
- Calculate the “load swing” which is equal to the difference between the maximum and minimum load.

- Identify all exit balancing points at which the load swing was bigger than the FCESS payment threshold (5 MWh, as per Rule 227(a)), and for these balancing points do the following:
  - Calculate the FCESS balancing point share for the balancing point, which is equal to the load swing divided by the sum of the load swings of all exit balancing points in the reference period.
  - Identify the payer of FCESS for each exit balancing point, being the nominator associated with the relevant exit balancing point.
  - For each payer, determine the payer’s aggregate FCESS payment share for the settlement period, this being the sum of the FCESS balancing point shares of all exit balancing points for which the payer is the nominator.

The outcome of this methodology is a data set relating to each relevant balancing point, that describes the allocation of FCESS costs to be paid to the primary and secondary FCESS providers.[24] This process is executed at the start of a new financial year for all relevant balancing points that were connected and metered for the previous three financial years.

SRESS settlement

SRESS – Cost and payees

SRESS costs consist of fixed monthly payments to SRESS providers, reflecting the opportunity cost of reserving generation capacity for spinning reserve. These payments are set by a confidential contract between the ISO and the SRESS providers.

SRESS – Cost allocation and payers

SRESS costs are allocated to all balancing points on the covered networks at which at least one generating unit was connected to the power system during the reference period. This means SRESS costs are allocated to generating facilities.

The methodology to allocate SRESS costs uses the “runway model” in which the largest share of the cost is allocated to the largest generating unit. That is, the potential causer of the largest single contingency due to loss of generation pays the largest share of the SRESS cost.

Rule 229 describes the detailed methodology to calculate the share of the SRESS costs to be allocated to each entry balancing point and the relevant payers. This methodology is summarised as follows:

- Identify the nominator associated with each entry balancing point.[25]

[24] This methodology summarises the content of the Rules, the ISO’s EBAS Procedure contains further information on how the methodology is applied for new connections, or multiple connections for the same load.

[25] As defined in Rule 229(1)(b)(i), “entry balancing points” are all balancing points on covered networks where at least one generating unit was connected, directly or indirectly, to the power system during the reference period.

- For each nominator identified above, identify the reference unit.[26]
- Identify the "payers" for SRESS in the settlement period, being the nominators for entry balancing points which have units bigger than the SRESS payment threshold.[27]
- Rank the payers by reference to the size of their units, from smallest (rankp = 1) to largest (rankp = n).

For each SRESS payer p, perform the calculation in Figure 2 (below) to determine its proportionate 'SRESS payment share' for the settlement period.

Figure 2 – Calculation of SRESS payment share

$$SRESS\ share_p = \sum_{i=1}^{rank_p} \frac{MW_i - MW_{(i-1)}}{[MW_n - MW_0] \times (n + 1 - i)}$$

where

$SRESS\ share_p$	=	the proportional SRESS payment share for payer **p**
i	=	the summation index
$rank_p$	=	the rank assigned to the payer **p**
n	=	the number of payers
MW_i	=	the nameplate capacity in MW of the reference unit for each $payer_i$ (such that $\boldsymbol{MW_p}$ is the nameplate capacity for payer **p**)
MW_0	=	the SRESS payment threshold

8.2.2 Balancing energy

Balancing energy concept

There is a general obligation to balance. However, in practice, this cannot be achieved. These amounts are identified as a balancing nominee's imbalance. A positive imbalance indicates excess injections, while negative imbalances reflect excess withdrawals (relative to their obligation to balance).

These amounts are known as 'balancing energy' and the ISO is responsible for settling these imbalances.

Payees and payers

Similarly to ESS, the ISO will identify payees and payers. Payees have positive imbalances and payers have negative imbalances.

As a general rule, positive imbalances are not entitled to full compensation. The ISO will determine and publish a margin,[28] which is used to calculate a positive balance tolerance quantity. Amounts up to the tolerance quantity will be compensated, with amounts above this level only compensated if the balancing nominee was enabled as the primary FCESS provider, was complying with system direction, or a non-normal system event occurred.

In contrast, all negative imbalances will incur costs (unless incurred in compliance with a system operations direction).

[26] As defined in Rule 229(1)(c), "reference unit" means the generating unit with the largest operating capacity in MW, and which is capable of forming a contingency outage, out of all the generating units that are associated with a Nominator for one or more entry balancing points.

[27] As defined in Rule 229(1)(a), the "SRESS payment threshold" equals the regulation raise reserve specified in the primary FCESS provider's ESS contract, in MW and published on the ISO's website. The current margin is 10MW.

[28] The tolerance margin is 1.5% (as of 31 January 2024).

ISO determines pricing calculation variables

ISO will determine and publish a margin which is used to calculate positive/negative imbalance tolerance quantities[29] (sum of imbalances x margin).

The ISO will also determine the administered price (AP) and the administered penalty price (APP) which are used to calculate payee and payer cost allocations and publish these on its website.[30]

Balancing energy – settlement calculations

The following table summarises the settlement calculations applied to balancing energy payers and payees, depending on prevailing conditions in a trading interval.

Table 2 – Balancing energy settlement calculations

Prevailing conditions	Settlement Calculation
Payees – positive imbalance quantities (PIQ)	Amount received
If payee is enabled as a FCESS provider	PIQ x AP
If payee was complying with a system direction	PIQ x AP
If a non-normal EBAS state was in effect	PIQ x AP
Otherwise -	PIQ x AP for MWh up to PBTQ; and Zero for MWh above PBTQ
Payers – negative imbalance quantities (NIQ)	Payment
If a payer is enabled as a FCESS provider	|NIQ| x AP for MWh up to |NBTQ|; and Zero for MWh above |NBTQ|
If a payer was complying with a system direction	Zero
If a non-normal EBAS state was in effect	|NIQ| x AP
Otherwise -	|NIQ| x AP for MWh up to |NBTQ|; and |NIQ| x APP for MWh above |NBTQ|

Settlement

The ISO calculates net payment balances for payers and payees in a settlement period in accordance with the tables above.

If a payment shortfall occurs, the ISO will use any overpayment balances it holds to proportionately compensate payees. If a payment shortfall still exists, payees' payments are proportionately decreased and an outstanding balance for each short-paid payee is recorded.

If an overpayment occurs in a settlement period, the ISO first compensates proportionately short-paid payees, then credits the residual to the ISO as an additional payee. The ISO is to accumulate these (additional payee) credits paid to it in a settlement period, and rebate or credit the total in equal shares to registered NSPs.

8.2.3 Replacement payer

The original payer under the Rules, being either the network user, nominator or balancing nominee, may designate a 'replacement payer' for future settlement periods. The original payer does this by giving the ISO a payment allocation notice.

[29] Positive Balance Tolerance Quantity (PBTQ) and Negative Balance Tolerance Quantity (NBTQ).

[30] The AP $168.00 per MWh and the APP $218.40 per MWh (130% of the AP) (as of 31 January 2024).

8.2.4 Payment notes

The ISO is required to identify payers and payees for each of the three services, aggregate the sum for each payer and payee (across each service) to derive a net balance, and issue payment notes directing a payer to pay amount to a payee. Payment notes are an enforceable debt. Under this design the ISO is not involved in the collection or transmission of settlement funds on behalf of participants.

9. Network access and connection

This section outlines the application of constrained access in the covered NWIS networks, as well as the access and connection processes, which facilitate third party access in a manner which is fair, efficient and consistent with power system security and reliability.

9.1 Constrained access in covered networks

Constrained access is only intended to apply to covered networks. The rules in Subchapter 9.1 (Constrained Network Access) apply only to the initial covered networks at the time the Rules commenced – that is the Horizon Power coastal network and APA Port Hedland network.

If any other Pilbara networks become 'covered', the Coordinator will conduct a review into how constrained access should be implemented for that network.

9.1.1 Covered NSP to provide limit advice to the ISO

A covered NSP must provide the ISO with 'limit advice' for its covered network. Limit advice means notice including limit rules (mathematical constraint equations) in respect of network limits, the rating for each listed network element, and any other constraint information for any facility or network element on its covered network.

The covered NSP is required, in consultation with the ISO, to use reasonable endeavours to ensure limit advice held by the ISO is complete, current and accurate.

The limit advice may:

- reflect its network planning criteria and any credible planning criteria interactions; and
- make provision for contingencies, islanding events, and pre-contingent actions.

The limit advice must, unless the network user agrees, preserve any network users' legacy rights and build-out rights.

Legacy rights (pre-15 March 2019)

A legacy right is derived from a network user's firm entitlements under a contract pre-dating 15 March 2019. Legacy rights are afforded a priority in limit advice and in the issuing of a constraint direction. This right is only available for the duration of the contract.

The ISO may, at its discretion and on application by any person, reduce or cancel a legacy right if the network user has not been utilising a legacy right for a sustained period of time.

Network access contracts (from 15 March 2019)

Must reflect constrained access

The Rules provide standard terms that must be included in network access contracts entered into after 15 March 2019. The effect of these terms is to ensure such a contract is subject to constraint directions, the constraint rules, and the functions of the ISO and NSPs related to constrained network access generally (set out in the Subchapter 9.1 of the Rules and summarised in section 9.1 of this document).

May contain build-out rights

A network access contract entered into after 15 March 2019 may provide for works to remove or reduce a network limit in a covered network.

If a network user contributes to the funding of those works (by way of capital contribution, underwriting, increased tariffs, risk allocation or otherwise), then the network access contract may

provide for the network user to have priority rights of access to the additional network capacity which results from the works (build-out priority rights).

9.1.2 ISO to develop and publish constraint rules

The ISO, in consultation with the covered NSPs, must develop and publish 'constraint rules', which refers to a method (mathematical or otherwise) to express a constraint.

- The constraint rules may make provision for contingencies, islanding events and pre-contingent actions.
- The constraint rules - to the extent practicable and consistent with the Rules, relevant objectives and GEIP- must be consistent with the relevant limit advice.

9.1.3 ISO to monitor network constraints and issue constraint directions

The ISO control desk must, to the extent it has visibility, monitor the power system to determine whether a constraint rule is, or is likely to be, violated.

If the ISO makes such a determination, it may issue a constraint direction to a registered controller at a connection point, requiring it to ensure that the energy injected into or withdrawn from the power system at the connection point does not exceed the limits specified in the constraint direction.

A constraint direction may specify the time or period after which, or the conditions under which, the direction ceases to have effect. Alternatively, a constraint direction may specify that it applies until withdrawn by further notice.

A constraint direction should reflect the priority and apportionment obligations in Rule 259. This requires the ISO to:

- prioritise the tranches of generators constrained-off in accordance with the table below; and
- as far as practicable, apportion constraint directions within tranches, with a view to sharing the financial and operational impacts of constraining off facilities equitably over time.

Table 3. Constrained off - tranche priority class

Priority Class	Tranche	Constrained off
Highest	Generators with legacy rights	Last
Middle	Generators with build-out priority rights	Second
Lowest	All other generators	First

Balancing obligations remain

A participant who is constrained off under a constraint direction still has an obligation to balance its injections and withdrawals in accordance with Rule 169. If the ISO determines the generator (subject to a constraint direction) is not complying sufficiently with its balancing obligation, the ISO may make further constraint directions to the consumer facility or registered NSP of the consumer facility or both, to minimise the imbalance.

9.2 Network access and connection

Access and connection is covered under Subchapter 9.2 of the Rules and the Interim Access and Connection Procedure.

9.2.1 Access and connection (standard pathway)

ISO to supervise the standards applied to new connections

Connection standards are the responsibility of registered NSPs. Before a new connection point is energised, the registered NSP must give the ISO a notice which certifies that the NSP has diligently complied with the connection requirements in the Rules. The detailed process is provided in the Interim Access and Connection Procedure.

On receipt of such notice, the ISO must assess the new connection's impact on security and reliability and certify that the new connection may proceed, or notify the NSP that the new connection cannot proceed.

ISO must provide modelling services for access applications (if requested)

If requested, the ISO must undertake system modelling for registered NSPs in connection with access applications. The ISO is entitled to charge a fee for services rendered.

ISO may assist access applicants

The ISO may confer with, and may make recommendations or provide guidance to, either or both the registered NSP and an access seeker in connection with an access application.

9.2.2 Connection point compliance (alternative pathway)

Compliance at the connection point is covered under Subchapter 9.3 of the Rules and the Interim Access and Connection Procedure.

Application for connection point compliance

Connection point compliance (CPC) means an arrangement in which equipment, assessed to include one or more non-compliant components is permitted to connect to the NWIS, subject to the equipment's controller or host NSP implementing measures to ensure the facility as a whole complies with the Rules at its connection point, despite the non-compliance of the component(s).

A connection applicant may apply for connection point compliance (CPC) if it has applied for access and connection, and one or more items of equipment are found to include non-compliant components.

A connection applicant may apply for CPC by providing notice to the host NSP and the ISO. If a connection applicant applies for CPC, it must propose one or more CPC measures to address the non-compliance.

Consideration of CPC measures

The host NSP and the ISO must not agree to proposed CPC measures unless satisfied that measures are sufficient to ensure that the CPC facility:

- complies with the Rules (including the HTR) at the CPC facility's connection point (despite any non-compliance by a non-compliant component);
- poses no credible threat to the NWIS's security or reliability; and
- neither the CPC facility nor the CPC measures will adversely affect system operation participants' ability to manage credible contingencies or any other credible threat to the NWIS security or reliability.

In determining whether to agree to CPC measures:

- the ISO's discretion is absolute and its failure or refusal to agree cannot be the subject of a rules dispute or access dispute;
- a non-covered NSP's discretion is absolute, and its failure or refusal to agree cannot be the subject of a rules or access dispute; and

- a covered NSP must act in accordance with the Pilbara Electricity Objective and its applicable Access Code, and its failure or refusal to agree may be the subject of a rules dispute or access dispute.

The ISO may terminate the process if an agreement is unlikely to be reached. This provision provides for circumstances in which non-compliance cannot be adequately addressed by any available CPC measures.

The ISO must publish the connection applicant's notice, and refer the notice to the PAC for its advice and have regard to the advice, prior to agreeing any CPC measures.

If the host NSP and ISO reach agreement with the connection applicant on proposed CPC measures, the host NSP and connection applicant must record the agreed measures and provide them in writing to the ISO to record.

Compliance with CPC measures

The CPC facility and its controller must comply with the CPC measures for the facility at any time the facility is connected to the NWIS.

The host NSP must comply with any obligations the CPC measures place on it in connection with the CPC facility, at any time the facility is connected to the NWIS.

10. Power system planning

This section outlines medium-term and long-term planning reports, including the Transmission Development Report and the Generation Statement of Opportunity for the Pilbara ('Pilbara GenSOO').

10.1 Medium-term planning reports

The Rules provide that the ISO is not required to undertake or publish a medium-term projected assessment of system adequacy (MT PASA) unless the Planning and Reporting Procedure provides otherwise. The ISO has discretion to create this procedure, which may set out the study's horizon period, information which must be provided to it, and any associated timeframes and publication requirements for the study.

As of January 2024, there is no Planning and Reporting Procedure proposed or in place by the ISO, and therefore no MT PASA is required.

10.2 Long term planning reports

10.2.1 Long term planning remit and reports

Chapter 10 of the Rules provides for the long term coordination and planning for the Pilbara networks.

Every two years, the ISO must prepare and publish a Transmission Development Plan and Pilbara GenSOO.

These planning reports:

- Cover a planning horizon, specified by the ISO, and are for information only. No person is obliged to implement any recommendation in a report.
- Initially start with a scope focused on the NWIS, and in particular (but not exclusively) covered networks. The scope is expected to evolve over time as the ISO, NSPs and others balance the advantages and disadvantages of the reporting process and determine what will best meet the State Electricity Objective.
- May consider, to the extent reasonably practicable, the broader Pilbara. This includes information in respect of existing – as well as potentially new, extended or expanded - non-covered networks which do not form part of the NWIS.[31]

To this end, the Rules provide that the ISO may inform itself in any manner it sees fit.

10.2.2 Transmission Development Plan

The Transmission Development Plan will set out the following, across the planning horizon:

- a description of covered networks including existing equipment and any proposed augmentations;
- a range of credible scenarios for the locations and quantities of electricity supply and demand in the NWIS covered networks (including locations which may be serviced if the system is suitably augmented); and

[31] The broader Pilbara planning remit is restricted for the first five years after the Rules Commencement date (see Rule 283(2)).

- having regard to the following supply and demand scenarios:
  - current and projected areas of network constraints;
  - possible efficient development strategies for extension or expansion of covered NWIS networks including optimisation of network and non-network investment, and opportunities for private investment; and
  - possible opportunities for new, extended or expanded Pilbara networks which may interconnect with the NWIS.

10.2.3 Pilbara GenSOO

The Pilbara GenSOO will set out across the planning horizon:

- possible efficient investment opportunities for new or expanded generation facilities and storage works for supply into the NWIS covered networks (including any new loads that might connect to the covered NWIS, following network augmentation);
- projections of generator fuel availability, new fuel sources, and renewable and intermitted energy developments;
- a report on the ESS acquired in the NWIS since the previous Pilbara GenSOO; and
- an assessment of generation adequacy.

10.2.4 Review of long-term planning

Within two years of the Rules commencement date, and at least once every five years thereafter, the ISO must conduct a review of the long-term planning processes and reports and publish a report on the review.

11. Administration and Governance

This section provides a brief summary of administrative and governance matters that provide confidence in the practical implementation of the Rules.

11.1 Treatment of confidential information

Confidential information is dealt with under Subchapter 11.2 of the Rules.

The Rules define 'confidential information' as information that is either confidential 'by its nature' or specified to be confidential by its discloser. Notwithstanding this definition, there are four categories of information that are not to be regarded as confidential including information:

- within the public domain or ascertainable from public domain sources;
- obtained by the recipient through means which did not create a duty of confidentiality under the Pilbara regime;
- already possessed by the recipient at the time it was disclosed to the recipient by the discloser; or
- which the recipient develops independently.

If a person proposes to disclose confidential information, they must first have regard to the confidentiality objective in Rule 294 and consider the balance between the benefits of the disclosure and the potential detriments to the information owners. A person proposing disclosure must first notify the information owner and have regard to the information owner's view and requests, including any requests for redactions.

A recipient of confidential information may only use it in the performance of a function in the Pilbara regime as required or permitted by the Pilbara regime or the Rules, unless the recipient gains the written consent of the information owner.

If a document contains confidential and non-confidential information, it may be disclosed if the confidential information is redacted. If the discloser is not the information owner, they must give the recipient enough information to identify the information owner.

11.2 Compliance, enforcement and auditing

Compliance, enforcement and auditing are provided for under Chapter 12 of the Rules.

11.2.1 Monitoring compliance

One of the ISO's functions is to monitor the compliance of rules participants (including its own compliance) with the Rules. The ISO must develop a Compliance Procedure for the purposes of its compliance functions.

Any person may notify the ERA if they believe the ISO has committed a breach and must also give notice to the ISO. The ERA can then investigate the breach in the same way the ISO would ordinarily investigate a breach.

If the ISO becomes aware of an alleged breach it must record, and may investigate, the alleged breach.

In the course of its investigation, the ISO may ask a rules participant for information and records, which the rules participant must provide. The ISO may also inspect the rules participant's equipment, and the rules participant must reasonably allow them to do so. If a rules participant does not cooperate with an ISO investigation, or engages in false or misleading conduct, the ISO may engage an investigator at the rules participant's expense.

If the ISO investigates a breach it must record the results of its investigation. If there is a finding of breach, the ISO must publish that and other information relevant to it. The ISO may issue the rules participant with a warning if it believes the rules participant is in breach and must record the rules participant's response. The ISO may also direct the rules participant to do or refrain from doing a thing in order to remedy the breach or prevent its recurrence. If a rules participant is found to be in breach, it can refer that finding to the ERB.

If the ISO finds that there was no breach, it must notify the rule participants alleged to have breached and those who notified the ISO of the alleged breach.

There are currently no penalties in the Pilbara regime.

ISO to report on breaches to the Minister

Every year, the ISO must provide a report to the Minister detailing all alleged breaches, the outcomes of any investigations, any matters referred to the ERA, and any matters referred to the ERB and the ERB's findings and orders.

11.2.2 Audits of the ISO

The ISO must periodically engage an auditor to audit its compliance with the Rules and the relevant procedures, processes and considerations. The first audit of the ISO must be conducted no later than 2 years after the Rules commencement date, with subsequent audits to be conducted no later than 5 years after the previous audit.

Within 30 business days of receiving an auditor's report, the ISO must publish the report and either accept its recommendations or publish a separate report setting out which of the auditor's recommendations the ISO does or does not accept, with reasons.

11.3 Legacy arrangements

The treatment of legacy arrangements is outlined in Appendix 3 of the Rules.

The HTR will not apply to a facility that was constructed, or on which construction had commenced, prior to the HTR commencement date (1 July 2021). Those facilities must instead comply with the previous standard.

A facility will lose these legacy arrangements if major works are undertaken on that facility which amount to a relevant modification. However, those parts of the facility operating under a previous standard will continue to do so. The ISO is responsible for determining if a modification is a relevant modification.

If the ISO believes the legacy arrangements of a facility places the security and reliability of the system at risk or are likely to do so in the next two years, the ISO can provide notice to the rules participant responsible for the facility and determine when the facility will lose its legacy arrangements.

A facility covered by legacy arrangements may opt into the HTR by notifying the ISO.

A facility that loses its legacy arrangements or which opts into the HTR may still apply for a general exemption from the HTR under Rule 64.

11.4 Rule change and procedure change processes

11.4.1 Rule change process

The rule change process is outlined in Sub-appendix 2.2 of the Rules.

Any person may make a rule change proposal to the Coordinator using the form provided on the Coordinator's website.

The Coordinator must decide whether or not to progress the proposal and notify the person who submitted it.

If the Coordinator decides not to progress a rule change proposal, it must be on the grounds that the rule change proposal is:

- materially incomplete;
- manifestly inconsistent with the Pilbara electricity objective; or
- manifestly the same as another proposal considered by the Coordinator in the 12 months prior to the date of the new proposal.

Within seven days of developing or receiving a rule change proposal, the Coordinator must publish a notice of that proposal, and provide a copy to the PAC.

If the ISO, the ERA or the Coordinator intend to develop a rule change proposal, they must first consult the PAC. The Independent Chair may make a rule change proposal based on advice from the PAC regarding the evolution or development of the Pilbara networks regime.

The Coordinator may make amending rules but must not do so unless satisfied that they are consistent with the Pilbara electricity objective. In deciding whether to make amending rules, the Coordinator must also have regard to:

- any applicable statement of policy principles;
- any advice provided by the PAC;
- the practicality and cost of implementing the rule change proposal; and
- the views expressed in any submissions on the rule change proposal.

Selecting a rule change process

Upon receiving a rule change proposal, if the Coordinator intends to develop the proposal, the Coordinator must choose an appropriate rule change process. The Coordinator can choose between the standard process, fast track process or abridged standard process.

The standard process includes two rounds of formal consultation in which stakeholders are invited to provide written submissions on the proposal. The standard process will usually take around 16 weeks (provided no timeframes are extended). The second round involves consultation on a draft report published by the Coordinator prior to the publication of the final rule change report.

The abridged standard process may be used for changes which, in the Coordinator's opinion, are not of a minor or procedural nature but are required to correct manifest errors, or are urgently required for the safe, effective and reliable operation of the power system. The abridged standard process may also be used upon request by the PAC.

The fast track process may be used for rule changes that the Coordinator considers are of a minor or procedural nature. The fast track process may also be used upon request by the PAC. Under this process, the Coordinator undertakes one round of consultation and the final decision must be published within 20 business days from the publication of the Coordinator's notice of the rule change proposal.

When a rule change comes into force and commences

A rule change comes into force:

- If it is a rule change requiring Ministerial approval, when the Minister approves (or is taken to have approved) amending rules; or
- If it is not a rule change requiring Ministerial approval, when the Coordinator has decided to make a rule change.

Subject to any review by the ERB, a rule change commences at the time and date specified by the Coordinator. The Coordinator must publish the commencement time and date.

11.4.2 Procedure change process

The procedure change process is outlined in Sub-appendix 2.3 of the Rules.

Any person may develop and submit a procedure change proposal. The person required or permitted by the Rules to develop a procedure (the custodian) must determine whether they will initiate a procedure change.

A procedure change proposal must be published by the custodian alongside a call for submissions. Any person may make a submission by using the procedure change submission form on the Coordinator's website. The PAC may be consulted on a procedure change under certain circumstances.

Following the closing date for submissions, the custodian must publish a procedure change report specifying whether the custodian accepts the proposal as submitted, accepts the proposal in a modified form, or rejects the proposal.

A procedure change comes into force when, in the custodian's opinion, there has been sufficient time after the publication of the procedure change report for rules participants to implement the changes required by it.

11.5 Rules disputes

Chapter 13 of the Rules provides a quasi-legal process that allows rules participants to dispute the interpretation of the Rules in certain circumstances.

A rules dispute is a dispute between participants (including the ISO) regarding an interpretation or application of the Rules. A dispute is launched when a rules participant lodges a dispute notice to the ERA. The ERA must then publish details of the parties to the dispute and the complainant must serve the notice on the other party and provide a copy of the notice to the ISO.

The functions of the ERA include appointing an Arbitrator and referring a rules dispute to it, as well as publishing information about rules disputes and Arbitrator's determinations regarding such disputes.

Each party must nominate two or more preferred Arbitrators from the available pool and notify the other side to the dispute of their preference. The parties must attempt to agree on an Arbitrator. If they cannot agree, the ERA will appoint an Arbitrator. After the Arbitrator has been appointed, the parties may apply to the Arbitrator to convene an Arbitral Panel of experts.

Parties must confer on a timetable for determining the dispute and lodge the agreed timetable with the Arbitrator. If they cannot agree on a timetable, each party must lodge their proposed timetable (and submissions in support) with the Arbitrator. The Arbitrator will then determine the timetable.

Subject to rules of natural justice, the Arbitrator may gather information about any matter relevant to the rules dispute in any way the Arbitrator thinks appropriate, including by seeking written submissions from persons who are not parties. The Arbitrator may obtain information from the ISO or the ERA. The Arbitrator may refer any matter to an independent expert.

When making a determination, the Arbitrator must take account of the Pilbara Electricity Objective, operational and technical requirements needed for the safe, secure and reliable operation of the power system, the interests of all power system users, and any other matters it considers relevant.

The Arbitrator must provide to the ERA its final determination for publication.

The parties typically bear their own costs and share the facilitation costs of arbitration. However, the Arbitrator may direct a party to pay some or all of the other party's costs.

An Arbitrator's final determination can be appealed to the Supreme Court, which may also issue orders if a party does not follow a determination.

11.6 Monitoring the regime's effectiveness

Rule 369 requires that the ISO must prepare and publish a report on the operation and effectiveness of the interconnected Pilbara networks and the regulatory arrangements (established under Part 8A of the Act[32]) in maintaining and improving the security and reliability and the Pilbara Electricity Objective.

The first report is to be published no later than two years after the commencement the Rules, with subsequent reports to be published within five years.

The ISO is empowered collect and analyse data necessary or desirable for the performance of its functions. This includes provisions that the ISO may:

- request additional specified data from a rules participant or the Coordinator, who must comply with the notice; and
- request information and assistance from the ERA.

If the ISO determines its report contains confidential information:

- the ISO must give the Minister an unredacted copy of the report; and
- may publish a redacted copy but identify any information in the report that is confidential or which the ISO considers should not be made public; or
- may in the published report disclose confidential information (permitted disclosure).

The ISO may develop a procedure in connection with its function under Rule 369.

11.7 Electricity Review Board (ERB)

A rules participant can apply to the ERB for review of a reviewable decision or a decision made under clauses subject to procedural review. This section provides an overview of reviewable decisions, categorised by decision-maker.

Decisions by the Coordinator:

- Whether to progress a rule change proposal.
- To subject a rule change proposal to the fast track rule change process, standard rule change process or abridged standard rule change process.
- To accept (as is or in modified form) or reject a rule change proposal (under the fast track or standard rule change processes only).

Decisions by the custodian of a procedure:

- Whether amending or replacing a procedure would be appropriate.
- To accept (as is or in modified form) or reject a procedure change proposal.

These types of decision by the Coordinator or the custodian of a procedure may only be subject to a procedural review.

[32] This includes the Access Code and the Rules.

Decisions by the ISO:

- Granting a person an exemption from one or more of the Rules.
- Deciding that certain controllers on a covered network must register.
- To remove a generation adequacy exemption for a non-covered network.
- A generation adequacy enforcement decision.
- To disclose confidential information in the context of reporting non-compliance.
- To withdraw or modify legacy arrangements.

A notice of determination given by the ISO or the ERA following an investigation into whether a breach of the Rules has occurred can also be challenged before the ERB.

12. The Harmonised Technical Rules (HTR)

The HTR form part of the Rules[33], and apply to the same extent as the rest of the Rules, unless a contrary intention is explicitly stated in the Rules. The HTR outline a comprehensive set of technical obligations for controllers, NSPs and the ISO, including requirements, procedures, standards, and other technical matters critical to the operation of the interconnected Pilbara networks. The HTR set out the technical envelope referred to in the Rules. The technical envelope has significant bearing on ISO functions related to system security and reliability.

NSPs are subject to specific obligations under the HTR that are in addition to those of a controller (being a person who owns, operates, can control or does control equipment or a facility). These additional obligations include:

- advising users of any interruption or reduction in the level of service at their connection points; and
- ensuring that network services continue, as far as practicable, to operate effectively within the specified technical standards.

This section provides a high-level overview of the provisions and technical issues addressed in the HTR. As with other parts of this design summary, the content of this section is of a general nature and is intended for informational purposes only. For a fulsome understanding of the Pilbara regime technical requirements participants, readers should refer directly to the most current version of the HTR.

12.1 Transmission and distribution system

Chapter 2 of the HTR sets out the power system performance standards and obligations for transmission and distribution networks in the Pilbara power system.

12.1.1 Power system performance standards

Clause 2.2 of the HTR:

- establishes the nominal operating frequency of the power system at 50Hz and sets out the frequency operating standards under various conditions;
- describes the limited circumstances in which load shedding and islanding may be used for the purpose of remaining within the frequency operating standards;
- specifies the steady state voltage requirements for the transmission system and distribution systems operating at 6.6kV or above and provides for more precise control of voltage to be negotiated by agreement; and
- stipulates limits for step-changes in voltage, as well as planning levels for flicker severity, harmonic voltage, negative phase sequence voltage, electromagnetic interference, rotor angle stability, short- and long-term voltage stability and temporary over-voltages.

12.1.2 NSPs power system performance obligations

Clauses 2.3 to 2.6 of Chapter 2 place specific obligations on NSPs regarding the performance of the power system. These obligations include maintaining the availability of load shedding,

[33] Although a part of the Rules (see Appendix 5 of the Rules), the HTR is published as a separate document available on EPWA's website.

developing network planning criteria, and maintaining protection systems for primary transmission and distribution equipment.

Obligations of NSPs in relation to power system performance

Clause 2.3 requires NSPs to design and install an automatic UFLS (and undervoltage load shedding) to ensure frequency performance of the power system following a contingency event meets the frequency operating standards. NSPs may require commercial and industrial customers to make a portion of their load available for UFLS by agreement, or failing agreement, as determined by an arbitrator or as specified by the ISO for the NWIS only.

An NSP must ensure that up to 75% of the power system load at any time is available for disconnection.

Clause 2.3 also outlines the obligations on NSPs to achieve planning standards for flicker, harmonic voltage, negative phase sequence voltage, electromagnetic interference, short term power system stability, short- and long-term voltage stability, as well obligations on an NSP to validate its modelling results. NSPs must also determine power transfer limits if requested by a controller, generator, the ISO or another NSP.

NSPs are also required to monitor the performance of the power system on an ongoing basis and ensure that power system performance standards specified in clause 2.2. continue to be met irrespective of changes in the magnitude and location of connected loads and generating units.

Under-frequency load shedding and islanding facilities

Clause 2.4 specifies the UFLS scheme settings, including for under-frequency islanding schemes.

It sets out that in the NWIS (*and not any other power system*), each NSP:

- will implement its own UFLS Stage 1 response within its own network when UFLS is required.
- If UFLS Stage 2 is reached, and a network is not the Horizon Power coastal network and is capable of islanding safely according to a GEIP standard the NSP must preference islanding the network.
- 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.

Planning criteria

NSPs are required to develop and maintain network planning criteria that comply with both GEIP and the HTR. These criteria must aim to maintain security and reliability within the NSP's network and across the broader power system.

For covered Pilbara networks, planning criteria must strike a balance between the Pilbara electricity objective and the reasonable requirements of access seekers and consumers, particularly regarding the connection of load or generation. NSPs must provide the ISO with a copy of their network planning criteria and update the ISO promptly following any changes. Covered networks must also publish their planning criteria.

Protection systems

All primary equipment on the transmission and distribution system must be equipped with protection systems that automatically remove faulty equipment from service using circuit breakers or fuses in the event of a fault. The main protection system must comprise two fully independent protection schemes, and primary equipment operating at transmission system voltages must be protected by both a main protection system and a back-up system.

NSPs must ensure that all protection schemes are operational at all times, unless they are required to be taken out of service temporarily for the purpose of testing and maintenance. This may be done for a prudent period of time and provided the outage does not pose a material threat to system security. If this is not possible then the NSP must notify the ISO, return the protection

scheme to service as soon as practicable and remove the protected part from service where necessary.

Protection schemes must be sufficiently sensitive and meet trip supply and trip circuit supervision requirements. Protection devices must also provide adequate flagging and indication monitors.

Clause 2.6.4 and 2.6.5 specify maximum total fault clearance times and allow NSPs to designate parts of the network as subject to critical fault clearance times.

12.2 Technical requirements for user facilities

Chapter 3 of the HTR sets out the technical requirements that controllers must meet as a condition of connecting equipment to the network, except if an NSP grants an exemption. The times at which a controller's facility may operate are governed by its access contract, the PNR (including any constraint directions issued under them), and the HTR. Additionally, an NSP and a controller may agree to further operating restrictions or requirements, which must be specified in the relevant access contract.

12.2.1 General requirements for all controllers

Clause 3.2 outlines general requirements applicable to all controllers, including:

- Capability to meet performance standards: Each facility must be capable of operating within the power system performance standards set out in clause 2.2 of the HTR.
- Completion of simulation studies prior to connection: Details are provided below.
- Ability to de-energise: Controllers must be able to de-energise their equipment without reliance on the NSP.
- Accommodation of NSP monitoring and recording: Controllers must allow NSP monitoring equipment within their facilities or at the connection point, providing necessary inputs to the NSP's power quality and monitoring systems.

Clause 3.2.6 specifies the matters that the controller and the NSP must agree upon for each new or altered connection.

Studies prior to connection

Before a controller's facilities can be connected to the power system, the impact on power system performance and on other facilities must be assessed through power system studies:

- For covered networks, this assessment is determined under the PNR, the PNAC, by the ISO or - in the absence of such determination - by the NSP acting reasonably.
- For non-covered networks, studies are specified by the NSP, with involvement of the ISO scoping relevant studies per the Access and Connection Procedure.

Studies may be conducted by the NSP, the ISO, the controller or (subject to requirements) a third party. Subclause 3.2.4(d) details the information the controller must provide to the NSP to enable these studies.

Final determinations on connection suitability are governed by the PNR.

12.2.2 Specific requirements by facility type and circumstances

Chapter 3 of the HTR specifies requirements for controllers, NSPs and the ISO in relation to specific facility types and circumstances. These requirements vary based on the facility size and type (including generation, networks, loads and storage).

A summary of these requirements is provided in Table 4 below.

Table 4. Summary of requirements under Chapter 3 of the HTR

Generators greater than 10MW
Clause 3.3 establishes requirements for controllers, including: • data a generator must provide to the NSP in relation to the design, construction, operation and configuration of the generating unit(s); • monitoring and control requirements; • requirements if a generator takes its auxiliary supplies through a transformer by means of a separate connection to the NWIS; • synchronisation at a generating unit circuit breakers; • technical performance standards; • the requirements for the computer model which the generator must supply to the NSP for each generating unit, for use in the ISO's power system model; and • detailed technical requirements requiring ongoing verification by a generator of its own equipment (by the methods described in clause 4.1.3).
Small generating units connected to distribution grid (1000kVA up to 10MW)
Clause 3.4 specifies requirements for controllers, including: • information to be provided to the NSP for the generator; • safety and reliability requirements to be imposed on the generator; • applicability of clause 3.3 to small power stations in addition to clause 3.4 requirements; • compliance with minimum fault current and maximum fault current contribution requirements; • connection and operation standards, including substations, having a main switch, synchronisation, and safe shutdown without external supply; and • standards for power quality and voltage change, remote control, monitoring, protection, inter-tripping, and automatic tripping.
Connection to low voltage distribution networks via inverters
Clause 3.5 requires NSPs to develop and maintain a procedure (in consultation with the ISO) setting out its requirements for the connection of energy systems to the NSP's low voltage distribution system via inverters. NSPs must provide a copy of its current procedure to the ISO. An NSP of a covered network is also required to publish its procedure.
Connection of loads
Clause 3.6 generally apply to the connection of a large load to the transmission or distribution network. It obligates a controller of a consumer facility to ensure: • its load does not cause excessive load fluctuations, reactive power draw or, where applicable, stalling of motor loads that would have an adverse impact on other parties; • its load does not create a reduction of power transfer capability based on frequency or voltage stability; • its facility complies with applicable connection requirements and follows NSP or ISO directions regarding its facilities and equipment; • that equipment connected to a consumer's connection point complies with the Australian Standards (at the time of installation), Electricity (Network Safety) Regulations 2015 (WA), GEIP; and the HTR; • the connection point must be capable of withstanding power frequency voltages and impulse levels specified by the NSP; • loads connected to the transmission or distribution system, and rated 1 MVA or more, meet the power factor requirements and ranges set out in clause 3.6.7; and • substations meet the design requirements set out in clause 3.6.8.

Further, a controller must also provide:

- data relevant to each connection point that an NSP reasonably requires for the detailed design and installation of the relevant connection assets;
- automatic load shedding facilities where required by the NSP; and
- remote monitoring equipment of large transmission and distribution connected consumers, as required by the NSP or ISO.

Connection of storage
Clause 3.7 outlines that storage may be treated as a generating unit for injections and as consumer equipment for withdrawals. The NSP and ISO must discuss storage connection requirements, with the ISO determining requirements as needed.

12.3 Inspection, testing, commissioning, disconnection and reconnection

Chapter 4 of the HTR establishes rules for NSPs and controllers in respect of the inspection, testing, commissioning, disconnection and reconnection of equipment to an electricity network.

12.3.1 Inspection and testing

Inspection

Clause 4.1.1 of the HTR sets out provisions for inspecting facilities of NSPs or controllers directly connected to the transmission system. It details who is authorised to conduct inspections and the scope of assessment, investigation or training activities permitted.

Testing

Clause 4.1.2 creates similar rights for testing. If an NSP or controller suspects that equipment connected under an access contract may not comply with the HTR or the contract, they may request testing of the equipment by giving notice in writing to the equipment owner. Clauses 4.1.2 to 4.1.4 sets out the requirements and process for such testing.

Clause 4.1.5 specifies that if a controller proposes to conduct a test on its equipment that requires a change to the operation of that equipment to what is specified in the access contract, it must notify the NSP in writing at least 15 business days prior. An NSP must review the notification, and under certain circumstances, may request the controller to modify the testing proposal. If an NSP approves a test, it must make sure the power system conditions required for the test are provided as close as is reasonably practicable. After conducting a test, the controller must provide a report to the NSP including test results.

Clause 4.1.6 allows NSPs to request, but not more than once every 12 months, that generators test each of their generating units. A testing request notice must be provided at least 15 business days in advance and should align with scheduled outages where possible. Generators must provide reasonable assistance requested by the NSP and must not unreasonably withhold its agreement to test procedures proposed by the NSP.

Clause 4.1.7 enables the NSP, a controller or the ISO to request tests that either verify power transfer capability or assess power system performance, and mandates NSP coordination and approval of such tests. It sets out timing, notification requirements, and operational conditions for tests.

Responsibility for inspection and testing of equipment

Pursuant to clause 4.2.1, controllers are responsible for ensuring equipment is inspected and tested in accordance with the specified standards.

12.3.2 Commissioning of equipment

Clause 4.2 governs the commissioning of connections and connected facilities, requiring coordination between controllers and NSPs. It outlines the factors to consider during the coordination.

Controllers must provide sufficient design information to the NSP for critical assessment of the impact of new or replacement equipment on power system performance. The controller must also submit a written commissioning program, including test procedures, to both the NSP and ISO, who will review and provide feedback.

Clause 4.2.5 addresses commissioning tests for new or replacement equipment, including remote monitoring equipment, protection and control equipment, and data acquisition equipment that may affect metering or the power system. It specifies how the tests should be conducted and grants NSPs and ISO the right to witness these tests.

Clause 4.2.6 describes how a controller's protection settings are coordinated with existing protection settings of the transmission and distribution system.

Clause 4.2.7 specifies who must approve proposed protection settings and under what conditions.

12.3.3 Disconnection and reconnection

Clause 4.3 outlines the circumstances in which NSPs may disconnect or reconnect controllers from the network.

Disconnection

NSPs may disconnect controllers if the network is operating outside permissible limits. Clause 4.3 provides for voluntary disconnection by a controller and disconnection directed by the ISO or NSP under certain circumstances. Agreed disconnection procedures must be followed, and NSPs must notify the ISO and other controllers if it reasonably believes that the procedures may adversely affect any rights under an access contract.

This clause also details:

- circumstances in which an NSP may disconnect a controller's facility or curtail services at a connection point;
- requirements to minimise the extent and duration of any curtailment;
- notification obligations to affected controllers; and
- emergency disconnection procedures.

If the NSP deems it necessary to interrupt supply to any controller for public safety, the NSP's personnel safety, or equipment protection, the NSP must, where possible, consult the relevant controller before executing that interruption.

Reconnection

Clause 4.3.7 imposes an obligation on the NSP to reconnect a controller's facilities as soon as practicable once an issue has been resolved.

12.4 Network operation and coordination

Chapter 5 of the HTR outlines the obligations of NSPs and controllers related to operation and coordination within an NSP's network. The broader operation and coordination of the power system (e.g. the NWIS or other power systems) are managed in the PNR (i.e. not in the HTR).

The Chapter establishes:

- processes and arrangements to enable NSPs to plan, coordinate and conduct operations within their networks; and
- arrangements for the dispatch of generating units and loads by controllers within an NSP's network.

Table 5 (below) provides a summary of NSPs' Chapter 5 obligations.

Table 5. Overview of NSP obligations in Chapter 5 of the HTR

Coordination of NSPs
Clause 5.2 lists the NSP's responsibilities in respect of its own network, including obligations to comply with power system performance standards.
Transmission and distribution voltages
Clause 5.3 specifies how an NSP must determine the adequacy of its network's capacity to produce or absorb reactive power for voltage control. NSPs must ensure access to sufficient reactive power reserves at all times to maintain or restore their network to a normal operating state.
Protection of power system equipment
Clause 5.4 requires NSPs to determine maximum fault levels at all transmission and zone substation busbars and all zone substation within their network. It specifies: • that NSPs must not exceed power transfer limits; • that NSPs must coordinate inspections and tests to ensure adequate protection against damage to power system equipment; and • how an NSP must respond if there is an outage of one protection scheme of a transmission element (i.e. a partial outage of power protection systems).
Security operation and coordination
Clause 5.6 requires that: • where the NSP has disconnected a transmission system controller, the NSP must provide a report to the controller detailing the circumstances that required the NSP to take that action; and • the NSP must provide a controller with available information or reports relating to the performance of that controller's equipment during power system incidents or operating condition deviations as that controller requests.
Power system operational communication facilities
Subclauses 5.9.2(d) and (e) include matters for which an NSP must advise a controller in respect of power system operational communication facilities and related record-keeping requirements.

Table 6 (below) provides a summary of controllers Chapter 5 obligations.

Table 6. Overview of controller obligations in Chapter 5 of the HTR

Power system operation coordination obligations
Clause 5.2.3 specifies controllers' obligations related to facility operation, cooperation with NSPs or ISO, and participation in reviews of operating incidents. It also outlines emergency and other scenarios requiring controllers to notify the NSP.
Security and coordination obligations
Clause 5.6 requires controllers to promptly inform the NSP and ISO if they become aware of any circumstance in respect of a protection or control system which could adversely affect security. If a threat to security is identified, the NSP or ISO may direct the controller to cease or alter the equipment operation. NSPs may review significant operating incidents or deviations from normal operating conditions to assess the adequacy of facility responses, with controllers required to cooperate and provide information.
Maintenance schedule

Clause 5.7 requires controllers, upon request from the NSP, to provide a maintenance schedule and plan by 1 July and 1 January of each year. The clause details the scope, content, and compliance requirements of these schedules as well as additional information that may be requested.
Operating procedures
Clause 5.8 allows NSPs to direct controllers to place reactive power facilities in or out of service to maintain power system performance standards specified in clause 2.2.
Communication facilities and remote control devices
Clause 5.9 mandates that controllers install, operate and maintain all remote control, metering, monitoring devices, and local circuits as outlined in Chapter 3 of the HTR. Both controllers and NSPs have record-keeping requirements of operational communications.
Adoption of common nomenclature
Clause 5.10 requires controllers to use NSP-determined nomenclature standards for transmission and distribution equipment.

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