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Audit Report

Horizon Power
2020 Network Quality and Reliability of Supply Audit - Operation of Compliance Monitoring Systems

September 2020

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executive summary

Under the Electricity Industry (Network Quality and Reliability of Supply) Code 2005 (the Code), Division 3, Section 26, Horizon Power is required to arrange for an independent audit of the operation of the systems that are in place to monitor its compliance with Part 2 of the Code or an instrument made under Section 14(3). In May 2020 Horizon Power commissioned Qualeng to carry out the audit in respect of the operation of its systems over the period 1 July 2017 to 30 June 2020.

Horizon Power supplies electricity services to 38 systems consisting of 32 Non-Interconnected (or islanded) Micro Grids in regional towns and remote communities, three micro grids (Kununurra, Wyndham and Lake Argyle) connected through a transmission network in the East Kimberley, two rural systems associated with Esperance and Hopetoun, and the Pilbara Grid (formerly known as the Horizon Power North West Interconnected System, NWIS). These systems supply the Kimberley, Pilbara, Gascoyne, Mid West and Southern Goldfields regions. In addition to its own power generation plant, Horizon Power also purchases electricity from third parties.

The audit was conducted between June and August 2020 and included:

- review of actions resulting from previous audit recommendations;
- identification and review of supporting documents;
- interview of key personnel;
- review and reporting on the evidence, data, reports and processes demonstrating the operation and performance of the systems.

The previous audit (2017) had found:

- no Code non-compliances or Opportunities for Improvement;
- two observations:
  - actions were in progress to improve the Power Quality (PQ) monitoring of customer electricity supply;

- actions were in progress to improve the system for notifying customers of planned outages.

Actions on both activities were still in progress at the end of this audit period (2017-2020).

Horizon Power has a number of systems that monitor its performance against the requirement of the Code:

- Monthly Asset Management Reports report to management on:
  - performance data in respect of power quality;
  - supply interruptions over 12 hours;
  - where frequency of interruptions is over 16 per customer per year;
  - planned outages over 4 or 6 hours; and
  - statistics on the duration of interruptions per customer over 4 years;
- Horizon Power currently relies on customer complaints to identify electricity supply quality issues such as flicker and harmonics;
- "Power Quality Investigations" deal with incidents and customer complaints due to electricity supply quality issues;
- the Trouble Call System (TCS) is used to manage and monitor faults through the SCADA system, customer calls and fault detection by field crews;
- customers with special health needs are recorded and identified in the system;
- procedures are in place for notification of planned outages;
  - monitoring of the compliance of the notification process relies on customer complaints;
- alternate power supplies are available to mitigate interruptions;
- a process is in place to ensure there is agreement with critical customers in the preparation for planned outages;
- remedial projects are initiated to improve reliability of supply.

Through interviews, discussions and examination of documents the audit noted two Opportunities for Improvement:

- The deployment of new Power Quality Analysers and testing of power quality has shown that the use and understanding of the equipment and of results is not always consistent and in accordance with Horizon Power's manuals.
- Horizon Power system has the capability to identify individual customers subject to over 16 interruptions per year and feeders subject to an interruption of more than 12 hours duration per year, however the process does not track individual customers that are subject to those interruptions, and to date there is not a process to track if remediation is provided to all those customers that are likely to be subject to more than one instance of significant interruption over 10 years as required by the Code.

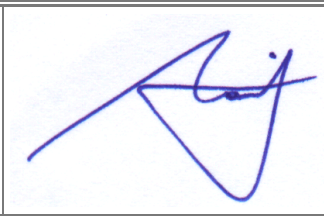
At the conclusion of the audit Qualeng has concluded that Horizon Power has further progressed its improvement actions.

Based on the scope of the audit defined in section 26 of the Code the audit has found that

the operation of Horizon Power's systems which monitor compliance with the requirements of the Code, was in compliance with the requirements of Part 2 of the Code, "Quality and Reliability Standards".

This report is an accurate representation of the findings and opinions of the auditors following the assessment of the client's conformance to nominated conditions. The report is reliant on evidence provided by other parties and is subject to limitations due to the nature of the evidence available to the auditor, the sampling process inherent in the audit process, the limitations of internal controls and the need to use judgement in the assessment of evidence. On this basis Qualeng shall not be liable for loss or damage to other parties due to their reliance on the information contained in this report or in its supporting documentation.

Approvals

Representation	Name	Signature	Position	Date
Auditor:	M Zammit		Lead Auditor / Projects Director, Qualeng	22/09/2020

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1 OBJECTIVES AND SCOPE OF AUDIT

1.1 Introduction

Horizon Power has an Electricity Integrated Regional Licence (EIRL2) (the **licence**) issued by the Economic Regulation Authority (the **Authority**) under Sections 7 and 15(2) of the Electricity Industry Act 2004 (WA) (the **Act**). Under the scope of the licence Horizon Power supplies electricity to approximately 110,000 residents, communities and businesses, including major industry. The services are provided to close to 48,000 customer connections, including 39,000 residential and close to 9000 business, to an area of approximately 2.3 million square kilometres extending from the Kimberley in the North to Esperance, Norseman and Hopetoun in the South and including the Kimberley, Pilbara, Gascoyne, Mid West and Southern Goldfields regions in Western Australia.

Services are provided through Pilbara Grid (formerly known as the Horizon Power North West Interconnected System, NWIS) and Horizon Power Microgrids (formerly known as Horizon Power's Non Interconnected Systems) which are made up from 38 systems including 32 Non-Interconnected (or islanded) Systems in regional towns and remote communities, three systems (Kununurra, Wyndham and Lake Argyle) connected through a transmission network in the East Kimberley, two rural systems associated with Esperance and Hopetoun and the Pilbara Grid.

In addition to power generating plant in Carnarvon, Marble Bar, Nullagine, Kununurra and Wyndham, Horizon Power also owns generating plant that is managed by a third party and purchases electricity from third parties.

Under the terms of the Act Horizon Power is required to comply with the Electricity Industry (Network Quality and Reliability of Supply) Code 2005 (the **Code**). In accordance with Section 26 "Audit and report on monitoring systems" of the Code, Horizon Power is required to arrange for an independent expert to audit and report on the operation of the systems that are in place to monitor its compliance with Part 2 of the Code or an instrument under Section 14(3). Under sub-section 25A(1)(a), the reporting period is "3 years" or as directed by the ERA.

In May 2020 Horizon Power commissioned Qualeng to carry out the Audit to cover the period 1 July 2017 to 30 June 2020.

The audit has been conducted and this report prepared in accordance with the Code.

1.2 Audit Objectives

The purpose of the Network Quality and Reliability of Supply (**NQRS**) audit is to assess and report on the operation of the systems implemented by the licensee to monitor its compliance with Part 2 of the Code or an instrument under section 14(3).

1.3 Audit Scope

Part 2 of the Code includes 4 Divisions:

1. Division 1 (sect. 4 to 8), "Quality Standards" for compliance with requirements for quality of supply at the point of connection to the customer, in regard to voltage fluctuations and harmonic distortion.
2. Division 2, "Standards for the interruption of supply to individual customers" provides for the maintenance of supply and management of interruptions to customers, both in terms of the duration and number of interruptions. It includes for:
    - 2.1. (Sect. 9) Provision of supply with the minimum number and duration of interruptions.
    - 2.2. (Sect. 10(1)) Reducing the effect of any interruptions to the customer
    - 2.3. (Sect. 10(2)) Considering the provision of alternative supply if the interruption is expected to be significant, its effect substantial or if the customer has special health needs that require continuous supply.
    - 2.4. (Sect. 11) Allowing planned interruptions for the purpose of maintaining or altering the transmitter's or distributor's network, if the customer is suitably notified within a stipulated time and the duration does not exceed 6 hours, or 4 hours for temperatures over 30 C or north of the 26th parallel.
    - 2.5. (Sect. 11A) Where the electricity is not supplied from the network, interrupting the supply of electricity to restore it from the network, provided the interruption duration complies with section 11.
    - 2.6. (Sect. 12) Requiring the distributor to remedy the causes of interruptions or enter into alternative arrangements if the supply has been interrupted more than 12 hours continuously or more than 16 times in the prescribed 12 months and the distributor considers that the prescribed standard (means supply without the specified interruptions for 9 years in every 10) is unlikely to be met for the customer.
3. Division 3, "Standards for the duration of interruptions of supply in particular areas" provides that the average length of interruptions to any customer premises should not exceed 290 minutes (calculated as the total annual interruption minutes per customer premises, calculated for each of the last 4 years and then averaged over the 4 years) in any area of the State (for areas that apply to Horizon Power).
4. Division 3A. "Temporary reliability standards for supply to particular areas" (from 1 October 2018

to 30 September 2023) provides for restoration and maintenance to essential services loads and the majority of small use customers of:

4.1. 45 MW to Eastern Goldfields and

4.2. 50 MW to North Country

as soon as is reasonably practicable following the occurrence of a planned or unplanned outage of a transmission element supplying the respective region.

5. Division 4, "Variations of obligations under this Part" provides for:

5.1. review and approval by the Minister of alternative requirements and

5.2. agreement between the transmitter/distributor and the customer of extensions and modifications to the standards.

The audit was carried out between July and August 2020.

On Horizon Power's behalf the following representatives participated in the audit, contributed to sourcing the documentation and providing evidence to the audit:

- Andy Neeman, Asset Systems Manager
- Gerald Chow, Data Management Officer
- Janet Tranthim-Fryer, Customer Service Process Manager.

1.4 Audit Methodology

The audit methodology provided for:

- preparation of an audit plan and risk assessment for Qualeng internal control;
- fieldwork; and
- reporting.

The audit proceeded through a documentation review, meetings and checks of processes. These were supported by additional queries to clarify aspects of Horizon Power policies and procedures.

1.4.1 Audit Terminology, Observations, Opportunities for Improvement and Findings

The audit report uses three terms to qualify the assessment of the evidence:

Observation: The report and assessment of evidence.

Opportunity for Improvement: Where it is assessed that resolution of a shortcoming requires formal

consideration.

Finding and recommendation: Where it is assessed that the shortcoming is non-complying with the Code.

1.5 Limitations and Qualifications

An audit provides a reasonable level of assurance on the effectiveness of control procedures, however there are limitations due to the nature of the evidence available to the auditor, the sampling process inherent in checking the evidence, the limitations of internal controls and the need to use judgement in the assessment of evidence.

1.6 Acronyms and Abbreviations

Abbreviation	Description
AMI	Advanced Metering Infrastructure
AMP	Asset Management Plan
CAIDI	Customer Average Interruption Duration Index (ie. Duration of each interruption per customer over the year)
Code	Electricity Industry (Network Quality and Reliability of Supply) Code 2005
DNAR	District Network Access Request
ENMAC	Electricity Network Management and Control
EO	Electric Office
FY	Financial Year
HP	Horizon Power
HPCC	Horizon Power Control Centre
HV	High Voltage
IPP	Independent Power Producer
LS	Life Support
LV	Low Voltage
NQRS	Network Quality and Reliability of Supply

Abbreviation	Description
NWIS	North West Interconnected System
OBS	Observation
OCS	Outage Capture System
POA	Power On Advantage
POF	Power On Fusion
PQ	Power Quality
PQI	Power Quality Investigation
PQIH	Power Quality Investigation Handbook
PQIM	Power Quality Investigation Manual
PSS	Power System Services
PUO	Public Utilities Office
QoS	Quality of Supply (as defined in the Code)
SAIDI	System Average Interruption Duration Index (ie. total interruption duration per customer over the year)
SAIFI	System Average Frequency Index (ie. average number of interruptions per customer over the year)
SCADA	Supervisory Control and Data Acquisition
SWIS	South West Interconnected System
TCS	Trouble Call System
THD	Total Harmonic Distortion
YTD	Year to Date

2 LICENSEE'S RESPONSE TO PREVIOUS AUDIT RECOMMENDATIONS

2.1 Background

The previous quality and reliability of supply audit was completed in September 2017. This section reviews Horizon Power's progress on that audit recommendations as well as Horizon Power's planned actions to address any outstanding issues.

The recommendations arising from the previous report and the confirmation and status of actions determined in this audit have been summarised in the following table.

2.2 Progress of actions from 2017 Audit

The following table lists the recommendations made in the 2017 Audit and records progress of any actions.

Item No	Code Ref	Requirement	Findings	2017 Recommendations and Opportunities for Improvement	Status
		Systems to monitor compliance with:			
1	Div 1, Sec. 5 - 7	**Quality and Reliability standards, voltage fluctuations, harmonics:** A transmitter and a distributor must, so far as is reasonably practicable, ensure that electricity supplied by the transmitter or distributor to a customer's electrical installations, as measured at the point of connection of those installations to the network, at all times complies with the standards including voltage fluctuation (flicker) and harmonics.	(**OBS**) The new process documented in the PQ Guides is designed to provide the monitoring of QoS and assess compliance of the electricity supply with the requirements of the Code. At this point the delivery of the program is still in progress and will be subject to a Business Case submission for full implementation.	No recommendation	Reference to the Code has been included in the PQI Manual. Horizon Power has taken a concerted approach to address the monitoring of QoS, in particular: • There has been an in depth review by the University of Wollongong in May 2017 of both WA and interstate industry practices; recommendations were included to suit Horizon Power's network. • Horizon Power "NQRS (Code) Compliance Investigation and Proposal", June 2017, includes costing of actions to comply with recommendations in above report. • Fixed meters that are suitable for measuring harmonics are being

Item No	Code Ref	Requirement	Findings	2017 Recommendations and Opportunities for Improvement	Status
					deployed, action in progress • Final implementation of recommendations by UoW report of June 2017 study not undertaken due to it having a negative Net Present Value. • Re-programming of existing meters for Total Harmonic Distortion (**THD**) measurements (993 re-programmed out of 1263, to be completed June 2021) and review of capability of other meters for the measurement of flicker is still in progress. **ACTIONS STILL IN PROGRESS** (Refer to findings of 2020 audit)
2	Div 2, Sec. 11	**General standard of reliability** System to monitor compliance with: • maintaining the supply with a minimum number and duration of interruptions. • providing 72 hour advance notification of planned interruptions.	(**OBS**) The audit noted that during the audit period Horizon Power relied primarily on customer complaints to identify non-compliance of its notification system. Actions are in progress to improve the monitoring of the notification system by following the procedures of	No recommendation	Notifications are generated by new Outage Capture System (**OCS**). Horizon Power is still relying on customer complaints to identify non-compliance. **OPEN**

Item No	Code Ref	Requirement	Findings	2017 Recommendations and Opportunities for Improvement	Status
			Esperance Regional Office.		

Key Findings

3 SYSTEMS TO MANAGE COMPLIANCE WITH PART 2, DIVISION 1 - QUALITY STANDARDS (SEC. 5 TO 8)

3.1 Quality of supply - system/process (sections 5 - 7)

Requirement: A transmitter or distributor is required to have systems in place to monitor:

- compliance at all times with, as far as reasonably practicable, quality of supply (QoS) requirements of the electricity supply at the point of connection to the customer, both in terms of voltage fluctuations (flicker) and harmonic distortion.

Summary

Through review of documentation and interview of staff the audit found that:

- There are documents describing the procedures, process and responsibilities for the monitoring of quality of electricity supply (QoS).
- Equipment was available in the regions to carry out the testing.
- The system does not systematically monitor supply power quality unless customer complaints are raised.
- The system relies on customer complaints to initiate QoS investigations.
- There was evidence to show that equipment had been installed to carry out limited monitoring of QoS at substation level and testing at customer level.
- Findings of incidents are recorded.
- Reports are reviewed by management at regular intervals.

The audit made two findings resulting in one Opportunity for Improvement (OFI):

- There was evidence that the process of applying QoS monitoring is fragmented and awareness of the Code and of the testing requirements is not as it would be expected following the extensive review in 2017 and proposed actions.
- Reports on the incidence of power quality are available to management however these reports track customer complaints and number of investigations. Where the investigations indicate power quality issues these include many different categories and may indicate non-compliances with requirements of Electricity Industry Act (e.g. fluctuations etc) or this Code.

Table 1: Systems to monitor compliance with requirements for quality of supply: Voltage Fluctuations (Flicker) and Harmonics Measurements (2nd order to nth and THD %)

Site	Flicker (Pst < 1.0; Plt < 0.8)	Harmonics (THD < 8%)	Customer Complaints or Faults Related to PQ
All	Reactive system relying on customer complaints. Evidence of monitoring based on customer complaints, tests carried out, all within limits.	Reactive system relying on customer complaints. ▸ Measurements were taken however it appeared that testing procedures were not always followed and results not clearly assessed	There was monitoring of customer complaints potentially related to Code PQ requirements.

Findings

Finding:

- Measurements were taken however it appeared that testing procedures were not always followed and results not clearly assessed. The deployment and use of PQ Analysers and the analysis of test data was not consistently understood and not always in accordance with Horizon Power's manuals.

One Opportunity for Improvement (**OFI**) was noted:

1/2020. (**OFI**) The deployment and use of PQ Analysers and the analysis of test data needs to be consistently understood and in accordance with Horizon Power's manuals.

Documentation

- "Power Quality Investigation Handbook" (**PQIH**), approved 5/9/2017
- "Power Quality Investigation Manual", (**PQIM**), number HPC-5DG-07-0001-2017
- (CS16#5242804) UoW - Determination of Appropriate Number of Power Quality Monitoring Sites for Horizon Power Network – FINAL, University of Wollongong
- NQRS (Code) Compliance Investigation and Proposal, June 2017
- monthly "Asset Management Reports" (**AMR**)
- AMR - Asset Management Report (Qlikview), Detail Reports
- "HPC-9DJ-01-0001-2012 Horizon Power Technical Rules NWIS & NIS", 31 March 2017
- Work requests / Work Orders

- Communications regarding and details of testing to Code requirements.

Observations

Through interviews and discussions with the Asset Systems Manager, the Data Management Officer and examination of documents and records the audit found evidence that a process is in place for the monitoring of quality of electricity supply for compliance with the requirements of the Code:

- Horizon Power is relying on customer complaints to highlight possible shortcomings in the QoS of the electricity supply at the point of connection to the customer. This monitoring policy has been the subject of previous non-compliances and corrective actions by Horizon Power, the outcome of the various actions has resulted in:
  - the decision to deploy improved meters,
  - document more comprehensive test methodologies and recording,
  - use of limited continuous monitoring (not fully implemented) and
  - a continuation of the previous policy to use customer complaints to initiate investigations.
  - However investigations are initiated in response to any number of complaints and the problem is classified, responded or dismissed under a variety of reasons.
- The process for proactive forecasting/ monitoring the QoS performance of the network commences with a preemptive approach documented in the PQIM to calculate if the addition of new customers (with large and/or disturbing loads) to the network is likely to result in voltage fluctuations in excess of the Code limits.
- The PQIH describes the process for initiation of the process and management of customer's complaints, including preliminary investigation and rectification if possible, initiating the power quality investigations (**PQI**) and completion.

  In addition the PQIH defines the tasks and responsibilities of functions and departments inside the business and the integration of data across Horizon Power‘s systems.
- The PQIM documents the procedure for undertaking PQIs, including limits for fluctuations and harmonics, equipment to be used, installation and testing parameters, such as duration of monitoring, the procedure for testing and the assessment of results.
- Customer complaints are recorded on spreadsheets and reported in monthly AMRs which are published on Powerlink, Horizon Power's dashboard and are available to management:
  - ref: “(CS16#5442790) AMR - Asset Management Report (Qlikview) (May 2020)” and “(CS16#5389397) AMR - Asset Management Report (Qlikview) Detail Report (May 2020)”: reporting 3 PQIs in month of May, 9 for year up to May 2020.
- Where there is sufficient evidence in the preliminary fault assessment customer complaints may result in full investigations following the procedure in the PQIH.
- In 2020 available data showed that there had been 17 incidents, none of those had been identified as a QoS as defined in the Code.

- In May 2020 there were 3 incidents that were investigated, however none of those was a QoS as defined in the Code:
  - One Voltage Fluctuation in WPIL, Karratha, due to a conductor across one bay is faulty and throwing a high impedance on the neutral. repaired within 1 day.
  - 1 High Volts in EPIL, Port Hedland and
  - 1 Low Volts in CEMW, Mount Magnet.
- Evidence of Voltage Fluctuation (Flicker) and Harmonic Distortion Measurement and Monitoring was found in communications and records detailing:
  - the deployment of PQ Analysers in regions including Substation and portable equipment
  - examples of records of readings such as:
    - Tallboys t-off flicker from 31/01/2020 to 6/02/2020
    - Vision Power Fitzroy Crossing Lodge flicker from 29-01-2020 to 04-02-2020
    - Total Harmonic Distortion (**THD**) at same places
  - There was evidence of use of network analysers at Easton Rd and Burton Rd, Esperance between November and December 2019 for investigation of PQ complaints.

Through examination of the audit evidence the following observations were made:

- the report by the University of Wollongong “Determination of Appropriate Number of Power Quality Monitoring Sites for Horizon Power Network – FINAL, May 2017, also recommends that fixed meters be deployed at 22 MV locations. The report recommends that the program may be extended to LV connections and extremities of LV feeders. The program recommended the deployment of the first 5 to 10 meters in the first 12 months, progressing to a total of 9 to 15 meters by 2020 and so on.
  - The program has not been adopted by Horizon Power as recommended, the deployment of PQ Analysers has been spread out over a longer period of time.

The audit made the following findings:

- Some of the reports showed that some of the investigations are still not in accordance with procedures or arranged to verify compliance with the Code, for example:
  - Investigation equipment was installed and monitoring was carried out on the customer side of the customer connection rather than on the supply side as specified in the PQIM (e.g. Fitzroy Lodge investigation).
  - Some of the results appeared to be in excess of Code requirements however were discounted due to incorrect installation, this was not immediately clear from records, nor followed up formally to indicate quality or validity of testing.
- There appeared to be a lack of awareness of the Code and its requirements where it would be

expected.

- There was evidence to show that there is a perception on the use of PQ Analysers which does not conform to the instructions in the PQIH. There was an understanding that, due to the small number of HV customers, PQ Analysers will not provide real benefits for Horizon Power systems in the network, however the PQIH is quite explicit that PQAs are “LV recording equipment”, in addition:
  - it is noted that the recommendation in “NQRS (Code) Compliance Investigation and Proposal” of June 2017 proposes deployment in MV and LV networks;
  - it also recommends that PQIM should be used to drive PQ monitoring but evidence did not support this;

3.2 Duty to disconnect if Quality of Supply may lead to damage (section 8)

Requirement: A transmitter or distributor is required to have systems in place to monitor::

- compliance with, as far as reasonably practicable, requirement to disconnect a customer where there is a possibility of damage to the customer installation due to the transmitter or distributor inability to comply with QoS standards (as per sections 5 - 7).

Summary

Horizon Power has procedures in place documenting the process of disconnections:

- Horizon Power Instruction Manual (**HIM**) has been developed to ensure standardisation of work practices and procedures and contains ‘Field Instructions’ to direct the performance of processes in the filed for compliance with legal and regulatory obligations.
- Horizon Power‘s Technical Rules specify the requirements placed on users connected to the system and their equipment.
- The PQI Handbook contains procedures for the field crews to disconnect customer electrical connections when the customer's electrical equipment is found to be faulty in accordance with the Technical Rules.
- Field instructions are available to provide all Horizon Power Workers the procedures and minimum requirements for performing work on customer owned electrical and non-electrical equipment, which may require a disconnection from the network when that equipment is found to be faulty.
- Commissioning sheets were sighted showing testing of both Horizon Power and the client installations.
- Evidence was sighted of customer disconnections by Horizon Power‘s crews because of various faults in the customer’s installation.

Findings

The audit did not record any findings.

3.3 Current Actions

In the submission to the Public Utilities Office (**PUO**) of early 2019, "(3.09) NQRS Code Combined PQ and Reliability Submission to PUO – For review", Horizon Power proposed:

- "...Continuation of the existing reactive based power quality monitoring program, using customer notified complaints to trigger power quality investigations."
- "Equip its regions with modern power quality monitoring equipment to undertake better and more detailed reactive power quality investigations."
- "Explore the use of available THD data from existing AMI (Advanced Metering Infrastructure) devices installed across its networks to trigger investigations where continuous or repetitive exceedances are observed"

  also

- "Horizon Power is presently reprogramming ~1,500 CT meters to measure and download THD data at the customer premises level for LV, MV and HV premises. Due to system limitations, the analysis of the data and alarming functionality is not yet implemented, however the capability is present and changes are being proposed which could potentially allow for this."
- "No installed LV meters have been identified with the capability to measure voltage fluctuations".

4 SYSTEMS TO MANAGE COMPLIANCE WITH PART 2, DIVISION 2 - STANDARDS FOR INTERRUPTION OF SUPPLY

A transmitter or distributor must establish systems to monitor compliance with requirements to minimise interruptions to customers, both in term of the duration and number of interruptions. The requirements are for the transmitter or distributor to:

- Maintain the supply with the minimum number and duration of interruptions (Sec. 9).
- Reduce the effects of interruptions; provide alternative supply if the proposed interruption is expected to be significant, its effect substantial or if the customer has special health needs that require continuous supply (Sec. 10).
- Ensure that where interruptions are planned, where practicable the customer is notified within a suitable time and the duration does not exceed 6 hours, or 4 hours for temperatures over 30 C or north of the 26th parallel (Sec. 11).
- Ensure that when the customer is supplied by alternative means, where interruptions are planned and supply has to be restored from the network, interruption duration does not exceed 6 hours, or 4 hours for temperatures over 30 C or north of the 26th parallel and notifications for planned interruption is provided (Sec. 11A).
- Remedy the causes of interruptions or enter into alternative arrangements if the supply has been interrupted more than 12 hours continuously or more than 16 times in the prescribed 12 months and it is considered that the prescribed standard is unlikely to be met for the customer (Sec. 12).

4.1 Duty to maintain the supply with a minimum number and duration of interruptions (Sec. 9)

Requirement: The transmitter or distributor must establish systems to monitor the compliance with the requirement to ensure that, so far as is reasonably practicable:

- the supply of electricity to a customer is maintained; and
- the occurrence and duration of interruptions is kept to a minimum.

Summary

Through interviews and discussions with the Asset Systems Manager, the Data Management Officer, the Customer Service Process Manager and review of documentation and evidence, the audit found that:

- Interruption reliability targets are defined at management level. Long term plans aimed at ensuring reliability of supply are covered in an Asset Management Plan Training module which includes reliability performance indicators such as interruptions to customers.

- Procedures are in place and records are available documenting:
  - the call-out process
  - the approach to identifying the nature of customer calls and of faults
  - the recording of incidents into logs
  - the response to incidents and resolution of faults
  - the closure of incidents
  - the reporting of incidents' data
  - review of incidents' data.

The audit found that processes are in place and in compliance with the process documentation and with the Code.

Table 2: Systems to monitor compliance with requirement to maintain supply and to maintain the occurrence and duration of interruptions to a minimum

Site	Procedures dealing with outages	Systems and Procedures monitoring performance
All	Yes	Yes

Findings

The audit did not record any findings.

Documentation

- Horizon Power Technical Rules
- Power on Fusion Network Management Procedure (HP_3178414)
- Process chart " Customer – C9.6 Faults"
- HPCC Fault Prioritisation and Restoration Procedure, 6 September 2017
- Reliability Incidents for Current Month-to-Date and Previous Month (Incident Level) (CS16#3322855)
- PQIH
- July 2018 Executive Submission "Review of Reliability Targets" (DM# 10039791)
- AMP Instruction Module 5 – Reliability & Quality
- AMRs.

Observations

Through interviews and discussions with the Asset Systems Manager, the Data Management Officer. the Customer Service Process Manager and examination of documents and records the audit found:

- Technical Rules ("HPC-9DJ-01-0001-2012 Horizon Power Technical Rules NWIS & NIS", 31 March 2017) specify the requirements placed on users connected to the system and their equipment.
- The reliability targets are defined in July 2018 Executive Submission "Review of Reliability Targets" (DM# 10039791).
- The overall processes are documented in the PQIH.
- The "AMP Instruction Module 5 – Reliability & Quality" outlines the process of developing long term plans to ensure that the reliability of customer electricity supply complies with Horizon Power requirements.
- The "Power on Fusion Network Management Procedure (HP_3178414)" details the procedures to be followed for uniform operation of Horizon Power's Power on Fusion network management system across the business.
- The process for handling calls from customers is documented in the process chart " Customer – C9.6 Faults".
- "HPCC Fault Prioritisation and Restoration Procedure", 6 September 2017 covers the process followed by System Controllers at Horizon Power Control Centre (**HPCC**) in order to restore services following a fault being raised in the system. The procedure provides the basis for and the ranking of priority of restoration which ranges from the highest for electric shock to lowest for single faulty street light.
- "Reliability Incidents for Current Month-to-Date and Previous Month (Incident Level)" report lists all incidents and details of the process of rectification.
- AMRs report the monthly and year to date (**YTD**) reliability performance and compare it to previous periods. The AMRs are published:
  - on the Horizon Power dashboard (as web based QlikView pages)
  - as monthly reports and
  - as detailed spreadsheets.

  The reports are available to all staff and especially provided to Regional Managers and Asset Managers for their review of regions performance and asset planning. Indicators of reliability are:
  - interruptions per customer over the year over the main networks and by township, monitored for trend and against previous year:
    - total interruption duration per customer over the year (SAIDI)
    - average number of interruptions per customer over the year (SAIFI)
  - number of customers subject to more than 16 interruptions per year
  - number of customers subject to supply interruptions over 12 hours per year

- planned outages with length in excess of requirements
- incidents over 7 days.

- AMRs were reviewed for each of the three audit years and showed reporting and review of interruptions trends.
- There was evidence of discussion of reports at management performance meetings.
- A sample of incident reports were examined including:
  - Incident “INCD-106870-F” of 10 May 2020, located at Dampier, Hill Rd, 6713, Lot 24, was reported on the “Reliability Incidents for Current Month-to-Date and Previous Month (Incident Level)” (CS16#3322855) spreadsheet. The incident, resulting in PQI Voltage Fluctuation, was due to equipment failure and the faulty conductor was repaired within one day.

- The audit noted that AMR May 2020 showed Outstanding Incidents (>7 days) as 1582, compared to previous figures of 79 and 72 -in 2018 and 2019 respectively. This was found to be due to a clerical entry error.

4.2 Duty to reduce the effects of interruptions and provision for alternative supplies for proposed interruptions (Sec. 10)

Requirement: The transmitter or distributor must establish systems for monitoring its compliance with its duty to:

- reduce the effect of any interruptions, so far as reasonably practicable and,
- without limiting the above, the licensee must consider providing alternative supply for proposed interruptions if the interruption is:
  - greater than 4 or 6 hours
  - the effect on a business is likely to be substantial; or
  - there are special health needs customers.

4.2.1 Reduce the effect of any interruptions (SSec 10(1))

Requirement: The transmitter or distributor must establish systems for monitoring its compliance with the requirement that:

- the transmitter or distributor must, so far as reasonable practicable, reduce the effect of any interruptions.

Summary

As reported at section 4.1 Horizon Power has systems and procedures in place to monitor that the supply of electricity to a customer is maintained and the effect of any interruptions is kept to a minimum.

Through interviews and discussions with the Asset Systems Manager, the Data Management Officer, the Customer Service Process Manager and review of documentation and evidence, the audit found that:

- processes are in place to monitor compliance with the requirement to reduce the effect of any interruptions, by:
  - prioritization of urgent work
  - processes and procedures for communication with crews and customers
  - attendance to faults including emergency repairs, and
  - recording of activities
- processes are in place to monitor compliance with requirement for reducing the effect of proposed interruptions by providing alternate electricity supply
- there are reporting and monitoring of performance through reports and charts in AMRs highlighting the number and durations of interruptions leading to analysis and management review.

Findings

The audit did not record any findings.

Documentation

- Technical Rules (“HPC-9DJ-01-0001-2012 Horizon Power Technical Rules NWIS & NIS”, 31 March 2017)
- Power on Fusion Network Management Procedure (HP_3178414)
- Process chart “Customer – C9.6 Faults”, C9.6.1 – Fault call process
- HPCC Fault Prioritisation and Restoration Procedure, 6 September 2017
- PQIH
- July 2018 Executive Submission “Review of Reliability Targets” (DM# 10039791)
- AMP Instruction Module 5 – Reliability & Quality
- (CS16#14289050) Horizon_Power – Crisis & Emergency Management Handbook 2019
- (CS16#14289345) EMP 04 002 – Emergency cyclone severe storm and flood procedure Oct 2019

- Reports on “Reliability Incidents for Current Month-to-Date and Previous Month (Incident Level)”
- (CS16#9247491) “Network Contingency Planning Guideline”
- Planned outage notification letters
- Performance is monitored in AMRs and AMR Detailed Spreadsheets.

Observations

There was evidence of the application of the documented process and outcomes were recorded and monitored:

- The “Power on Fusion Network Management Procedure (HP_3178414)” details the procedures to be followed to operate Horizon Power‘s Power on Fusion network management system, including:
  - responses to faults
  - communication protocols and equipment
  - control and responsibility
  - approval of planned work
  - time requirements for notices, from 3 to 10 days
  - procedures for unplanned work including response in the case of:
    - emergencies
    - faults (found in the field or through TCS, or
    - plain network access requests (DNARs) where there is insufficient notice
  - process for fault resolution
  - timeline of activities prior, during and after a ‘job’
  - permits and recording of attendances.
- The “Network Contingency Planning Guideline” covers the planning and management of contingency events.
- HPCC Fault Prioritisation and Restoration Procedure details the prioritization of fault attendance:
  - it defines priority levels for fault types,
  - assigns priorities to fault attendance and resolution,
  - assigns field crews,
  - includes for follow up and closure of incidents within 7 days, or else
  - flagging of outstanding incidents.
- AMRs report the monthly and YTD interruption performance and compare it to previous periods.
- AMRs were reviewed for each of the three audit years and showed reporting and review of interruptions trends.

- There was evidence of discussion of reports at management performance meetings.

4.2.2 Provision of Alternative Supply for Proposed Interruptions, Special Health Needs Customers and Commercially Sensitive Loads (SSec 10(2))

Requirement: The licensee must establish systems for monitoring its compliance with:

- without limiting the requirement to reduce the effect of any interruptions so far as reasonably practicable, the licensee must consider providing alternative supply for proposed interruptions if the interruption is:
  - greater than 4 or 6 hours;
  - the effect on a business is likely to be substantial; or
  - there are special health needs customers.

Summary

Through interviews and discussions with the Asset Systems Manager, the Data Management Officer, the Customer Service Process Manager and review of documentation and evidence, the audit found that:

- There is evidence to show that alternative supply is considered by Horizon Power where interruptions are proposed that would exceed the limits set in section 11(2) of the Code.
- Monitoring is provided by reports and charts within the monthly AMRs highlighting the number and durations of interruptions.

Consideration of alternative power is part of Horizon Power procedures, activities are in compliance with the process documentation and with the Code.

Table 3: Systems to monitor compliance with duty to reduce the effect of interruptions and provide alternative supply for planned interruptions

Site	Reduce the Effect of Interruptions	Alternative Supply	Special Health Needs Customers
All	Yes	Yes	Identified

Findings

The audit did not record any findings.

Documentation

- HPC-9DJ-01-0001-2012 Horizon Power Technical Rules NWIS & NIS
- Network Contingency Planning Guideline
- (CS16#14289345) EMP 04 002 - Emergency Cyclone Severe Storm and Flood Procedure Oct 2019
- Critical Customer Procedure
- (CS16#16180256) Sensitive Customer Policy Document V1.1, 28 January 2020
- Electric Office Web Maps.

Observations

Consideration of alternative power in the case of extended interruptions is part of Horizon Power procedures and in compliance with the process documentation and with the Code:

- "Horizon Power Technical Rules NWIS & NIS", requires "The Generator and the Network Service Provider to agree in respect of back-up (alternative) supply arrangements in the event of each new or altered connection".
- "Network Contingency Planning Guideline" addresses the planning and management of contingency events.
- The "Emergency Cyclone Severe Storm and Flood Procedure" includes the use of Independent Power Producers (**IPP**) as alternative power suppliers to assist in the recovery of the system.
- The outage planning process is in place and includes the task of tracing the network branch that will be isolated and checking for Special health Needs (**SHN**) Customers that will be affected.
- "Critical Customer Procedure" specifies that critical customers are to be notified in advance of a planned outage:
  - five weeks for a SHN customer or
  - three weeks to three days in advance (on a sliding scale depending on criticality) of a planned outage through a meeting with the customer.
  - In the event that an agreement is not reached between the customer and Horizon Power in regard to the outage then alternative supply arrangements have to be made which may include the use of live line techniques or mobile power generation.
  - The final agreement must be communicated in writing to the customer and records kept.
- The "Sensitive Customer Policy Document V1.1" provides the policy for maintaining and restoring electricity supply to 'sensitive customers'.
- Electric Office (**EO**) Web Maps show the Horizon Power network and identification of SHN customers in physical maps.
- POA network maps also highlight SHN customers.
- AMRs identify interruptions and trends.

4.3 Planned interruptions: acceptable if less than 4 or 6 hours and if notified (Sec. 11)

Requirement: The transmitter or distributor must establish systems to monitor compliance with the requirement to, as far as reasonably practicable:

- maintain planned outages not exceeding 4 or 6 hours and
- provide notifications at least 72 hours before each planned outage.

Summary

Through interviews and discussions with the Asset Systems Manager, the Data Management Officer, the Customer Service Process Manager and review of documentation and evidence, the audit found that:

- Horizon Power has a system to manage planned outages and advance notification of those outages.
- The system relies on the customer providing the 'monitoring' of the performance of the system by raising a complaint.
- Failures in notification delivery are not reported to management due to the low number of customer complaints per year (up to a maximum of 15 in a year during the audit period).
- Whilst there was an evident number of non conformances with respect to the stipulated notification time, in view of the number of outages performed by Horizon Power it can be concluded that the Horizon Power system as far as reasonably practicable, complied with the Code requirements.

Table 4: Systems to monitor compliance with planned outages not exceeding 4 or 6 hours and providing notifications at least 72 hours before each planned outage

Site	Notification ≥ 72 hours prior	Duration ≤ 4h or 6h (as practicable)
All	The system relies on customer complaints to show if the process is working, failures are not reported to management due to the low number of customer complaints per year (up to a maximum of 15 in a year during the audit period). In view of the number of outages performed by Horizon Power it can be concluded that the Horizon Power system as far as reasonably practicable, complied with the Code requirements.	Monitored 119 planned outages > 4 or 6 hours in FY ending in 2017 to 84 in FY 2020

Findings

The audit did not record any findings.

Documentation

- Work Instruction "(CS16#4032037) Planned outage - Customer Notification Reference Guide EO Web Version"
- Planned Outage Guide POF
- Planned Outage Guide EO
- Planned Outages - Notifications July 2019 - June 2020
- (CS16#15135204) Website Shortcut Guide – Adding a planned power interruption
- AP24 – Customer card drop Replacement NIS RCM Update – June 2016
- (CS16#5005156) C9.7.9 - Regional planned outage notification process, February 2017
- Outage Capture System - User Reference Guide
- Notification Request Form, including date and time of outage, map(s), addresses.

Observations

There was evidence of the application of the documented process and outcomes were recorded and monitored:

- Work Instruction "Planned outage - Customer Notification Reference Guide EO Web Version" provides step by step instructions for undertaking the process of defining the outage and notification:
  - tracing the network affected by the outage on Electric Office and Power On Fusion
  - an automatic process will identify customers affected by the trace and select the appropriate mode of notification (SMS, e-mail and Australia Post)
  - communication to Horizon Power Corporate Communications team.
- "AP24 – Customer card drop Replacement NIS RCM Update" (partly superseded by the Outage Capture System (**OCS**) process) also covers the notification process.
- "Website Shortcut Guide – Adding a planned power interruption" has the process description
- "Regional planned outage notification process" defines the steps for notification of customers, starting from the issue of work packages to Crew Leaders.
- The "Outage Capture System - User Reference Guide" describes the system (OCS) used to record planned outages and filter meter alerts to create lists of meter and customers affected by planned interruptions, including customers' contact information.
- The "Planned outage notification template letter" provides the template for notification to customers.
- Performance can be queried from region's offices, statistics of outages and notifications were collected in spreadsheet "Planned Outages - Notifications July 2019 - June 2020" for FY2020
- AMRs showed that Horizon Power monitored compliance with the planned outage duration over the three year audit period through its "Planned Outages Against Charter" reports:
  - over the audit period the number of "Planned Outages Outside of Charter" (exceeding 4 or 6 hours) had a steady decline from 119 planned outages > 4 or 6 hours in FY ending in 2017 to 84 in FY 2020 with an overall decrease of around 30% over the period.
- Failures in notifications are registered from customer claims:
  - in FY2020 there were 3 claims regarding lack of notification:
    - 417766 – Lot 1081 Wilson Street, Menzies (applied twice, HP data was incorrect and customer was not notified on 2 occasions for outages dated, 2/6/20 and 9/6/20);
    - 514782 – 11 Gwalia Street, Leonora (applied once, customer was not notified for outage dated 8/6/20).

The audit noted:

- There is no reporting of claim payments from Customer Service to Management due to the low

number of occurrences. Data for “Planned Outages and Planned Outage Payments” over 3 periods was:

- 2018/19: 15
- 2017/18: 0
- 2016/17: 1 (outside of audit period).

4.4 Interruptions to restore supply from network (Sec. 11A)

Requirement: Where the customer is supplied from alternative power because it is unable to receive supply from the network and the transmitter or distributor interrupts the supply of electricity for the purpose of restoring the supply of electricity to the customer from the network, the transmitter or distributor must establish systems to monitor compliance with the requirement to:

- as far as reasonably practicable, ensure that the interruption does not exceed 4 or 6 hours and
- the transmitter or distributor has used its best endeavours to give notice to the customer.

Summary

Through interviews and discussions with the Asset Systems Manager, the Data Management Officer, the Customer Service Process Manager and review of documentation and evidence, the audit found that:

- Horizon Power has a system for monitoring compliance with the requirements to monitor that interruptions do not exceed 4 or 6 hours and the customer is provided notifications of the outage where the customer supply from alternate power had to be interrupted to restore it from the network.

There is evidence to show that processes are in place and in compliance with the process documentation and with the Code.

Findings

The audit did not record any findings.

Documentation

The process is documented in

- Work Instruction "(CS16#4032037) Planned outage - Customer Notification Reference Guide EO Web Version"
- Planned Outage Guide POF
- Planned Outage Guide EO
- (CS16#15135204) Website Shortcut Guide – Adding a planned power interruption
- AP24 – Customer card drop Replacement NIS RCM Update – June 2016
- (CS16#5005156) C9.7.9 - Regional planned outage notification process, February 2017
- Notification Request Form, including date and time of outage, map(s), addresses.

Observations

There was evidence of the application of the documented process and outcomes were recorded and monitored:

- Arrangements have been put in place in cases where customer(s) are supplied by alternate power to provide power from the network in case their supply fails;
  - Battery Energy Storage System in Gibson feeder in Carnarvon has been set up with an arrangement to bypass it in case of any faults allowing the customer to be fed with an alternate supply while the faults are attended to.

4.5 Significant interruptions (over 12 hours duration or more than 16 in a year) to small use customers (Sec.12)

Requirement: The distributor must establish systems to monitor compliance with the requirement to remedy the causes of interruptions or make alternative arrangements where significant interruptions (duration over 12 hours or more than 16 interruptions in the preceding year) occur to a small use customer and where the distributor considers that the prescribed standard (no significant interruptions in 9 years out of 10) is unlikely to be met, the distributor must establish systems to monitor compliance with the requirement to:

- either remedy the causes of interruptions or
- make alternative arrangements.

Summary

Through interviews and discussions with the Asset Systems Manager, the Data Management Officer and review of documentation and evidence, the audit found that:

- Horizon Power has systems for monitoring compliance with the requirements to monitor significant interruptions to the prescribed standard, and

- remedy the causes or make alternative arrangements where significant interruptions occur so that the prescribed standard is met.

- However, Identification of customers has not been drilled down to individual customer level, this is however achievable using current Horizon Power systems.

Table 5: Systems for monitoring compliance with interruption duration not to exceed 12 hours

Site	Criteria		Causes of Interruption Remedied / Alternative Arrangements
	Duration ≤ 12 hours FY2018 - 2020	9 Years out of 10 2010 and 2020 (≤ 12 hours)	
MONITORING			
All	Monitoring in place	Not available	Traceability of remediation for interruptions > 12h is not yet available.
PERFORMANCE			
All	Interruptions occurring each FY	Not available	Not available.

Table 6: Systems for monitoring compliance with interruption frequency not to exceed 16 per customer per period

Site	Criteria		Causes of Interruption Remedied / Alternative Arrangements
	# interruptions ≤ 16# / period FY2018 - 2020	9 Years out of 10 (# interruptions ≤16)	
MONITORING			
All	Monitoring in place	Not available	Traceability of remediation for interruptions > 16#/FY is not yet available.
PERFORMANCE			
All	Interruptions occurring each FY	Not available	Not available

Findings

Finding:

- As noted above, the Horizon Power system has the capability to identify individual customers that are subject to over 16 interruptions per FY, or feeders subject to an interruption of over 12 hours per FY, however to date there is not a process to monitor if remediation is provided to all those customers that are likely to be subject to more than one instance of significant interruption over 10 years as required by the Code.

Opportunity for Improvement:

2/2020. (**OFI**) Identify and provide remediation to the individual customer(s) likely to be subjected to over 16 interruptions per FY, or an interruption of over 12 hour duration per FY more than once in 10 years. This could be achieved by implementing remediation at relevant feeders or at other more granular level as determined by Horizon Power.

Documentation

- Monthly AMRs
- Spreadsheet (CS16#5389397) AMR - Asset Management Report (Qlikview) Detail Report"
- Report "Regulatory - Customers Greater than 16 Incidents" within spreadsheet "(CS16#5389397) AMR - Asset Management Report (Qlikview) Detail Report".

Observations

Significant Interruptions and Remediation

There was evidence to show that significant interruptions are monitored:

- Monthly AMRs report significant interruptions.
- Spreadsheet "AMR - Asset Management Report (Qlikview) Detail Report" includes detailed reports on each aspect of the AMRs.
- Report "Regulatory - Customers Greater than 16 Incidents" within spreadsheet "AMR - Asset Management Report (Qlikview) Detail Report" records monthly each instance of a customer receiving over 16 interruptions in the FY; individual customers are identified in each record in compliance with the Code.
- There was an increase in customers experiencing over 16 interruptions in Esperance, East Kimberley and COMW between FY2018 and 2019.
- Report "Regulatory - Over 12 Hour Incidents Current YTD" within spreadsheet "AMR - Asset Management Report (Qlikview) Detail Report" records monthly each instance of an incident interrupting supply to customers for over 12 hours.
- Interruptions over 12 hours increased over the audit period while the number of customers

experiencing over 16 interruptions trended downwards.

- The audit noted that in regard to interruptions over 12 hours:
  - in FY2019 there was an increase in EPIL, WPIL, ESPE & COMW
  - in FY2020 there were increases in WPIL, ESPE, CEMW, COMW & WKIM.
- The audit noted that in regard to interruptions frequency of over 16 per FY:
  - in FY2019 there was an increase in the number of customers experiencing interruptions in WPIL, ESPE & EKIM.
  - In FY2020 there were increases in ESPE & COMW.

The Code requires that where significant interruptions (duration over 12 hours or more than 16 interruptions in the preceding year) occur to a small use customer and where the licensee considers that the prescribed standard (no significant interruptions in 9 years out of 10) is unlikely to be met, the causes of the interruptions must be remedied or alternative arrangements put in place.

Evidence of analysis of causes and remediation was found:

- Causes were identified in detailed reports supporting AMRs for outages over 12 hours:
  - equipment failure
    - pole top fire
    - transmission, feeder or recloser trip
    - flooded equipment
  - planned interruption
  - external fire
  - lightning
  - wind
  - vehicle impact
  - bird
  - vegetation
  - emergency outage due to hazard
  - vandalism.

Whilst remediation has not drilled down to individual customer level, indicators such as the frequency of interruptions have guided the implementation of remediation projects. Remediation projects were identified in each of the three financial years in the audit period.

The audit noted the following:

- Customer data was only included in the reporting system until approximately 2015 (with the implementation of the Normalised Data Store (NDS).
- Individual customers are not tracked by Horizon Power.
- Customers with more than 16 interruptions over each FY (as per subsection 12(2)(b)) are individually identified in records. The TCS Outage Management System was implemented in November 2009 so the audit period ending in 2020 is the first for which there have been over 10 years of applicable data.
- Records are kept of feeders which are subject to interruptions over 12 hours (subsection 12(2)(a)) and of the respective number of customers affected. No records are maintained to individually identify which small use customers are affected over 10 years. With Horizon Power system capacity to link feeders and customers this should be possible to achieve.
- In the auditor's opinion that monitoring of feeders should be sufficient to ensure compliance with the Code requirement, as long as traceability of each individual customer to each feeder is maintained. This would allow Horizon Power the ability to identify each area and, consequently, each individual customer affected by significant interruptions and provide either remediation or alternative arrangements with the individual customer as necessary.

5 SYSTEMS TO MANAGE COMPLIANCE WITH PART 2, DIVISION 3 - STANDARDS FOR THE DURATION OF INTERRUPTION OF SUPPLY IN PARTICULAR AREAS (SEC. 13)

Requirement: The transmitter or distributor must establish systems to monitor compliance with the Code requirement to ensure that, so far as is reasonably practicable, the average total length of interruptions per customer in an area, during each year, for the four years up to the current year, for areas other than the Perth CBD, does not exceed 160 minutes in urban areas or 290 minutes in any other area of the State.

Summary

Through interviews and discussions with the Asset Systems Manager, the Data Management Officer and review of documentation and evidence, the audit found that:

- Horizon Power has a system to monitor that the average total length of interruptions per customer for the four years up to the current year do not exceed 290 minutes.

There is evidence to show that processes are in place and in compliance with the process documentation and with the Code.

Table 7: Systems to monitor compliance with requirement for interruption not to exceed 290 minutes average per customer over 4 years.

Site	Average of Total Length of Interruptions per Customer per year (minutes)				4 Year Average (Avg over 4 years ≤ 290 min)
	2017	2018	2019	2020	
All sites	234	152	234	315	234

Table 8: Systems to monitor compliance with requirement for interruption not to exceed 290 minutes average per customer over 4 years.

Site	4 Year Average Total Length of Interruptions per Customer (Avg over 4 years ≤ 290 min)		
	2018	2019	2020
All sites	293	226	234

Findings

The audit did not record any findings.

Documentation

- Monthly AMRs
- Horizon Power intranet dashboard 'Powerlink'
- Code reports - Network Quality and Reliability of Supply.

Observations

The audit found that a process is in place for monitoring compliance with the requirement to ensure that the average length of interruptions to customer premises for the four years up to the current year does not exceed 290 minutes.

There was evidence of the application of the documented process and outcomes were recorded and monitored:

- The process uses monthly AMR reports to provide a continuous view over the performance of the entire network down to individual townships. The reports are published monthly, they include targets for each town which, if achieved, will result in compliance with the Code requirements.
- Monthly AMRs applicable to the audit period were examined, each AMR included reports for "Performing Systems (Normalised Data)" which lists systems on a township basis and applicable reliability data against the criteria including:
  - the total interruption duration per customer over the year (SAIDI)
  - the average number of interruptions per customer over the year (SAIFI)
  - the duration of each interruption per customer over the year (CAIDI)
  - Criteria are set for SAIDI and SAIFI while no criteria is set for CAIDI
  - Systems which are non-performing and those that are close to non-performing are highlighted
  - Reasons for non-performance and improvement or deterioration in performance are included in the reports.
- A variety of data is reported to support and complement the AMRs and allows regions and management to analyse trends. These include:
  - Charts for reliability data
  - Performing system tables
  - YTD Graphs
  - District SAIDI performance

- SAIDI graphs for feeders
- Historical and predictive charts.

The audit noted the following:

- The reliability information only includes data where:
  - 2 or more customer connections on the network are affected;
  - the data also includes generation outages.
- The reported information is based on “Normalised” data, which excludes data from incidents that are due to external factors outside of Horizon Power‘s control, such as:
    - extreme events such as cyclones, fires and floods; days subject to these events are classified as “Major Event Days” which are declared and reported in the annual reports to the ERA such as the “2018 code report - Network Quality and Reliability of Supply” and similar reports for 2019 and 2020
    - motor vehicle accidents
    - vandalism
    - accidents due to machinery or tools outside of Horizon Power control
    - bird strikes etc.
- Whilst data reported on AMRs internally is ‘normalised’, data reported to the ERA in the annual Code Reports is not normalised and reflects all events, including those that are outside of Horizon Power control.

Over the three year period the figure for the average total length of interruptions per customer over 4 years decreased from 293 minutes in 2018, to 226 in 2019 and 233.75 in 2020.

The figure of 293 minutes in 2018 was greater than the Code requirement however it was noted that;

- The overall result of FY2018 was skewed by the 2014-15 period result of 501 minutes. The trend in interruptions from FY 2015 to FY2018 was downwards, decreasing to the average total length of interruptions per customer of 152 minutes in FY2018.
- The effect of external factors in the FY2018 period was noted, the ‘normalised’ figure for FY2018 was 83.3 minutes.

6 VARIATIONS OF OBLIGATIONS (SEC 14-15)

6.1 PROVISIONS MAY BE EXCLUDED OR MODIFIED BY AGREEMENT WITH CUSTOMERS (SEC 15)

Requirement: A customer and a transmitter or a distributor may agree in writing that a provision of this Part is excluded or modified in relation to the supply of electricity by the transmitter or distributor to the customer and the agreement must set out the matters that the parties consider are the advantages and disadvantages.

Summary:

During the previous audit period an “Energy Supply Agreement for large enterprise customers” was in place with a limited number of customers to manage and interrupt the supply, if necessary, to allow demand management and provide financial benefit to customers.

There was no evidence in this audit period that this policy is in place.

7 Audit Summary and Recommendations

Under Section 26 "Annual report on monitoring systems" of the Code, Horizon Power is required to arrange for an independent audit of the operation of the systems that are in place to monitor its compliance with Part 2 of the Code. or an instrument under Section 14(3).

The previous audit (FY ending 2017) resulted in no non-compliances, no "Opportunity for Improvement", no recommendation and two observations.

This audit (2020) has found that there has been progress in Horizon Power actions in response to the audit observations.

The 2020 audit has found that Horizon Power's systems monitoring compliance with Part 2 of the Code are in general compliance with the requirements of the Code.

The audit found no non-compliances and two Opportunities for Improvement (**OFI**) as noted in Table 9 below which provides a summary of the findings and recommendations. The table rates the various element as complying (✔), non-complying (✖), actions in progress, observations or OFIs.

Throughout the audit it was evident that staff were aware of the Code requirements and there was commitment to improvement of the system compliance.

Based on the scope of the audit defined in section 26 of the Code, in the opinion of the auditor, and as noted in the report and audit summary table, the system and processes within Horizon Power are in compliance with the requirements of Part 2 of the Code, "Quality and Reliability Standards".

Table 9: Systems Compliance Summary

Code Division, Section	Code Requirement	Evidence of System	Evidence of Process	Operation of the System ▸ Findings / Observations	Recommended Corrective Actions / Opportunities for Improvement (OFI)
	General system Systems monitoring compliance with the requirements of the Code.	✔	✔	Operation of the systems which monitor Horizon Power's compliance with the Network Quality and Reliability of Supply Code (the **Code**), satisfies the Code requirements except for findings of non-compliance reported below.	
Div 1, Sec. 5 - 7	System to monitor compliance with quality standards: voltage fluctuations, harmonics.	✔	OFI	▸ Measurements were taken however it appeared that testing procedures were not always followed and results not clearly assessed. The deployment and use of PQ Analysers and the analysis of test data is not consistently understood and not always in accordance with Horizon Power‘s manuals.	**1/2020.** (**OFI**) The deployment and use of PQ Analysers and the analysis of test data needs to be consistently understood and in accordance with Horizon Power‘s manuals.
Div 1, Sec. 8	System to monitor compliance with duty to disconnect if damage may result due to electricity supply quality.	✔	✔	Complies	

Code Division, Section	Code Requirement	Evidence of System	Evidence of Process	Operation of the System ▸ Findings / Observations	Recommended Corrective Actions / Opportunities for Improvement (OFI)
Div 2, Sec. 9	System to monitor compliance with maintaining the supply and minimise the number and duration of interruptions.	✔	✔	Complies	
Div 2, Sec. 10	System to monitor compliance with reduction of effects of any interruption and consideration of alternative supplies for proposed interruptions where it affects business or special health needs customers	✔	✔	Complies	
Div 2, Sec. 11	System to monitor compliance with length (less than 4 or 6 hours) and notifications for planned interruptions (over 72 hours prior to interruption).	✔	✔	The system relies on customer complaints to show if the process is working, failures are not reported to management due to the low number of customer complaints per year (up to a maximum of 15 in a year during the audit period). In view of the number of outages performed by Horizon Power it can be concluded that, so far as reasonably practicable, the Horizon Power systems complied with the Code requirements.	
Div 2, Sec. 11A	System to monitor compliance with:	✔	✔	Complies	

Code Division, Section	Code Requirement	Evidence of System	Evidence of Process	Operation of the System ▸ Findings / Observations	Recommended Corrective Actions / Opportunities for Improvement (OFI)
	interruption duration (less than 4 or 6 hours) when the customer is supplied by alternative means and supply has to be restored from the network, and notifications for planned interruption is provided.				
Div 2, Sec. 12	System to monitor compliance with limiting significant interruptions to small use customers (≤ 16 times or ≤ 12 Hours) and to provide remedial action where breaches occur.	✔	✔ OFI	A system is in place to monitor the number of interruptions greater than 12 hours or where the frequency of interruptions exceeds 16. Horizon Power system has the capability to identify individual customers subject to over 16 interruptions per FY and feeders subject to over 12 hours of interruption. However: ▸ the Horizon Power process does not track individual customers that are subject to over 16 interruptions per FY, or subject to over 12 hours of interruption per FY, and to date there is not a process to monitor if remediation is provided to all those customers that are likely to be subject to more than one instance of significant interruption over 10 years as required by the Code.	**2/2020.** (**OFI**) Identify and provide remediation to the individual customer(s) likely to be subjected to over 16 interruptions per FY, or an interruption of over 12 hour duration more than once in 10 years. This could be achieved by implementing remediation at relevant feeders or at other more granular level as determined by Horizon Power.

Code Division, Section	Code Requirement	Evidence of System	Evidence of Process	Operation of the System ▸ Findings / Observations	Recommended Corrective Actions / Opportunities for Improvement (OFI)
Div 3, Sec. 13	System to monitor compliance with standards for the duration of interruption of supply in particular areas (≤ 30, 160, 290 min)	✔	✔	Complies	
Div. 4, Sec. 15	Systems to monitor compliance with provisions may be excluded or modified by agreement	-	-	Not Applicable. Not performed in the audit period.	