
SECURITY OF SUPPLY – PARTICIPANT ROLLING OUTAGE PLAN (2018)

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1 GENERAL**1.1 Scope**

This plan (hereinafter referred to as 220S032) provides a means of compliance with the System Operator Rolling Outage Plan (SOROP), prepared by the System Operator and issued by the Electricity Authority. It details Powerco’s planned response to a major electricity supply shortage resulting from major generation shortages or significant transmission constraints.

1.2 Application

220S032 shall apply if the System Operator declares a shortage of electricity supply.

Note: The *Electricity Industry Participation Code 2010* details the empowering provisions of the System Operator in declaring a supply shortage.

1.3 Objective of 220S032

The objective of 220S032 is to prescribe the actions taken to:

- Reduce electricity consumption in the event of a declared shortage of supply by the System Operator.
- Comply with the requirements of the System Operators Rolling Outage Plan (SOROP).
- Comply with the requirements of the Electricity Industry Participation Code 2010 – Part 9.

1.4 Referenced Documents**1.4.1 Legislation**

Electricity Industry Participation Code 2010
Electricity Industry Act 2010

1.4.2 Industry Rules and Standards

Emergency Management Policy - (published by the System Operator on 19 June 2016).
System Operator Rolling Outage Plan.

1.4.3 Powerco Standards

Reference	Title
100R001	Risk Management Framework
160P002	Communications Policy
220F009	Switching Instruction Sheet (Planned)
220S002	Powerco Standard Definitions – Electricity Networks
220S025	Grid Emergency GXP Load Shedding Plan
310S001	Security of Supply Classification – Zone Substations
310S003	Distribution Feeder Security and Reliability Classification
310S035	Powerco Environmental Management System.
393S045	Automatic Under Frequency Load Shedding Equipment - Maintenance
393S131	Electricity Networks – Emergency Response Plan

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1.5 Definitions

Unless stated otherwise, all words and phrases used in 220S032 shall have the meanings as defined in:

- Electricity Industry Act 2010
- *220S002 Powerco Standard Definitions – Electricity Networks*
- Common English language definitions

Automatic Under Frequency Load Shedding (AUFLS)	An automatic system that sheds load from the transmission (at the distribution system level) if a significant system frequency decay is detected. Load is shed in these circumstances in order to support system frequency and stabilise the transmission system in order to avoid a complete system collapse
Distribution	Means the conveyance of electricity on lines other than lines that are part of the national grid (Electricity Industry Act 2010 definition).
Distributor	Means a business engaged in distribution (Electricity Industry Act 2010 definition).
Electricity Authority (EA)	The Electricity Authority (Authority) is an independent Crown entity established under the Electricity Act to regulate New Zealand's electricity industry and markets. The Authority regulates the operation of the electricity industry and markets, to ensure electricity is produced and delivered to all consumers in an efficient, fair, reliable and environmentally sustainable manner. The Authority also promotes and facilitates the efficient use of electricity.
EMP	Emergency Management Policy – sets out the steps the System Operator will take, as a reasonable and prudent operator, and encourage participants to take at various stages during and extended emergency (the system operator is required to prepare and publish an Emergency Management Policy under clause 7.3(3)(a) of the Electricity Industry Participation Code 2010).
Energy Efficiency and Conservation Authority (EECA)	EECA is the main body responsible for helping to deliver the Government's extensive energy efficiency agenda. Its function is to encourage, promote and support energy efficiency, energy conservation and the use of renewable energy sources.
Government Policy Statement (GPS) on Electricity Governance	A document that specifies the Minister of Energy's sets of objectives and outcomes the government wants the Electricity Authority to give effect to in relation to governance of the electricity industry, and against which the Authority must report and be examined. The Authority is required to operate in a manner that is consistent with the GPS, which outlines the government's expectations for effective operation of the electricity market and identifies three priority areas: <ul style="list-style-type: none">▪ security of supply and reserve generation▪ priority investment in the transmission grid▪ hedge-market arrangements and demand-side participation
Participant	(Extract from The Electricity Industry Act 2010)

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7 Industry participants

- (1) The following are industry participants for the purposes of this Act:
 - (a) a generator:
 - (b) Transpower:
 - (c) a distributor:
 - (d) a retailer:
 - (e) any other person who owns lines:
 - (f) a person who consumes electricity that is conveyed to the person directly from the national grid:
 - (g) a person, other than a generator, who generates electricity that is fed into a network:
 - (h) a person who buys electricity from the clearing manager:
 - (i) any industry service provider identified in subsection (2).
- (2) The following industry service providers are industry participants:
 - (a) a market operation service provider:
 - (b) a metering equipment provider:
 - (c) a metering equipment owner:
 - (d) an ancillary service agent:
 - (e) a person that operates an approved test house:
 - (f) a load aggregator:
 - (g) a trader in electricity:
 - (h) any other industry service provider identified in regulations made under section 109.
- (3) The Authority is not an industry participant, except to the extent that it performs functions as an industry service provider.
Compare: SR 2003/374 r 4

Powerco outage planning tool	Simple response planning tool aligned with feeder priorities identified in <i>220S032 section 8.3 – Methodology for Rolling Outages</i> enabling a feeder outage plan to be quickly established.
Rolling Outages	Reductions in demand or electricity consumption implemented by specified participants in order to comply with directions.
Immediate Event	Shortage of supply event that occurs with little or no warning such as a major generator failure or transmission line failure.

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Evolving Event	Shortage of supply event that evolves over time, for example low hydro lake or fuel levels.
Security of Supply Emergency	Means the energy security of supply level at which the risk of shortage is at least 10% (Definition from: Security of Supply Forecasting and Information Policy – issued by the Electricity Authority on 30 September 2010).
Specified Participant	(Definition from The Electricity Industry Act 2010) - specified participant for the purposes of Part 9,— (a) means any of the following: (i) distributor; (ii) retailer; (iii) a line owner; and (b) includes a person who uses electricity that is conveyed to the person directly from the grid.
System Operator	System operator means the person who ensures the real-time co-ordination of the electricity system, and is the person referred to in <u>section 8</u> (Electricity Industry Act 2010). The System Operator is Transpower (refer Electricity Industry Act 2010, Section 8).
Transpower	Transpower means Transpower New Zealand Limited or any subsidiary of, or successor to, that company (Electricity Industry Act 2010 definition).

1.6 Risk Identification and Management

A systematic method of identifying all risks shall be applied to all design, construction, maintenance and operation activities undertaken on Powerco's networks, generally as required by Powerco's *100R001 Risk Management Framework*. Appropriate risk elimination, mitigation or reduction methods shall be implemented before work commences on any network asset.

1.7 Environmental Considerations

Environmental considerations shall be in accordance with the requirements of *310S035 Powerco Environmental Management System*.

1.8 Copyright

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1.9 Document Owner

Contact Person: Head of Network Operations

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2 BACKGROUND

The *Electricity Industry Act 2010* requires the System Operator to manage supply emergencies. As required by the Electricity Industry Participation Code (Code), the System Operator has prepared a System Operator Rolling Outage Plan (SOROP) approved and issued by the Electricity Authority.

Transpower, the System Operator, controls the electricity transmission network and balances generation with electricity demand. Influences and potential causes of shortage of supply include:

- Low lake level, reducing hydro generation capacity.
- Generator failure.
- A fault on a critical transmission circuit.

The System Operator Rolling Outage Plan (SOROP) details the System Operator's Response to a Security of Supply Emergency and declaring a supply shortage. Guidelines for Distributors' Participant Rolling Outage Plans are also included (refer "*Guidelines for Distributors' Participant Rolling Outage Plans*" on Transpower's website at <https://www.transpower.co.nz/system-operator/security-supply/rolling-outage-plans>). 220S032 is written in accordance with the SOROP.

Upon the System Operator declaring a shortage of supply, participants are required to respond accordingly with planned measures in reducing consumer electricity consumption.

The SOROP indicates that 'Rolling Outages' are an extreme measure with potential to impact on public health and safety and the economy. Rolling outages are therefore regarded as being a 'last resort' measure taken in an attempt to balance electricity supply and demand. Electricity conservation is expected to be applied before last resort rolling outages.

Note that 'rolling outages' is a common industry term. The SOROP identifies that the term 'rolling outages' is 'a convenient way of referring to outages under the Code, even though it is acknowledged some outages may not be rolling in nature' (refer SOROP, section 1). The SOROP defines rolling outages as "reductions in demand or electricity consumption implemented by specified participants in order to comply with directions."

The System Operator has developed and published, under Part 7 of the Code, an Emergency Management Policy (EMP). The policy details the process that the System Operator will take to manage supply emergencies such as initiate an official conservation campaign and coordinate planned outages.

The EMP and SOROP indicates that the System Operator would typically determine that emergency measures are required, and declare a shortage of supply, in circumstances categorised as the following events:

- Developing Event: Evolving over time, such as low hydro generation lake levels.
- Immediate event: Sudden occurrence, such as critical transmission line or major generator failure.

The EMP details the staged approach to management of extended emergencies and implemented emergency measures such as a conservation campaign and rolling outages.

Effective management of a supply emergency situation is dependent on the role of participants. Part 9 of the Code prescribes the System Operator and Participant roles and

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obligations in the event of an emergency situation. Powerco's Participant Rolling Outage Plan is a response to such obligations.

Part 9 of the Code requires:

- Participants to develop a rolling outage plan.
- Submit the plan to the System Operator for Approval.
- Make the rolling outage plan available to the public, at no cost, on an internet site maintained by or on behalf of the participant.
- Re-submit the plan to the System Operator for approval not later than 2 years after the date on which it was last approved.

3 GENERAL PRINCIPLES

In response to a security of supply emergency situation the following general principles apply:

- Powerco will endeavour to align any response to that of key industry groups and the Electricity Authority to ensure that the collective national response to the situation is effective.
- Operations will be in accordance with applicable legislation, codes of practice and safety requirements.
- All reasonable steps shall be taken to minimise any adverse impacts derived from the situation on Powerco's business, owners and stakeholders.
- Be well prepared to act swiftly should it be necessary, to mitigate the effects of a shortage of supply situation.
- Take all appropriate action in a proactive and timely manner.
- Provide relevant details and/or measurements of the impact of actions taken to the appropriate parties.
- Powerco's operational response will be aligned with its general guidelines for responding to emergency events that affect its electrical networks – namely: *393S131 Electricity Networks – Emergency Response Plan*.
- Powerco will ensure System Operator notification of a Grid Emergency will be responded to independent of any System Operator supply shortage initiatives for an evolving or immediate event.
- Powerco will only shed hot water heating load in response to a declared Grid Emergency unless specifically directed by the System Operator to shed hot water load for the purposes of mitigating a security of supply situation.
- Powerco will ensure 32% of system load is reserved for AUFLS at all times. However, under rolling outages where demand reduces it may be possible for Powerco to include low priority AUFLS feeders in outage planning thereby preserving outages of higher priority feeders.

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4 ROLES AND RESPONSIBILITIES

Once it has been determined that rolling outages are required the roles and responsibilities shall be determined in accordance with Powerco's *393S131 Electricity Networks – Emergency Response Plan*.

393S131 is Powerco's top level document in a hierarchy of electricity network emergency response plans. It contains processes, guidelines and information to be adopted in the event of a major emergency or natural disaster that affects Powerco's electricity networks.

393S131 is based on *The New Zealand Coordinated Incident Management System (CIMS) 2nd Edition*.

A summary of the roles and responsibilities required to implement rolling outages in response to a System Operator declaration of a shortage of supply (developing event) is as follows:

4.1 Customer and Communications Strategy Manager (CCSM)

The Customer and Communications Strategy Manager will be responsible for the following activities:

- Communicate details of Powerco's Response Plan to the media and other interested parties as necessary.
- Maintain awareness of the Security of Supply situation and communicate updates to Powerco personnel (e.g. Media and Customer Experience teams) to ensure Powerco's end-customers (electricity consumers) are informed and supported as necessary.
- Manage all activities associated with the support and/or promotion of an industry initiated or System Operator initiated electricity conservation campaign.
- Communicate with public local authorities, emergency services and civil defence authorities regarding the plan.

4.2 Electricity Commercial and Retailer Manager (ECRM)

The Electricity Commercial and Retailer Manager will be responsible for the following activities:

- Communicate details of Powerco's Response Plan to the Retailers and Major load Customers.
- Liaise with retailers who identify medically dependant and vulnerable customers, to clarify changes, outage area, times, and communicate special arrangements.
- Maintain awareness of Security of Supply situation status and communicate updates to Retailers, their customers and Major load Customers as necessary.
- Manage all direct communication with Retailers and Major Customers regarding the support and/or promotion of a System Operator initiated electricity conservation campaign.
- Manage communication activities associated with the extended control of domestic hot water and thermal storage heating loads that may impact customers (via Retailers).

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NB: Powerco has no agreements with Retailers or Major Customers that exempt them from actions taken by Powerco under System Operator instruction. Powerco's PROP is a schedule of its Default Agreement with Retailers.

4.3 Head of Network Operations (HNO)

The Head of Network Operations, responsible for management of Powerco network operations centre (NOC), will be responsible for the following:

- Communicate details of Powerco's Plan to the Network Co-ordination Manager, the Operations Performance team, and the System Operator.
- Maintain awareness of Security of Supply situation status and communicate updates and potential for activating an operational response to the Network Co-ordination and Performance teams as necessary.
- Prepare and plan outages for the purpose of reducing electricity consumption (involving rolling distribution feeder outages) and communicate the plan to the System Operator.
- Maintain communication with the System Operator during planning and implementation of rolling outages and communicate the anticipated and actual effect of outages with the System Operator i.e. report Powerco's performance against savings targets to the System Operator.
- Manage the impacts, communication and subsequent restoration of a Transpower initiated or AUFLS initiated tripping event in accordance with Powerco's normal emergency response procedures.

4.4 Executive Management Team (EMT)

The Executive Management Team will be responsible for the following activities:

- Liaison with key industry participants and development of co-ordinated industry response to the particular Security of Supply situation
- Authorisation of Powerco-specific responses to the Security of Supply situation (refer *220S032 Section 5 Escalating Sequence of Activities*).

4.5 Network Co-ordination Manager (NCM)

The Network Co-ordination Manager is responsible for the day-to-day management of Powerco's network control room. In relation to a grid Emergency or a security of supply declaration, the Co-ordination Manager will be responsible for the specific following activities:

- Maintain awareness of Security of Supply situation and as required brief the Network Co-ordination team on their specific response requirements.
- Implement extended control of domestic hot water and thermal storage loads in accordance with legislative requirements.
- Ensure the Network Co-ordination team implement planned outages for the purpose of reducing electricity consumption (involving rolling distribution feeder outages).
- Monitor restoration of load following an outage and direct the Network Coordinators to maintain SO requirement to limit demand increase through time.
- Generate switching instruction sheets for rolling outages.

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4.6 Network Co-ordinator (NC)

The Network Co-ordinator is responsible for day-to-day operational activity within the Powerco network control room and in relation to in 220S032 will specifically be required to:

- Carry out specific actions and control functions as required by the feeder outages plan switching sheets.
- Report and record actions and status of the system during the implementation of a feeder outage plan.
- Implement restoration of load following an outage under supervision of the Network Co-ordination manager.

4.7 Network Planning Manager (NPM)

The Network Planning Manager is responsible for Powerco teams that include Network Planning Engineers. Depending on the circumstances, additional engineering support may be required to help develop outage plans. The Network Planning Manager shall be responsible for allocating engineering resource(s), if required, to assist the Network Operations Centre (NOC) with preparing outage plans.

4.8 Network Planning Engineers (NPE)

Network Planning Engineers shall assist the Network Operations Centre to prepare outage plans based on the amount of load required to be dropped, as directed by the Network Planning Manager.

4.9 Transmission Relationship Manager (TRM)

The Transmission Relationship Manager is responsible for staying abreast of all aspects of the on-going relationship between Powerco and Transpower. With regards to 220S032, the Transmission Relationship Manager shall be responsible for:

- Being a Managerial Contact for Transpower as required under the SOROP. This involves being a dedicated contact for administrative matters, including receiving System Operator Customer Advisory Notices (CAN) and Grid Emergency Notices (GEN) and to be a point of escalation.
- Ensuring Transpower's contact list for Powerco is up to date with the correct personnel and group email addresses.
- Ensuring there is awareness across Powerco of developing events and providing support to Powerco teams as required throughout.

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5 ESCALATING SEQUENCE OF ACTIVITIES

220S032 Section 2 – Background defines the scenarios under which this plan would be invoked. The scenario considered most likely to require rolling outages to reduce energy consumption over a prolonged period is low lake levels, reducing hydro generation capacity (i.e. a developing event and potentially an extended emergency). The System Operator continually monitors hydro risk curves and hydro storage projections. As such, there would be advanced notification of the need to invoke 220S032. The System Operator will make a supply shortage declaration when it considers there is a shortage of electricity supply or transmission capacity such that:

- (a) the normal operation of the spot market for electricity is, or will soon be, unlikely to facilitate the adjustment of supply and demand necessary to ensure that supply matches demand; and
- (b) if planned outages are not implemented, unplanned outages are likely

A supply shortage declaration is made when the System Operator considers the probability of unplanned outages occurring as a result of a supply shortage is greater than 50%. The supply shortage declaration will be revoked when the probability of unplanned outages reduces below 50%.

Notifications outlining the required responses from industry participants' will be made by way of Customer Advice Notices (CAN). These will be sent via email to the addresses in *220S032 Section 7 – Communication between System Operator and Powerco*. CANs will specify whether Powerco needs to take a specific action or simply monitor the situation.

The expected sequence of steps and corresponding actions under this scenario is described in *Figure 1* below. Roles and responsibilities for actions in each step are outlined in *220S032 Section 4 – Roles and Responsibilities*.

Figure 1

#	Step Description	Powerco Action
1	System Operator commences an official conservation campaign (OCC). NB: An OCC relates predominately to the initiation of public communications encouraging the public to reduce household demand.	Monitor situation and ensure awareness across Powerco. No restrictions instructed at this point. Align any social or mainstream media messaging with the OCC as per <i>220S032 Section 6 – Communication Strategy</i> . NB: communications outlined in this step continue throughout the following steps until the event is over.
2	System Operator issues 14 days' notice of Supply Shortage Declaration. NB: If it is not reasonably practicable to provide 14 days' notice, the System Operator will provide as much prior notice as reasonably practicable.	Continue to monitor situation. No specific actions required at this point, although future action may be required if the scenario does not change.
3	System Operator issues advance notification of savings targets to industry participants.	Begin preparing 11kV feeder outage plans based on the demand savings targets determined by the System Operator. See <i>220S032 section 8.3 – Methodology for Rolling Outages</i> for further details.

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4	System Operator issues revised savings targets to industry participants.	Refine outage plans based on latest information and any changes to the supply shortage situation.
5	System Operator makes a formal supply shortage declaration under Part 9 of the Code and the SOROP.	No specific actions required in response to the formal declaration. Continue refining plans.
6	System Operator issues final savings targets to industry participants. NB: the System Operator will endeavour to issue this 48 hours before rolling outages are due to occur.	Finalise outage plans based on the confirmed savings targets in the directive issued by the System Operator.
7	Rolling outages commence.	Implement outage plan. Report energy savings to the System Operator.
8	System Operator revokes the supply shortage declaration.	Revert to business-as-usual operations.

Figure 2 below provides an overview of an escalating sequence of actions that Powerco may undertake as part of its overall response to the prospect or actual development of a national security of supply situation. The initial industry-wide response focuses on the corrective forces applied by the market and other demand-side management techniques. As the severity of the situation increases, supply-side management techniques will become necessary. It is important, however, that these strategies are activated at the appropriate point in the escalation of an event, so that the effectiveness of the overall response is maximised.

Figure 2

Scenario	Powerco Response	Indicators	Authority to Implement	Responsibility to Implement
1	Support and/or promotion of a Public Voluntary Electricity Conservation Campaign initiated by the System Operator.	EA EMP	EMT	CCSM
2	Planned outages for the purposes of reducing electricity consumption (involving rolling distribution feeder outages, etc.)	EA EMP - SOROP	HNO	HNO
3	Transpower / System Operator Initiated event (Grid Emergency) Powerco Invoke Major Network Incident and Severe Weather Event Procedures as required.	System Operator notification	N/A	HNO
4	Automatic Under Frequency Load Shedding	Grid Emergency – UF Event	N/A	Automatic

Figure 3 below provides an overview of the restoration process following a Security of Supply or Grid Emergency event that has required supply-side management activity.

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Figure 3

Powerco Response	Indicators	Authority to Implement	Responsibility to Implement
Retract of supply shortage deceleration requiring a return to normal operations	System Operator notification	HNO	NCM
Restoration of supply to feeders	HNO	NCM	NC

6 COMMUNICATION STRATEGY

Powerco’s goal for any communications relating to a System Operator conservation campaign is to be perceived as being responsive and reliable. Powerco will work closely with retailers/generators to ensure messages to the public are consistent and fit with the overall industry and/or the System Operator objectives for the campaign.

Powerco’s communications on electricity savings will be by way of supporting prudent industry-wide measures, responding to media queries with relevant information, and ensuring stakeholders are advised of developments as they eventuate:

- Where the situation reaches Scenario 1 as described in Figure 2 above, Powerco will work closely with industry members and the Electricity Authority to ensure the messages being sent to consumers are consistent and achievable at household levels. Powerco would expect the System Operator to take the lead on publicising any campaign and provide support by way of information on network loadings (estimated load reductions/voluntary savings) and answer media queries with the relevant information and/or industry/EA contacts.
- Where the situation reaches scenario 2, 3 and 4 as described in Figure 2 above, Powerco will:
 - Issue media statements advising key media, local authorities, civil defence, emergency services and other stakeholders of measures being undertaken.
 - Powerco will follow the guidance provided by 160P002 *Communications Policy*.
 - Notify retailers of rolling outage timetables and indicative areas being affected.
 - Reproduce all media and outage schedules on Powerco web site.
 - Advise media callers to contact Transpower and/or the Electricity Authority for contextual background.

See Figure 4 below for Communications outputs for Scenarios 1 to 4.

Figure 4

Scenario	Target Stakeholders	Communication leader
1	General public, media, city, district and regional councils, MPs, Chambers of Commerce.	System Operator.
2	General public, city, district and regional councils, MPs, Transit, Police, District Health Boards, Chambers of Commerce, Media, Civil defence.	Powerco on regional specifics / System Operator on situation.
3 and 4	General public, city, district and regional councils, MPs, Waka Kotahi, Police, District Health Boards, Chambers of Commerce, Media, Civil Defence.	Powerco on regional specifics / System Operator at national level / Electricity Authority on situation.

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Communication procedures and performance shall be in accordance with Powerco's *160P002 Communications Policy*. Principles promoted in *160P002* include: trust, empathy, equity, honesty and timeliness. *160P002* includes Powerco's policy on the following:

- Media Relations.
- News Releases.
- Outages Communications.

Note: Powerco will endeavour to maintain electricity supply to customers with particular/vital health and safety needs (medically dependant or vulnerable customers), however, Powerco cannot guarantee them an uninterrupted supply. Such customers need to have an independent contingency plan to be applied in the event of an electricity outage.

Refer to *220S034 Civil Defence Liaison Standard* if the scenario results in a declaration of a Civil Emergency

7 COMMUNICATION BETWEEN POWERCO AND SYSTEM OPERATOR

The SOROP requires that Powerco provide at minimum two key personnel for the System Operator to contact about matters relating to supply shortages, supply shortage declarations, directions and rolling outages, being:

- (a) an operational contact for all operational matters (typically an Operations Manager)
- (b) a managerial contact for all administrative matters and escalation (typically a senior manager or regulatory specialist).

7.1 Communication with The System Operator – Operational Contact

The Head of Network Operations is ultimately responsible for Powerco's operational contact with the System Operator. For most circumstances Powerco operational communication with the System Operator is maintained via Transpower's Regional Operating Centres of Auckland (RCN) and Christchurch (RCS), using normal communication systems. However, Powerco will communicate direct with the System Operator for consultation purposes during planning and restoration stages of rolling outages and to communicate any unexpected change to forecast for any GXP of more than 20% for any trading period.

Powerco shall provide the System Operator with a daily week-a-head forecast of half hourly load, at each GXP, during any period in which rolling outages are scheduled.

After receiving a direction from the System Operator, Powerco will use best endeavours to-

- a) not increase or decrease its demand by more than 25 MW in any five-minute period without the System Operator's prior approval
- b) minimise the impact on frequency and voltage stability
- c) minimise the disconnection and restoration of its demand during times when demand is typically ramping up or down in the region affected by the supply shortage (for example, either side of morning and evening peaks).

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The System Operator via the Transpower Regional Operating Centres, or direct as they wish, can contact Powerco NOC Control Room using the following details;

Powerco NOC Control Room
35 Junction Street
Private bag 2065
New Plymouth 4342
Telephone:

- Eastern region: 0508333855
- Western region: 0508333856

Alternative phone: 06 769 5200
Email: NOCCO-ORDINATION@powerco.co.nz

Powerco will acknowledge receipt of a direction to save energy, as required under Section 6.13 of the SOROP. This acknowledgement will be via email sent from NOCCO-ORDINATION@powerco.co.nz to the System Operator at System.Operator@transpower.co.nz

Powerco will contact the System Operator for administration and reporting of targets using the following details:

System Operator
Transpower New Zealand Ltd
Waikoukou
22 Boulcott Street
PO Box 1021, Wellington
Email: System.Operator@transpower.co.nz
P +64 4 590 7000

7.2 Communication with the System Operator – Managerial Contact

The System Operator can contact Powerco about administrative matters and escalations using the following details:

Transmission Relationship Manager
Powerco Ltd.
35 Junction Street
Private bag 2065
New Plymouth 4342
New Zealand
Telephone: 0800 769 372
Email: TRM@powerco.co.nz

The Transmission Relationship Manager can escalate matters as required directly to the Powerco General Manager Electricity.

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8 STRATEGY

8.1 Strategy adopted for Grid Emergency during Immediate or Evolving events

Where the System Operator requests Powerco to reduce load under a Grid Emergency notice, Powerco will cooperate with the System Operator and endeavour to reduce demand utilising accepted methods of control such as exerting hot water off signal to reduce demand.

If the grid emergency is not resolved, Powerco under direction of the System Operator, will disconnect load in a controlled manner as per Powerco standard 220S025 Grid Emergency GXP load shedding plan.

If load shed is insufficient to stabilise the network, then automatic 11 kV feeder disconnection will occur via the AUFLS system.

A description of the Powerco AUFLS system is detailed in 220S032 section 10 *Automatic Under-Frequency Load Shedding*.

8.2 Strategy adopted for immediate events

If the System Operator declares a supply shortage requiring rolling outages during or immediately following a Grid Emergency or similar event requiring urgent action then Powerco will implement rolling outages as described in 220S032 section 8.3 *Methodology for Rolling Outages*.

8.3 Methodology for Rolling Outages

Plans will be prepared that meet targeted saving levels as directed by the System Operator. Powerco's Outage Planning Tool helps determine which feeders to include in rolling outage plans. The methodology of selecting feeders involves the following steps:

1. Assess feeders against the priorities outlined in the SOROP and shown in Figure 5 below (1 being the highest priority i.e. last to be included for disconnection). Lowest priority feeders are to be included first. Higher priority feeders and those feeders dedicated to supporting the Automatic Under-Frequency Load Shedding (AUFLS) system should only be included if it is otherwise impossible to meet the required energy savings targets. See 220S032 Section 10 – *Automatic Under-Frequency Load Shedding* for more information on the AUFLS system
2. Value of Lost Load (VOLL) is then applied to the feeders. VOLL is a monetised indicator of the value to customers of unserved energy. Powerco uses VOLL guidelines from the New Zealand Electricity Authority and values from surveys conducted by the Australian Energy Market Operator.
3. Load profile simulation work is then undertaken. Simulated customer load profiles are generated based on ANZIC and Registry billing codes for all Installation Control Points (ICP) connected to each feeder. The tool enables these to be applied daily or weekly at any time of the year to determine which feeders to include and the length of outage required to achieve the necessary energy savings targets.

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Figure 5

Priority	Priority Concern	Maintain Supply to:
1	Public health and safety	Critical health and disability services e.g. major hospitals, air traffic control centres, and emergency operation centres.
2	Maintaining important public services	Lifelines infrastructure e.g. energy control centres, communication networks, water and sewage pumping, fuel delivery systems, major ports, public passenger transport and major supermarkets.
3	Public health and safety	Vulnerable sectors e.g. rest homes, prisons, medical centres, schools, and street lighting.
4	Animal health and food production/storage	Dairy farms, milk production facilities, chicken sheds, cool stores.
5	Maintaining production	Central business districts, commercial and industrial premises.
6	Avoiding disruption to households	Residential premises.

NB: The above table is taken directly from Transpower’s SOROP. Priorities in this table are based on information contained in section 13 of the National Civil Defence Emergency Management Plan 2015. These priorities are intended as a guide. They do not prevent Powerco from making pragmatic decisions based on particular circumstances and knowledge of local communities.

The Head of Network Operations, with the support of a Network Planning Engineer (if necessary) will coordinate the preparation of outage plans for weekly rolling outages. The outage plans will aim to provide an estimated weekly MWh energy value that can be conserved to implement 5, 10, 15, 20 or 25% energy reduction. To aid the formation of outage plans and to improve the implementation and restoration process, feeders are put into groups where each feeder has the same priority value.

Groups are also arranged in loading priority where normal demand of each group does not exceed 25MW. Where feeder demand exceeds 25MW another group of the same priority is formed, leading to several groups of similar priority feeders.

Powerco has a feeder classification system. 220S032 section 15 *Appendix A Powerco Priority Feeder Selection Criteria* provides guidance on alignment of System Operator priorities and Powerco’s feeder classification system. Where possible the plan should ensure groups are not interrupted for longer than the durations outlined in Figure 6:

Figure 6

Priority	Outage Duration
6	10 hours
5	8 hours
4	6 hours
3	5 hours
2	3 hours
1	2 hours

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Figure 7 Weekly Target Saving Schedule

The tables below demonstrate Powerco’s ability to meet savings targets.

5% Saving Plan														
Feeder Group	Hours per Day	Days per Week	Total Savings [MWh]											
			January	February	March	April	May	June	July	August	September	October	November	December
3	3 x 3h	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	2 x 3h	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	1 x 3h	7	4438.68	4462.85	4542.08	4191.63	4742.09	4956.11	5102.99	5117.43	4991.54	4580.66	4355.16	4389.14
Total Weekly Saving [MWh]			4438.68	4462.85	4542.08	4191.63	4742.09	4956.11	5102.99	5117.43	4991.54	4580.66	4355.16	4389.14
Total Weekly Load [MWh]			89182.79	89591.66	91711.96	83964.64	94993.83	99653.67	102515.74	102653.43	100596.86	92551.23	87268.73	87848.15
Saving [%]			5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	4.9%	5.0%	5.0%

10% Saving Plan														
Feeder Group	Hours per Day	Days per Week	Total Savings [MWh]											
			January	February	March	April	May	June	July	August	September	October	November	December
3	3 x 3h	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	2 x 3h	7	2747.18	2620.59	3020.01	3317.63	3422.81	4113.54	4016.47	3680.95	3673.98	2510.38	1982.89	2482.29
1	1 x 3h	7	6152.41	6335.53	6142.95	5072.08	6067.43	5849.54	6230.22	6563.19	6364.83	6738.80	6737.13	6301.76
Total Weekly Saving [MWh]			8899.59	8956.12	9162.96	8389.72	9490.24	9963.07	10246.69	10244.14	10038.82	9249.18	8720.03	8784.06
Total Weekly Load [MWh]			89182.79	89591.66	91711.96	83964.64	94993.83	99653.67	102515.74	102653.43	100596.86	92551.23	87268.73	87848.15
Saving [%]			10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%

15% Saving Plan														
Feeder Group	Hours per Day	Days per Week	Total Savings [MWh]											
			January	February	March	April	May	June	July	August	September	October	November	December
3	3 x 3h	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	2 x 3h	7	11799.75	11868.62	12749.90	11666.60	13123.27	14274.49	14382.48	13966.95	13849.70	12147.97	11006.49	11372.43
1	1 x 3h	7	1550.32	1549.88	988.27	903.09	1109.86	653.42	984.18	1394.03	1217.44	1726.97	2068.30	1783.95
Total Weekly Saving [MWh]			13350.07	13418.50	13738.17	12569.69	14233.13	14927.91	15366.65	15360.98	15067.14	13874.93	13074.79	13156.37
Total Weekly Load [MWh]			89182.79	89591.66	91711.96	83964.64	94993.83	99653.67	102515.74	102653.43	100596.86	92551.23	87268.73	87848.15
Saving [%]			15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%

20% Saving Plan														
Feeder Group	Hours per Day	Days per Week	Total Savings [MWh]											
			January	February	March	April	May	June	July	August	September	October	November	December
3	3 x 3h	7	9013.47	8691.52	9457.74	7806.57	8093.78	8517.67	8104.78	8471.91	8882.33	8924.46	7326.31	8207.33
2	2 x 3h	7	8821.55	9223.15	8867.78	8963.70	10883.84	11377.67	12360.47	12050.91	11236.08	9580.38	10120.94	9360.73
1	1 x 3h	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Weekly Saving [MWh]			17835.02	17914.67	18325.52	16770.27	18977.62	19895.34	20465.25	20522.82	20118.41	18504.84	17447.26	17568.06
Total Weekly Load [MWh]			89182.79	89591.66	91711.96	83964.64	94993.83	99653.67	102515.74	102653.43	100596.86	92551.23	87268.73	87848.15
Saving [%]			20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%

25% Saving Plan														
Feeder Group	Hours per Day	Days per Week	Total Savings [MWh]											
			January	February	March	April	May	June	July	August	September	October	November	December
3	3 x 3h	7	21746.02	21258.67	22289.48	20164.99	21864.46	22822.29	22581.87	23331.85	23740.13	22088.64	19988.26	21151.05
2	2 x 3h	7	541.49	1120.40	627.70	806.82	1883.79	2058.03	3039.60	2318.49	1385.64	1042.31	1823.86	797.95
1	1 x 3h	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Weekly Saving [MWh]			22287.52	22379.07	22917.18	20971.81	23748.25	24880.32	25621.48	25650.34	25125.77	23130.96	21812.12	21949.00
Total Weekly Load [MWh]			89182.79	89591.66	91711.96	83964.64	94993.83	99653.67	102515.74	102653.43	100596.86	92551.23	87268.73	87848.15
Saving [%]			25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%

11kV feeders will be grouped to achieve the savings targets as directed by the System Operator. In the tables above the column “Feeder Group” refers to whether the selected feeders will have:

- one outage of three hours duration (three hours total),
- two outages of three hours duration (six hours total), or
- three outages of three hours duration (nine hours total)

As savings targets increase, multiple outages of three hours duration may be required for the selected feeders each day. In a real situation Powerco will seek feedback from customers regarding their preferences. For example, would they prefer one outage of six hours duration to two separate outages of three hours duration each (six hours total) in one day, or one outage of nine hours duration to three separate outages of three hours duration each (nine hours total)? Depending on the situation, Powerco’s preference may be to have single outages of longer duration to lower the workload for its NOC Control Room.

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For all events requiring rolling outages Powerco will invoke Powerco's 393S131 *Electricity Networks – Emergency Response Plan*.

The completed rolling outage plan and at least a week ahead estimated half hourly load forecast per GXP will be forwarded to the System Operator to agree the disconnection and restoration process (refer 220S032 section 7.1 – *Communication with The System Operator – Operational Contact*). Copy plans will also be forwarded to the Powerco Customer and Communications Strategy Manager (CCSM) and Electricity Commercial and Retailer Manager (ECRM) for onward briefing to stakeholders. A copy will also be forwarded to the Network Co-ordination Manager who will generate a switching instruction sheet (Powerco's 220F009 *Switching Instruction Sheet - Planned*). The Network Coordination Manager will ensure Network Co-ordinators disconnect load indicated on the switching instructions sheet, recording time off (and on) supply and the demand shed by each action as indicated by Powerco SCADA.

The Network Co-ordination Manager will monitor and report the effects of load shedding to the Head of Network Operations who communicates the effects of load shedding to the System Operator (refer to 220S032 section 11.2 *Reporting the Effects*)

8.4 Management of Feeder Outages

In general terms, the NOC Control Room, under supervision of the Head of Network Operations, will manage outages on a similar basis to other major network incidents and emergency situations as defined by Powerco's 393S131 *Electricity Networks – Emergency Response Plan*.

The aim of these procedures is to sustain electricity network capabilities through abnormal and emergency situations. Specifically with reference to the SOROP the procedures will establish relationship channels within Powerco and third parties and raise awareness of the proposed outages to appropriate levels of authority. It will also allow those directly involved with the implementation of rolling outages to be relieved of superfluous duties and other distractions as much as is possible so that they are able to focus on the implementation and restoration of outages.

8.5 Restoration of feeder supply

To ensure Powerco adheres to the 25MW in five minute rule proposed in the SOROP careful staged disconnection and restoration will be required when considering feeders and groups.

Time must be allowed to implement outages and to allow load to normalise on restoration. The focus here will be on ensuring sufficient time is allowed between groups of feeders to implement the outage and that when restoring supply Powerco meets customer expectations of the advertised outage timeframe.

The ability to notify affected parties should restoration time increase will be limited. Powerco will endeavour to provide regular updates during any emergency and once the situation has passed.

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9 INTERRUPTIBLE LOAD

The SOROP requires Powerco to state demand on its network that is for the provision of interruptible load (IL). IL is contracted load that can be automatically shed by industrial customers. The amount of active IL and the percentage of demand it constitutes per GXP is listed in Figure 8 below. A dash (“-”) means there is no active IL contracted at that GXP.

Figure 8

GXP	Active Interruptible Load (MW)	% of average annual demand available for interruptible load	Rolling outages may occur at this GXP (Y/N?)
BRUNSWICK	0.258	1.29%	Y
BUNNYTHORPE	1.054	2.50%	Y
CARRINGTON ST 33	0.716	2.22%	Y
GREYTOWN	-	-	Y
HAWERA	-	-	Y
HINUERA	-	-	Y
HUIRANGI	1.909	11.49%	Y
KAITIMAKO	0.506	3.31%	Y
KINLEITH 11	-	-	Y
KINLEITH 33	-	-	Y
KOPU	-	-	Y
LINTON	0.984	2.50%	Y
MANGAMAIRE	-	-	Y
MARTON	1.732	16.61%	Y
MASTERTON	1.384	6.14%	Y
MATAROA	-	-	Y
MT MAUNGANUI 33	1.759	6.30%	Y
OHAKUNE	-	-	Y
OPUNAKE	-	-	Y
PIAKO	0.744	3.92%	Y
STRATFORD	2.740	20.72%	Y
TAURANGA 11	-	-	Y
TAURANGA 33	1.111	2.53%	Y
TE MATAI	1.218	4.13%	Y
WAIHOU	0.459	2.07%	Y
WAIKINO	-	-	Y
WANGANUI	-	-	Y
WAVERLEY	-	-	Y
Eastern Region	5.797	2.33%	N/A
Western Region	10.777	4.26%	N/A
Powerco Total	16.574	3.31%	N/A

The values for percentage of average annual demand available for interruptible load is obtained by taking the amount of active interruptible load (maximum) at each GXP and dividing it by the annual average demand (MW) for that GXP.

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10 AUTOMATIC UNDER-FREQUENCY LOAD SHEDDING

10.1 Overview

The Automatic Under-Frequency Load Shedding (AUFLS) system is an automatic system that sheds load from the transmission (at the distribution system level) if a significant system frequency decay is detected. Load is shed in these circumstances in order to support system frequency and stabilise the transmission system in order to avoid a complete system collapse. The Code stipulates that where the Distributor installs an Automatic Under-Frequency Load Shedding (AUFLS) system, the Distributor must ensure that the AUFLS system operates to shed demand in two blocks of 16% of the total demand at any one point in time as specified in Figure 9 below.

Figure 9

Demand Block	Frequency to Operate	Time Delay
Block 1	47.8 Hz	0.4 seconds
Block 2	47.8 Hz	15 seconds
	or 47.5 Hz	0.4 seconds

To achieve the required demand reduction and stabilise system frequency, frequency monitoring relays, timers, and trip relays, have been installed on selected feeders throughout the Powerco network. The equipment will shed load upon the frequency decaying and remaining at or below the threshold points for the specified time period.

The feeders provided for the AUFLS system, have been selected to give the required two blocks of 16% (exclusive of controllable load) of the total GXP load for the time and seasonal period. The seasonal periods are defined as Winter Day, Winter Weekend, Summer Day, and Summer Weekend with summer being the period 20 October to 9 May and winter being 10 May to 19 October. An AUFLS event is considered to be a Grid Emergency and all feeders other than those with major hospitals or airports have been considered for inclusion in the scheme.

Further details of the AUFLS system are provided in Powerco’s *393S045 Automatic Under-Frequency Load Shedding Equipment - Maintenance*.

10.2 AUFLS in the Context of a Security of Supply Situation

Powerco will ensure any response to a System Operator instruction either as part of a Grid Emergency or System Operator notification of shortage of supply (immediate or evolving events) will maintain the levels of available AUFLS.

Powerco will either;

Exclude current AUFLS feeders from its rolling outages plan and use only the groups of non-AUFLS feeders, or

Include AUFLS feeder shedding but limit shedding to ensure, at all times, two 16% blocks are available as system load reduction is brought about by rolling outages. That is, if Powerco shed 20% of network load we would be able to shed up to 20% of AUFLS load.

Where Powerco utilises AUFLS designated feeders in rolling outages Powerco will produce new load groups. The new load groups will include AUFLS feeders and exclude higher priority feeders but will maintain as a minimum maintain 32% AUFLS control of system demand.

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11 MEASURING AND REPORTING THE EFFECTS OF CONSERVATION ACTIVITIES

11.1 Measuring the Effects

The Head of Network Operations, as indicated in 220S032 section 8.3 – *Methodology for Rolling Outages*, will monitor the effects of load reduction utilising Powerco SCADA data. However, to avoid discrepancy over the accuracy of differing data sources the System Operator will report on actual demand verses the target.

Powerco will review the System Operator report of savings and will, as required, amend rolling release plans to increase or decrease target volumes.

Where a report is not available Powerco will utilise SCADA demand profiles to provide an estimate of energy used during the outage. A comparison of the preceding week's data will be compared to measure the effectiveness of rolling outages against desired System Operator targets.

11.2 Reporting the Effects

The Head of Network Operations will make available the report identified in 220S032 section 11.1– *Measuring the Effects* to the System Operator at least on a weekly basis.

SECURITY OF SUPPLY – PARTICIPANT ROLLING OUTAGE PLAN (2018)

12 APPENDIX A – POWERCO PRIORITY FEEDER SELECTION CRITERIA

Powerco observes a security rating of its feeders. However, there is no direct comparison of Powerco security class with the SOROP priority feeder classification system. Refer the following Powerco standards:

- 310S001 Security of Supply Classification – Zone Substations.
- 310S003 Distribution Feeder Security Reliability classification.

To ensure feeders from the Powerco classification system align with that of the System Operator a new reference table has been generated to align the terminology. Refer *Figure 10* below.

Please note Power security classification provides a general classification of connected load, however, to assist in implementing 220S032 (this plan) and to align as closely as possible with System Operator guidance Powerco has also assigned a sensitivity rating to each feeder.

A high sensitivity rating (10) reflects a priority concern connected to the feeder should not be affected by rolling outages, if at all possible.

Figure 10

EA SOROP Priority	Priority Concern	Maintain Supply to:	Sensitivity rating
1	Public health and safety	Critical health and disability services e.g. major hospitals, air traffic control centres, and emergency operation centres.	F1 Sensitivity >8
2	Maintaining important public services	Lifelines infrastructure e.g. energy control centres, communication networks, water and sewage pumping, fuel delivery systems, major ports, public passenger transport and major supermarkets.	F3 Sensitivity >8 F1 Sensitivity >5 or = 8
3	Public health and safety	Vulnerable sectors e.g. rest homes, prisons, medical centres, schools, and street lighting.	F3 Sensitivity >5 or = 8 F1 Sensitivity <5
4	Animal health and food production/storage	Dairy farms, milk production facilities, chicken sheds and cool stores.	F4 Sensitivity 1-10 F5 Sensitivity 1-10 F2 Sensitivity >5
5	Maintaining production	Central business districts, commercial and industrial premises.	F2 Sensitivity <5
6	Avoiding disruption to households	Residential premises.	F3 Sensitivity ratings <5

An example might be a regional airport connected to a residential feeder (F3). By security classification alone an F3 security class of feeder may be considered for disconnection. However, by appending a sensitivity rating of 10 it would become a high priority feeder and not considered for early disconnection. Hence this feeder would become a System Operator priority 2 as indicated by Figure 10 above.

SECURITY OF SUPPLY – PARTICIPANT ROLLING OUTAGE PLAN (2018)

13 DOCUMENT REVIEW HISTORY:

Version Number	Reviewed By.	Review Date	Reason
1	R. Dixon	28/ 4/2008	First issue of document to BMS
2	P. Marsh	17/ 2/2010	Document Title changed. Significant changes to the document. This is version 2.9 which was agreed with the Electricity Commission on 16 March 2010.
3	S. Corbitt	14/11/2013	Replaced references to Electricity Commission with Electricity Authority. Changes and additional information - Sections: 2 & 3. Title changed. Updated tables in sections: 5, Appendix A, B, C. Additional definitions. Updated titles in section 4 to 'Corporate Affairs Manager' and 'Electricity Customer Relations Manager'. Minor wording changes throughout document.
4	P. Marsh S. Corbitt	26/ 1/2015	Updated to reflect System Operator control of rolling outages
5	S. Corbitt	4/10/ 2018	Updated reference to some Powerco standards. Updated reference to some Powerco roles and responsibilities – position titles. Update to some contact information.
6	M. Ogier D. Stevenson M Saghaffifar R. Reddy N. Janapriya	27/5/2022	Significant changes made following System Operator initiated desktop exercise to simulate rolling outages and to ensure compliance with SOROP. Updates include: Added definition of rolling outages as per SOROP. Roles and responsibilities – updated job titles and added new roles. Further clarification of event types (immediate vs. evolving) Updated section on Communication between Powerco and System Operator to include operational and managerial contacts with email addresses Updated Weekly Target Saving Schedule tables Removed the following appendices because they are not required for compliance and instead will be an output following invocation of this standard: <ul style="list-style-type: none"> Appendix A – Powerco feeder priority list Appendix B – Feeder groups (25MW or less) Appendix C – Disconnection and reconnection tables Removed section on public voluntary savings as it was duplicated. Changed section on “Strategy for evolving events” to “Methodology for Rolling Outages” to clarify how feeders are selected for rolling outages. Added section on Interruptible Load.

SECURITY OF SUPPLY – PARTICIPANT ROLLING OUTAGE PLAN (2018)

14 POWERCO STANDARD - DOCUMENT CHANGE REQUEST

Memo To: **Head of Network Operations.**
 Junction Street,
 New Plymouth.

Change Details:
 (Attach separate sheets
 as necessary).

**Paragraphs
 Affected:**

Priority: **Urgent** **Routine** **Low**
 (Within 1 week) (Within 12 months) (Next Review)

Submitted By (Print Name)	Date
----------------------------------	-------------

Document Change Request - Acknowledgement

Dear

Thank you for your suggestion regarding changes to the above mentioned document.

Your request has been noted and added to our works program. Should we require any additional information regarding your notification then we will be in contact with you. Thank you for your contribution to improving the quality of Powerco's documentation. Regards,

.....
Network Operations Manager

.....
Date

220S032 Ends