Northpower

Northpower
Electricity Network

Northpower Participant Rolling Outage Plan Guideline

Document summary

This Participant Rolling Outage Plan (PROP) is written to comply with:

- Part 9 of the Electricity Industry Participation Code 2010 (the Code), and
- The System Operator Rolling Outage Plan (SOROP).

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1.0 Introduction

1.1 Purpose

This plan has been prepared in accordance with clauses 9.6 to 9.8 of Part 9 of the Electricity Industry Participation Code ("the Code"), which requires each specified participant (in this case, Northpower) to prepare and publish a Participant Rolling Outage Plan ("PROP") that is consistent with the System Operator Rolling Outage Plan ("SOROP").

The PROP advises the System Operator and the public of Northpower's planned response to a declared 'Supply Shortage Declaration' if issued by the System Operator. Typical scenario where this plan might be called into effect would be during generation constraint due to a low inflow spring and/or a drought summer, when low water levels in the main hydro lakes seriously reduce electricity generation capacity or loss of multiple generation stations or transmission failures.

For avoidance of doubt, the plan is not intended to be used to recover from grid emergencies or localised disruption of supply where normal operational procedures apply.

2.0 References

Internal Reference	Details
Coordinated Incident Management Plan	This Coordinated Incident Management Plan sets out the arrangements for coordinated action by Northpower Network in response to a significant Network Incident occurring or being likely to occur. When activated, these major incidents and the response/recovery process will be managed by the Incident Management Team ("IMT").
CDEM and Lifeline Utility Requirements	This standard details Northpower's requirements as a 'Lifeline Utility' under the Civil Defence Emergency Act and the National Civil Defence Emergency Management Plan. It covers the responsibilities of a Lifeline Utility in being prepared for a Civil Defence Emergency and the response activities after a state of local emergency has been declared.
NorthAMPS	Northpower's Network Access Management, Permits and Switching functions and the processes and responsibilities for working on, or in close proximity to the Network.
Northpower's Definitions Standard	Outlines the standard definitions used in the Northpower Network.

External Reference	Details
www.ea.govt.nz	Electricity Industry Participation Code 2010
www.legislation.govt.nz	Electricity Industry Act 2010
www.legislation.govt.nz	Civil Defence Emergency Management Act 2002
www.civildefence.govt.nz	The New Zealand Coordinated Incident Management System (CIMS) 3rd Edition (2019)

3.0 Definitions

Terminology	Definition
ADMS	Advanced Distribution Management System - a software platform designed for electric utilities to manage and optimise the operation of the power distribution network.
AUFLS	Automatic Under Frequency Load Shed - An automatic protection system that disconnects loads during severe under-frequency events to stabilise the power grid and prevent blackouts.
The Code	Electricity Industry Participant Code 2010
Electricity Act	Electricity Industry Act 2010
Authority	Electricity Authority
CDEM	Civil Defence Emergency Management
Feeder	A feeder in an electrical distribution network is a power line that transports electricity from a substation to distribution transformers or points, delivering power to local areas for further distribution to cutomers.
GXP	Grid Exit point - is the physical connection point where electricity leaves the national transmission grid and enters a local distribution network, serving as the interface between Transpower's high-voltage system and Northpower's network.
PROP	Participant Rolling Outage Plan (this plan)
SOROP	System Operator Rolling Outage Plan
Rolling Outages	Planned electricity disconnections spread over different parts of the network at differing times to avoid prolonged outages at any one location.
Security Coordinator	The person responsible for system security at the System Operator
GEN	Grid Emergency Notice
NOC	Northpower Operations Centre – Control room that monitors, controls, and coordinates the real-time operation of an electricity distribution network to ensure safe, reliable, and efficient power delivery.

4.0 Background

4.1 Electricity Authority

The Electricity Authority (the Authority) is a Crown entity set up under the Electricity Industry Act 2010 to oversee New Zealand's electricity industry and markets.

In accordance with the Code the Authority must approve the System Operator Rolling Outage Plan (SOROP) submitted by the System Operator.

4.2 Transpower

Transpower is a State-Owned Enterprise, tasked with owning and operating New Zealand's National Grid - the network of high voltage transmission lines and substations that connect areas of generation with distribution lines networks such as Northpower.

As System Operator, Transpower manages the real-time operation of New Zealand's electricity transmission system. It keeps the right amount of energy flowing to match generated supply with demand.

4.3 Northpower

Northpower operates and maintains electricity distribution network in the Whangarei and Kaipara region with more than 65,000 connected customers.

5.0 Authorisation to Receive Direction and Activate

5.1 Range of Events

Events that could lead System Operator to make a supply shortage declaration can in general terms be categorized as:

- **Developing Events** – Events that evolve over time, for example low hydro lake or fuel levels.
- **Immediate Events** – Events that occur with little or no warning, usually as a result of a transmission line or major generation failure.

5.2 Major Incident

As per Northpower's *Coordinated Incident Management Plan*, both events, developing events and immediate events will be classified as a major incident and Northpower Network management team will activate Incident Management Team structure as appropriate and will manage the event accordingly.

Communication with retailers, civil defence, local government authorities and other stakeholders will be carried out in accordance with normal notification procedures. Northpower has Default Distributor Agreement with retailers to ensure that Northpower has ability to manage load as per direction from System Operator.

5.3 Roles and Responsibilities

The following Northpower personnel who will be expected to receive the instructions, and to activate the PROP, are:

Role	Responsibilities
Receive communication from System Operator	Chief Operating Officer - Network General Manager - Network Operations and DSO
Implement this plan	General Manager - Operations and DSO
Preparation of load shedding schedules	Control Room Manager
Customer notification	General Manager - Customer and Operational Excellence
Reporting to System Operator	General Manager – Network Operations and DSO Head of Commercial and Regulatory
Reporting to media, public agencies	General Manager - Customer and Operational Excellence
Reporting to CDEM and Lifelines	General Manager – Network Operations and DSO
Weekly savings reporting	Control Room Manager
Revoking rolling outages	Chief Operating Officer - Network General Manager – Network Operations and DSO

6.0 Communication with the System Operator

The System Operator will contact Northpower using the following details for both operational and managerial matters:

Northpower Limited
28 Mt Pleasant Road
Raumanga
Whangarei 0110
Email: control@northpower.com
Phone: +64 9 430 1778 (preferred)
Phone: +64 9 438 9811 (as a back-up)

Northpower will contact the System Operator for administration purposes (including reporting performance against targets) using the following details:

Transpower System Operator
Waikoukou
22 Boulcott Street
Wellington
Email: system.operator@transpower.co.nz
Phone: +64 4 590 7000

7.0 Actions for Immediate Events

7.1 System Stability

Transpower, as the System Operator, is required to keep enough reserve generation to cover the risk of the largest connected generator tripping. They are also required to keep the system frequency at 50Hz. If a large generator trips, it may cause a reduction in frequency which if not rectified can result in other generators tripping and could lead to cascade failure of the transmission system.

As reserve generation cannot immediately pick up the load of a disconnected generator, an immediate load reduction is required until additional generation can pick up load. Automatic load shedding groups reduce load in stages until the frequency stabilises.

7.2 Reserve Market

Generators and load users with interruptible load such as distribution networks may offer in reserve capacity to cover the risk of the largest generating unit or a critical transmission line tripping. The ability to do this is affected by the number of frequency capable relays installed and the likely revenue stream from the market less the compliance costs of participating in the reserve market.

7.3 Disconnecting Customers

7.3.1 Automatic Under Frequency Load Shedding (AUFLS)

AUFLS is a safety system designed to protect New Zealand's electricity grid from collapsing during major disturbances. If the system frequency drops too low and the normal Reserve Market response isn't enough, AUFLS automatically disconnects parts of the electricity load in stages. This helps restore balance between supply and demand and prevents a nationwide blackout.

Each distribution network company, unless exempt, must always have four demand blocks available for shedding via automatic under-frequency relays. Each block must disconnect at least the specified percentage of pre-event demand.

Northpower's AUFLS reserve load is pre-configured and controlled by frequency-sensitive relays hard-wired to 11 kV feeder tripping circuits at Zone Substations:

Block	Load to be Disconnected	Activation Conditions
Block 1	10%	• Within 0.3 sec when frequency ≤ 47.9 Hz
Block 2	10%	• 15 sec after frequency ≤ 47.9 Hz • Within 0.3 sec when frequency ≤ 47.7 Hz
Block 3	6%	• 15 sec after frequency ≤ 47.7 Hz • Within 0.3 sec when frequency ≤ 47.5 Hz
Block 4	6%	• 15 sec after frequency ≤ 47.5 Hz • Within 0.3 sec when frequency ≤ 47.3 Hz • Within 0.3 sec if frequency is falling at 1.2 Hz/sec and is below 48.5 Hz

7.3.2 Manual Shedding

If AUFLS Blocks 1-4 tripping fails to stabilise frequency the System Operator will give direction for more load to be shed. Emergency load shedding feeders are listed in ADMS.

Once the frequency has stabilised the System Operator will advise the Northpower Network Operations Centre when load can be restored.

7.4 Supply Restoration

Disconnected load must be restored in conjunction with the System Operator. This is to prevent overloading distribution network or the transmission grid and/or creating further instability.

7.5 Transmission Grid Emergency

The System Operator may request Northpower to reduce load under a Grid Emergency Notice (GEN). Northpower will shed all controllable load, the System Operator will give direction, if more shedding is required, the System Operator will instruct the Grid Owner to further disconnect load by shedding feeders to provide a nominated demand reduction. Northpower will ensure to revise its interruptible load bided into the market which may eventually become unavailable.

If an Immediate Event is in place, the grid emergency will take precedence. If the System Operator declares a supply shortage during a Grid Emergency, then Northpower will respond by implementing rolling outages as described in the following “Developing Events” section.

8.0 Actions for Developing Events

If the System Operator requires a load reduction for a planned Developing Event, Northpower must reduce supply to meet the energy saving targets. The targets are likely to be in the form of a weekly energy savings target that is reviewed weekly.

8.1 Declaration of a Developing Event

The System Operator will endeavour to provide:

- At least 14 days' notice of a supply shortage declaration, and
- At least nine (9) days' notice of a direction containing a savings target. This notice will include the times and dates the savings target will likely apply.

If the System Operator declares a developing event, they will:

- Determine the energy savings target to be enforced for a specific region for a specified timeframe, and
- It may also decide to communicate the need to conserve electricity and warn about pending rolling outages through a coordinated media strategy.

Under these circumstances, any public messages/statements from Northpower will be coordinated with the System Operator. Northpower will broadcast messages via its website, social media and/or telephony (faults line) to inform the public of current circumstances and will include any System Operator messages as practicable.

8.2 Acknowledgment of Receipt of a Direction

Northpower will acknowledge receipt of a direction to save energy, as required under Section 6.13 of the System Operator's PROP by email to the System Operator at system.operator@transpower.co.nz.

8.3 Criteria For Rolling Outages

To ensure public health and safety is preserved and costs to the economy are minimised, the following table shows the desired criteria for selecting rolling outage feeders to be included in rolling outages. Rolling outage feeders will all contain a variety of customers. The priority for each rolling outage feeder will be based on the priority ratings assessed for the connections within each feeder.

Loads with the lowest priority (6) will be interrupted before higher priority loads (1). Some feeders serve various customer types, but feeder priority is typically based on the predominant customer type.

8.3.1 Table 1 Priority Loads

Priority	Priority Concern	Maintain Supply To
1	Highest priority – Critical Lifelines (Public Health & Safety)	Major hospitals, air traffic control centres, emergency operation centres
2	Important public services	Energy control centres, communications, water & sewage pumping, fuel delivery, ports, passenger transport, major supermarkets
3	Public health & safety	Minor hospitals, medical centres, schools, traffic lights, street lighting
4	Animal health & food production	Dairy farms, milk plants, chicken sheds, cool stores
5	Maintaining production	Commercial & industrial premises
6	Lowest priority – Residential load	General households

8.3.2 Vulnerable Customers and Priority Sites

It is not possible for Northpower to prevent rolling outages affecting individual vulnerable customers and priority sites. In addition to the prioritisation of rolling outage feeders Northpower will:

- Provide information in its public notices and on its website alerting vulnerable customers to the risks, and
- Request that the Retailer consider individually notifying their vulnerable customers.

8.3.3 Retailer Agreements

Currently Northpower do not have any contractual restrictions with retailers or consumers which would adversely affect Northpower's ability to comply with System Operator directions.

8.3.4 AUFLS Requirements

The level of AUFLS during rolling outages must be maintained. The selection criteria for feeders included in the AUFLS scheme are similar to those used for rolling outages, as outlined in Table 1. As a result, AUFLS load blocks primarily consist of lower priority load categories.

Northpower's AUFLS network reserve load is configured in advance and managed by frequency-sensitive relays directly connected to 11kV feeder tripping circuits at Zone Substations. These loads cannot be reassigned during planned rolling electricity outages. To maintain AUFLS during rolling outages, Northpower would need to rotate outages across AUFLS feeders to ensure that the requirement to have 32% of total load (excluding the largest industrial site) covered by AUFLS is met.

8.4 Rolling Outages Strategy and Methodology

When it comes to rolling outages, there is always a chance that due to a positive change in circumstances (e.g., steady rain in key catchment areas), the need for them will cease to exist sooner than originally expected. Northpower will utilise the ADMS system to balance Impact to customers and avoid a situation where some customers are repeatedly selected for interruption.

All 11kV feeders within Northpower's network are catalogued, prioritised, and grouped in the Emergency Load Shed Priority List maintained in ADMS. Feeder prioritisation is based on the composition of load, aligned with the six priority groupings outlined in Table 1. A weighted scoring system is applied, recognising that most feeders serve mixed-use areas. For example, suburban feeders may include residential loads (Priority 6) alongside essential services such as supermarkets or medical centres.

The Emergency Load Shed Priority List assigns objective 'shed' and 'restore' rankings to each feeder using a weighted formula incorporating the following elements:

- Northpower Ripple Plant load control sites
- Northpower key communication sites
- Northpower capacitor banks
- Northpower local service supplies (zone substations and communication sites)
- CDEM-designated facilities (medical, airport, sanitation, water supply)
- Fault restoration categories (commercial/industrial)
- CDEM restoration categories (dense urban)
- Dairy farm density
- Residential predominance

Feeders are grouped for scheduled disconnection based on these rankings, with constraints designed to minimise disruption to critical industries and communities. Under normal operating conditions, outage durations and scheduling are sensitive to customer needs. However, during emergency energy-saving operations, these constraints may be relaxed to achieve required savings, resulting in broader and longer outages as dictated by operational data.

Table 2 provides an illustrative guide to the potential frequency and duration of rolling outages across priority groups, aligned with various energy savings targets. It is important to note that a 4-hour outage does not equate to 4 hours of energy savings due to post-outage consumption rebound (e.g., refrigeration, water heaters).

8.4.1 Table 2 – Savings plan

Saving target	Highest priority to remain connected			Lowest priority to remain connected			Target MWh per week
	Priority 1	Priority 2	Priority 3	Priority 4	Priority 5	Priority 6	
5%	-	-	-	-	5d x 4hr	7d x 4hr	700
10%	-	-	3d x 4hr	5d x 5hr	6d x 6hr	7d x 6hr	1400
15%	2d x 4hr	3d x 4hr	5d x 4hr	7d x 5.5hr	7d x 7.5hr	7d x 9hr	2100
20%	4d x 2hr	5d x 3hr	7d x 4hr	7d x 6hr	7d x 9hr	7d x 12hr	2800
25%	5d x 4hr	6d x 4hr	7d x 5hr	7d x 10hr	7d x 12hr	7d x 15hr	3500

Table 2 Possible frequencies and duration of rolling outages

8.4.2 Operational Coordination and Performance Monitoring

Load reductions and restorations will be coordinated in real time with the System Operator (Security Coordinator) prior to implementation. This includes meeting any reasonable requirements to limit the rate of disconnection. In the absence of an alternative agreement, the rate of disconnection and restoration will be limited to no more than 25 MW per 5-minute period. Northpower Network Controllers carrying out switching are to monitor their activities in relation to this limit.

Instantaneous electricity reduction will be achieved by switching off groups of feeders. Based on the prioritisation outlined in Table 1 and illustrated in Table 2, Northpower will develop a confidential outage management plan. This plan will detail rolling electricity cuts across a mix of priority groups, designed to minimise disruption and align with prior communications with critical organisations, industry stakeholders, and the System Operator.

For reasons of security and public order, the specific rotation details will not be publicly disclosed.

Northpower will use best endeavours to minimise the impact on:

- Frequency and voltage stability, and
- Disconnection and restoration during demand ramp-up or ramp-down periods

During any period of rolling outages directed by the System Operator, Northpower (NOC) will provide:

- A half-hourly load profile for each day of the following week
- The corresponding baseline profile from the same weekdays 52 weeks prior
- A daily report including arithmetic comparisons and commentary
- A week-ahead plan (target profile + adjustments)

Any expected change exceeding 20% for any half-hour period at any grid exit point will be reported to the System Operator as soon as reasonably practicable.

8.4.3 Savings Targets

The system operator will set savings targets as follows:

- The system operator will determine the total demand or electricity consumption savings required in the region affected by the supply shortage. The savings targets will be set to the minimum necessary so that there is no extended period of unplanned outages forecast at any GXP within the next 35 days.
- The system operator will determine any energy savings target for Northpower Network as a percentage of the specified participant's forecast electricity consumption over the next 35 days. The system operator will generally set the same energy savings target in percentage terms for all specified participants in the affected region. Northpower Network may provide feedback by email to the system operator on their 35-day forecast electricity consumption within 48 hours of receipt of any such forecast if they believe the forecast is inaccurate.
- A savings target will typically be an energy savings target per week, updated weekly on a rolling basis. In some cases (for example, an immediate event limited to a particular area) a savings target in the form of a capacity savings target may be applied for particular peak periods in addition to, or instead of, a savings target in the form of an energy savings target.

8.4.4 Grid Exit Points (GXP's) and Rolling Outages

Rolling outages will be implemented on 11kV feeders from Northpower Zone Substations, rather than on the 33kV sub-transmission from GXP's. The allocation of energy savings to particular GXP's will be reported on.

GXP	Rolling Outage may occur (Yes/No)
Bream Bay (BRB)	Yes
Maungatapere (MPE)	Yes
Maungaturoto (MTO)	Yes

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8.5 Communication With System Operator

All communications with the System Operator will take place between Northpower's Network Control Centre (NOC) and Transpower's National Grid Operating Centre (NGOC) using standard communication channels.

Before notifying and implementing a rolling outage plan, Northpower will work with the System Operator (Security Coordinator) to agree on the process for load shedding and restoration. This may include applying a MW load cap during the restoration phase.

Unless otherwise agreed with the System Operator, load shedding and restoration will be limited to no more than 25 MW every 5 minutes.

Northpower will confirm receipt of any direction from the System Operator to save energy by replying to system.operator@transpower.co.nz.

8.6 Communication Strategy and Notification

In the case of a Developing Event, Northpower anticipates receiving advance notice from the System Operator that it may need to make a supply shortage declaration and direct rolling outages. Ideally, this would be several weeks in advance of any direction to implement this plan and provide an opportunity for Northpower to communicate with the Northland public in order to mitigate the need for, and the effect of, widespread electricity cuts on a regular basis. Northpower would initiate some or all of the following actions:

- Media liaison during the run-up period to inform and educate the public.
- Northpower Network staff contact critical, sensitive and important customers, emergency services, local authorities and civil defence to explain how our outage plan affects them.
- As the plan is being called into action, the General Manager- Customer & Operational Excellence would:
    - Create a banner on the home page of Northpower's website, linked to further details on our plan and specific advice.
    - Co-ordinate our communications with electricity retailers who in turn should communicate directly with consumers (particularly vulnerable consumers) via telephone, electricity bills or flyers, as appropriate.
    - Issue a media release to local papers, radio stations and social media.
    - Place adverts in local papers and on social media.
    - Produce a flyer and/or letter for distribution to customers
    - Email those customers affected directly where email addresses are available.
    - Include electricity saving tips and current information on social networking website.
    - Include appropriate pre-recorded messages on the 0800 104040 'Faults Line'
    - Use the radio adverts to notify of outages and electricity saving measures and to go to our website for further information.

In the case of an Immediate Event, advance notice will not be possible, but Northpower will take steps to advise the public, electricity retailers and other agencies as soon as feasible.

8.7 Coordination with Grid Emergencies

If the System Operator declares a grid emergency during a Developing Event, the grid emergency will take priority. As water heating load generally would not be used to reduce load in a Developing Event, Northpower would have water heating load available for load reduction when required for the grid emergency. This load would be shed, the System Operator advised and, if more shedding is required, the System Operator will instruct the Grid Owner to further disconnect load. The rolling outage feeders may have to be rearranged to comply with the grid emergency. After the grid emergency is cancelled the rolling outages pattern would continue.

8.8 Target Monitoring

To avoid discrepancy over the accuracy of different data sources, the System Operator will report on actual energy usage versus the target.

For load shedding to a weekly target, the Network Controller Manager will monitor the System Operator report of our savings results to our target and together with the GM Network Operations and DSO and Head of Commercial and Regulatory, adjust as required future load shedding to increase or decrease the amount of rolling outages and enable the weekly target to be met.

The GM Network Operations and DSO will be responsible for daily and weekly reporting to the System Operator of consumption relative to target levels. The GM Network Operations and DSO will also be responsible for providing to System Operator the predicted load for the next week on a seven-day rolling basis. This prediction will be by GXP for each half hour.

8.9 Log of Rolling Outages

Northpower Network Controllers will generate a Rolling Outage Log Report, which is already preconfigured in the ADMS, to record the times of disconnection and reconnection for all feeder interruptions (as shown in Table 3).

8.9.1 Table 3 – Rolling Outage Log

GXP	Feeder Code	Load (amps)	No. of Customers	Time Off	Time On	Duration	Notes

8.10 Revoke Declaration of Supply Shortage

To revoke their Declaration of Supply Shortage, the System Operator should notify the named key network personnel (see under ‘Authorisation to receive direction and activate’).

Upon receipt of notification, the System Operator will be issued with an acknowledgement from Northpower, copied to all (other) key personnel.

Northpower Network Controllers will then cancel the planned rolling electricity outages and restore all supplies in a controlled way in consultation with the System Operator, using their normal operating procedures and guidelines.

9.0 Document Review History

Version Number	Date	Revision Notes (reason for change)
1.0	07/05/2010	Participant Outage Plan (“POP”) approved by the former Electricity Commission on 7 May 2010.
2.0	16/12/2014	Northpower Participant Rolling Outage Plan (“PROP”) is derived from the existing Northpower PROP dated 1 December 2014, which was approved by the System Operator on 16 December 2014
3.0	9/03/2021	Updated and align with Northpower Coordinated Incident Management Plan.
4.0	03/07/2022	Updated based on feedback from System Operator (e.g., affecting to sections 5.2, 10 and 14)
5.0	16/06/2023	2 yearly review – Operations team Replaces: • NOP.G.13.02 Northpower Participant Rolling Outage Plan Guideline (due to ID Code change in File Name).
6.0	30/09/2025	2 yearly review – Changes made from SOROP review