

Northpower – Participant Rolling Outage Plan

(Derived from the PROP which was approved on 16 December 2014)
Draft update on 6 June 2017 – submitted for approval

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1. Purpose

This plan has been prepared in accordance with the requirements of 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”) which 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. A foreseeable scenario where this plan might be called into effect would be during a low inflow spring and/or a drought summer, when low water levels in the main hydro lakes seriously reduce electricity generation capacity and action needs to be taken in order to conserve energy.

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. Approval Status

This updated 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. The 2014 PROP was derived from the Participant Outage Plan (“POP”) approved by the former Electricity Commission on 7 May 2010.

Clause 9.13 of the Code requires participants to keep the PROP under review and to resubmit the PROP for approval by the System Operator at least every two years.

3. Authorisation to receive direction and activate

Northpower’s primary point of contact in relation to this plan is: -

Network Commercial & Operations Manager
Northpower Limited
28 Mt Pleasant Road
Raumanga
Whangarei 0110

Tel: 09 430 1803, Fax 09 430 1804

The following Northpower personnel are authorised to put this plan into operational effect upon receipt of written notification from the System Operator: -

- General Manager Network
- Network Commercial & Operations Manager
- Network Engineering Manager
- Network Operations Manager

Written communication from the System Operator (email or fax) must stipulate: -

- Declaration of Supply Shortage
- Reason / Circumstances
- Public Message (optional)*
- Issuing Authority Reference
- Named Authority & Signature

*If the System Operator makes a Supply Shortage Declaration, 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 and/or telephony (faults line) to inform the public of current circumstances and will include any System Operator messages as practicable.

4. Key Personnel

General Management – General Manager Network

Supported by:

Network Commercial & Operations Manager and support teams
Network Engineering Manager and engineering team

Operations – Network Operations Manager and System Control Operators

Supported by:

Network Engineering Manager and engineering team

- Implement and oversee the execution of this plan
- Liaise with police, civil defence, local authorities, etc
- Maintain accurate outage messages on Northpower's faults Line (0800 10 40 40)

Commercial and compliance - Network Commercial & Operations Manager and Commercial team

- Liaise with large industrial sites and critical infrastructure owners, keeping them informed
- Report performance against savings targets to the System Operator

Media and PR – Public Affairs Manager - Communicate with the media

Upon receipt of written notification it is incumbent on the initiator of this procedure to contact the originator at the System Operator to verify the instruction, then send him/her written acknowledgement of that instruction, and copy to all the other Northpower staff named above.

5. Implementing rolling outages

This part of the Participant Rolling Outage Plan specifies the process for establishing how particular target levels of savings would be achieved for different types of events, including how 5%, 10%, 15%, 20%, or 25% savings targets might be achieved. Achieving up to 25% savings within the Northpower network poses particular problems because a significant proportion of the load is supplied to very

large industrial sites. In the year to 31 March 2017, large industrial sites consumed nearly 50% of the total annual supply from the Northpower network. Applying the priority criteria from the SOROP indicates that these very large industrial loads need to be given highest priority. The requirement to maintain AUFLS means that the 25% savings target would then need to be made by rolling outages across approximately 30% of Northpower customer load and it would be necessary to cut most rural and residential customers off for most of the time.

Energy supplied by the network (excluding the single largest industrial site) is, on average, around 14,000 MWh/week. Target energy savings are in five blocks of 5%, ranging from 700 MWh/week (MAX) to 3,500 MWh/week (MAX). An illustration of the likely impact on customers in order to achieve the prescribed energy savings under this plan is given in Table 2 on page 8.

Before considering implementing rolling outages, it is prudent to consider and publicise energy saving actions that would have relatively little impact (when compared to lengthy electricity outages over widespread areas) including: -

- Controlled hot water would be controlled more aggressively;
- Switch streetlights off at (say) midnight;
- Use available generation wherever possible (hospital, etc) – by prior agreement, and funded by the electricity retailers;
- Cut production or output; and
- Other measures? (all measures to be communicated in advance via media)

All Northpower 11kV feeders are listed, prioritised and grouped in an internal online tool [*Network Reports/SCADA/Feeder Classification*] which was compiled by Northpower Network Engineering personnel and is accessible to the Network System Control Operators for reference and for use with this procedure. The Civil Defence / Northland Utilities 'Lifeline' Contacts List is also accessible to enable Northpower planners and operators to maintain contact with key personnel at other organisations.

The prioritisation of 11kV feeders takes into account the composition of load on each feeder according to the priority groupings in Table 1 on the following three pages. A weighting system is used because few feeders are entirely residential (Priority 6) - for example: supermarkets and medical centres are located in suburban areas for the benefit of the residents in those areas.

TABLE 1 – Grouping of Load Types in Terms of Priority

The priority groupings in this table are from clause 6.8 in the System Operator Rolling Outage Plan (SOROP) dated 19 June 2017 which are referenced to the National Civil Defence Emergency Management Plan 2015 and to section 13 of the Guide to the national CDEM Plan 2015.

Caution: The composition and numbering sequence of the priority groups in this table and the SOROP differs from those used in the Manual Load Shedding Plan.

Priority	Priority Concern	Maintain Supply to:
<p>1</p> <p>Highest priority to remain connected</p>	<p>Critical Lifelines (Public Health and Safety)</p>	<p>Major hospitals, air traffic control centres, and emergency operation centres.</p> <p>These facilities are protected by high priority usage supply agreements. However they generally have the means to support themselves and will not be exempt from planned measures to reduce consumption from the grid. In the event of a need to reduce electricity consumption, it may be feasible to use their local electricity generation plant for reasonable periods of time (yet to be agreed) in order to ease consumption from the grid.</p>
<p>2</p>	<p>Maintaining important public services</p>	<p>Energy control centres, communication networks, water and sewage pumping, fuel delivery systems, major ports, public passenger transport and major supermarkets.</p> <p>Business and services that offer critical services that are highly dependent on continuous electricity supply will, more likely than not, maintain uninterruptable power supplies and have a means of local generation to continue limited operations.</p> <p>Northpower has a list of such organisations and will contact each one individually to discuss foreseeable options prior to imposing electricity cuts that might otherwise cause problems.</p> <p>Facilities such as Council-operated wastewater pumping stations with minimal storage, and where no backup generation is available, must also have a 'Plan B' should prolonged electricity outages be necessary to meet electricity reduction targets under this plan</p>

Priority	Priority Concern	Maintain Supply to:
3	Public health and safety	<p>Minor hospitals, medical centres, schools, and street lighting.</p> <p>Medical centres, where no acute / critical care procedures are affected by loss of electricity, and schools, should be able to withstand a normal rotation of electricity outage and will not be exempt from electricity cuts. In the event that rolling scheduled electricity cuts become unavoidable, Northpower will inform all schools and minor hospitals in writing and will aim to give at least 7 days advance notification of the high risk of electricity cuts.</p> <p>Traffic lights will be inoperable during area-wide electricity outages; therefore the police will receive notice of planned outages likely to affect traffic lights so that they can plan accordingly.</p> <p>Street lighting is something which the community might have to manage without during area-wide electricity outages, and there might also be a need to reduce the night hours of street lighting across the entire network, as an energy saving measure. This might mean street lights routinely going off at say, midnight, or 1 am. The public will be notified of these intentions by media in advance of implementation.</p>
4	Animal health and food production and storage	<p>Dairy farms, milk production facilities, chicken sheds and cool stores.</p> <p>Northpower is very mindful of the requirements for electricity in dairy production, and the disruption to process plant if electricity fails for lengthy periods. Farms and processing facilities will not necessarily be exempt from electricity cuts, however extra consultation, planning and communication with farmers and processing facilities will take place to try to minimise wasteful disruption, and to reduce the risk of suffering being caused to livestock. For example, where practical, rolling cuts in rural areas will be timed outside normal milking times.</p>
5	Maintaining production	<p>Commercial and industrial premises.</p> <p>There may be times when production will be interrupted and this might be unavoidable if rolling electricity outages affect an entire area. Northpower will communicate plans and intentions to conserve energy via the media, and will take extra special care to communicate with, and plan around, critical industrial processes where unplanned interruption is likely to cause disproportionate financial damage and hardship to companies.</p>

Priority	Priority Concern	Maintain Supply to:
<p>6</p> <p>Lowest priority to remain connected.</p> <p>First choice for disconnection</p>	<p>Avoiding disruption to consumers</p>	<p>Residential premises</p> <p>The general public at home (and at schools and in the workplace) will be encouraged to take steps to withstand periods without electricity. Specific guidance will be published in newspapers prior to electricity cuts being implemented as a means of conserving energy.</p> <p>These statements will include such things as: -</p> <ul style="list-style-type: none"> • Everyone must play their part • Energy saved will reduce the frequency and duration of electricity cuts • Turn down thermostat settings on heating appliances by a couple of degrees • Switch off unnecessary lights and appliances • Occupy less rooms in order to conserve heat and light • Reduce the number hours watching TV • Consider retiring to bed earlier • Have a supply of torches and fresh batteries on hand • Consider having alternative means of cooking • Fridges and freezers maintain their cold state best if left closed • Refrigerated food shouldn't be affected by just a few hours of electricity outage as long as the doors remain closed • Ensure alarm systems have good backup batteries (they often need replacing every 3 to 5 years, so it's worth having them checked) • Think about personal safety when out late at night if streetlights are being switched off early to conserve energy • Ensure cars have plenty of fuel in the tank (petrol stations often can't serve petrol during electricity cuts) • Keep a supply of convenience meals and essential supplies at home in case electricity cuts disrupt retail stores • People with medical problems requiring use of electrical equipment (oxygen concentrators, etc) must have a "Plan B" to cope without electricity for several hours • etc

Table 1 Priority Grouping of Load types

6. Translating Savings Targets into an Operational Plan

The internal online tool compiled by Northpower Network Engineering personnel [*Network Reports/SCADA/Feeder Classification*] derives the objective ‘shed’ and ‘restore’ priority rankings for all feeders based on a weighted formula comprising the following elements:

- Do Not Shed (essential supplies, including major ripple-injection plants)
- Critical Sites – Criticality as defined by Northland ‘Lifelines’ group
- Critical Sites - Restoration Priority
- Industrial
- Large Commercial
- Small Commercial
- Dairy Farms
- Domestic

Relating this to the six groups of load types in terms of priority (Table 1), feeders have been grouped for scheduled disconnection and each group has constraints intended to minimise the impact to the industry/community that is fed by particular supplies. In normal times, constraints and durations of cuts would be sensitive to the particular needs of (the majority of) customers affected by disconnection. In the exceptional operating regime anticipated in order to achieve the required energy savings, normal constraints and considerations will be largely ignored, and then it comes down to making the cuts as widespread and lengthy as is necessary based on operational data.

Table 2 is an illustration of possible frequencies and durations of rolling outages for the priority groupings (from Table 1) for the various levels of savings targets. It is important to note that an outage lasting 4 hours will not save the equivalent of 4 hours of normal electricity consumption because some appliances including fridges/freezers, and activities such as cooking, will simply “catch up” once the supply is restored.

TABLE 2 – An illustration (number of days in week) x (hours duration)

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

7. Coordination with the System Operator

Load reductions (and restoration) will be coordinated with the System Operator (Security Coordinator) in real time, before rolling outages are implemented and before restoration is commenced (including meeting any reasonable requirements of the System Operator to limit the rate of disconnection). In the absence of an alternative agreement with the System Operator, the rate of disconnection and restoration of load would be limited to no more than 25 MW per 5 minute period.

Instantaneous electricity reduction will be achieved by switching off groups of feeders.

From the prioritisation of feeders detailed in Table 1 and illustrated in Table 2, Northpower would produce a confidential outage management plan for rolling electricity cuts across a mix of the priority groups in a way that was designed to minimise disruption, and which conformed to prior communications with critical organisations, industry and the System Operator. For security and public order considerations, the detail of these rotations would not be publicly disclosed.

8. 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.

9. Automatic Under-frequency Load Shedding (AUFLS) Requirements

Northpower's AUFLS network reserve load is pre-configured, operated by frequency-sensitive relays hard-wired to 11kV feeder tripping circuits at Zone Substations. These cannot be reassigned as part of planned rolling electricity outages. In order to maintain AUFLS when implementing rolling outages, Northpower would need to roll outages across AUFLS feeders to the extent that it remains possible to meet the requirement to have 32% of total load (net of the largest industrial site) covered by AUFLS. This would mean that few, if any, AUFLS feeders would be able to be included in rolling outages. Since the feeders assigned to AUFLS generally contain the lowest priority loads, this is a potential conflict of requirements which would need to be resolved by the System Operator at the time of Supply Shortage Declaration.

10. Format of the Operational Plan

The baseline for comparison and measurement of performance will be the energy consumed by the same 'in-scope' network load during the same weekday 52 weeks prior. In the comparison, adjustments would be made for significant plant closures, new industrial demands, exceptional temperature differences, etc, to ensure that fair and reasonable comparisons were made. Adjustments (if any) would be detailed and justified to the System Operator.

During any period of rolling outages directed by the System Operator, information will be provided by Northpower to the System Operator (Security Coordinator) in the form of a half-hourly profile for each day of the following week. The corresponding baseline half-hourly profile for the same weekdays 52 weeks prior will also be provided. An arithmetical comparison and comments will be included in the report submitted daily to the System Operator, for the duration of the declared supply shortage together with the plan (ie target profile + adjustments) for a week ahead.

Any expected change to this forecast for any grid exit point, of more than 20% for any half hour, would be reported to the System Operator (Security Coordinator) as soon as reasonably practicable.

11. Timeframes to respond to a Developing and an Immediate Event

Immediate Event: Immediately (blackout)

Developing Event: Following receipt of the initial formal Short Supply Declaration by the System Operator, Northpower would endeavour to respond to any direction from the System Operator within 5 business days.

Northpower would expect engagement from the System Operator prior a Short Supply Declaration notice being issued and Northpower would most likely already be implementing some measures to conserve energy demand. Consequently, the measurement of savings must be against energy usage for normal operations (baseline 52 weeks prior) rather than against a recent time when cutbacks might already be in existence.

12. Load Restoration

Following a series of rolling outages, load will be restored in a controlled manner and coordinated with the System Operator (Security Coordinator). Northpower System Control Operators will use the prioritised list of feeders alluded to above, and detailed supplementary operational procedures as their reference documents when operating to this procedure. Feeders will generally be restored manually, one at a time, to minimise step load increases.

13. Communicating the Operational Plan to the System Operator

The System Operator will have knowledge of this plan and the supplementary operating procedures which make reference to all necessary communications and prioritisation.

Communications with the System Operator will generally be between Northpower's Control Centre and Transpower's Regional Operating Centre using Transpower's TSX telephone system.

14. Communicating Health & Safety Issues Affecting Consumers and Retailers

Arrangements for communication with a full range of critical, sensitive and important customers are in place within detailed operating procedures, the priority listings and Northland's Civil Defence communications plan. If rolling electricity cuts are implemented there will need for coordination and communication between all emergency management stakeholders, of which Northpower is one.

15. Backup / Contingency Planning

The plan will be worked through as detailed. Unexpected events and contingencies will be handled as part of normal operations. This is planned, rather than reactive, outage management. The public and all critical/industrial customers should have been forewarned.

16. Coordination with Grid Emergencies

Arrangements to manage Grid Emergencies take immediate priority over rolling outages.

Under-frequency events are instantly responded to by Interruptible Load (IL) and then, if necessary, by AUFLS, which has been exempted from this procedure, and normal load building operations will follow when the grid emergency has passed in order to restore the AUFLS load to its normal state of availability.

The rolling outages program would continue, once a Grid Emergency is over, if the Grid Emergency occurred during a period of rolling outages.

17. Maintaining Performance Over Time

Northpower has half-hour electricity loggers at GXP's that enable tracking and monitoring of all electricity outages. The target for the grid for all half-hour periods will be set at $n\%$ less than the corresponding period in the baseline set on the same day 52 weeks prior, with any particular adjustments for industrial load changes and/or temperature. Accordingly, Northpower System Control Operators will be able to observe the impact rolling outages have on demand relative to target levels, and will be able to use their judgement to modify the application of rolling outages to maintain savings at the target level.

18. Monitoring and Reporting Performance against Targets

A combination of half-hour metering and SCADA systems collect the electricity consumption data across the network to build the load profile. Comparison with half-hourly data from the same weekday 52 weeks prior, adjusted for changed industrial loads and/or temperature is reported and graphed on a daily basis. Near-real-time reports are also available to Northpower System Control Operators as required during operations.

An outage log maintained by Network System Control Operators is used to record: Feeder number, Load, ICP Count, Time Off, Time On, Duration, Notes

Northpower's quantified comparison of load profile against baseline and comments will be provided to the System Operator on a regular basis (as specified by the System Operator from time to time) with sufficient commentary to show compliance (or otherwise) with this plan. Northpower would otherwise summarise their findings daily and report to the System Operator weekly.

19. Authorisation to Receive Direction and De-activate

To revoke their Declaration of Supply Shortage, the System Operator should notify one of 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 System Control Operators 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.

20. Communication Strategy

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 Public Affairs Manager 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 and radio stations
 - Produce a flyer for distribution to customers’ mail boxes
 - Distribute posters and quantities of flyers to community groups, local councils, local retailers and health care services.
 - Include electricity saving tips and current information on ‘Twitter’ social networking website.
 - Include appropriate pre-recorded messages on the 0800 104040 ‘Faults Line’
 - Use the Energy column in the Whangarei Leader (published monthly) on how this affects them and what they can do
 - Place adverts outside of this in the local papers
 - Use the 15 second radio adverts to notify 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 coordinate with the public, electricity retailers and other agencies as soon as feasible.

21. Footnote

This plan represents Northpower’s methodology for compliance with the Code. We reiterate that the plan is only for use in times of critical national electricity shortages.

..... End