
Security of Supply Participant Rolling Outage Plan



**keeping
you
connected.**

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1. Purpose

This plan was written to comply with the Electricity Industry Participation Code 2010; Part 9; Security of Supply.

Pursuant to clause 9.8, participant rolling outage plans (PROP) must:

- Be consistent with the system operator rolling outage plan.
- Comply with the requirements specified in the notice sent under clause 9.6(2)(a).
- Specify the actions that as participant, The Lines Company will take to reduce consumption as specified in the SOROP as directed by the System Operator.

Reducing demand by disconnecting supply to customers would be a last resort after all other forms of savings including voluntary savings had been exhausted.

The Lines Company will always endeavour to keep supply on to customers.

The procedures outlined are in response to major generation shortages and/or significant transmission constraints, typical scenarios include unusually low inflows into hydro- generation facilities, loss of multiple thermal generating stations or multiple transmission failures.

How an event is declared and how the System Operator should communicate its requests are detailed.

The main energy saving measure listed are rolling outages, how these are structured and implemented is discussed.

2. Definitions

AUFLS	Automatic Under Frequency Load Shedding
Authority	Electricity Authority
EDN	Electrical Distribution Network.
Feeder	A high voltage circuit typically supplying up to 1500 consumers.
GXP	Transpower Grid Exit Point.
GEN	Grid Emergency Notice.
PROP	Participant Rolling Outage Plan (this plan).
Regulations	Electricity Governance (Security of Supply) Regulations 2008 and subsequent amendments.
Retailers	Electricity Retail Companies.
Rolling Outages or Rolling Cuts	Planned electricity disconnections spread over different parts of the network at differing times to avoid prolonged outages at any one location.
SOROP	System Operator Rolling Outage Plan (Transpower)
Supply Shortage Declaration	Declaration made by the System Operator (Transpower) after consultation with The Electricity Authority
System Operator	Operator of the national electricity transmission grid (Transpower).
The Code	Electricity Industry Participation Code 2010, Part 9

3. Background

3.1 Electricity Authority

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

3.2 Transpower

Transpower is a State Owned Enterprise, tasked with Owning & Operating New Zealand's National Grid – a network of high voltage transmission lines and substations that transports bulk electricity from where it is generated to distribution line companies such as The Lines Company.

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.

3.1 The Lines Company (TLC)

TLC is the electricity distribution company that owns and maintains the electricity lines, cables and substations that deliver power to consumers in the North Island's King Country region.

4. Range of Events

4.1 Supply Shortage Declaration

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

- Developing Event – 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.

4.2 Major Incident

A developing or an immediate event will be classed by TLC as a major incident and the Network Manager will assemble a team of senior managers and staff to manage the incident accordingly.

The Communications and Relationship Manager will communicate directly with retailers, Civil defence and other stakeholders and place shutdown notifications with all local newspaper and radio stations as per the notification procedures described in our Event Management Policy.

5. Actions for Immediate Events

5.1 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 the load. Automatic load shedding groups reduce load in stages until the frequency stabilises.

5.2 Reserve Market

Generators and load users with interruptible load such as distribution networks may offer 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 numbers of frequency capable relays installed and the likely revenue stream from the market less the compliance costs of participating in the reserve market. The Lines Company does not presently participate in this market.

5.3 Disconnecting Customers

To recover from immediate events electricity consumption can be reduced by;

5.3.1 Automatic under Frequency Load Shedding (AUFLS)

If the load shed by the Reserve Market tripping is insufficient to stabilise the network, further automatic load reduction is required.

Each distribution network company must, unless exempt have available at all times two blocks of load each of 16% of its total load to be shed by AUFLS relays.

5.3.2 AUFLS Zone 1

If system frequency fails to recover after Reserve Market load shed, AUFLS Zone 1 shedding will occur. This will disconnect 16% of The Lines Company's load by disconnecting customers supply.

5.3.3 AUFLS Zone 2

If Zone 1 tripping fails to restore frequency, the next stage, Zone 2 activates. This will disconnect a further 16% of The Lines Company's load.

5.3.4 Manual Shedding

AUFLS Zone 1 and Zone 2 tripping fails to stabilize frequency the System Operator will shed more load, once the frequency has stabilised the System Operator will advise the TLC Control room when load can be restored.

5.4 Transmission Grid Emergency

The System Operator may request TLC to reduce load under a grid emergency notice (GEN).

TLC will shed all water heating load, the System Operator will be advised, and if more shedding is required the System Operator will instruct the Grid Owner to disconnect load as per feeders listed in Appendix 2. Generally, feeders will be chosen from the bottom of table first.

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 TLC will respond by implementing rolling outages as described in the following "Developing Events" section.

5.5 Supply Restoration

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

6. Developing Events

If the System Operator requests a load reduction for a planned developing event, TLC must reduce load to meet the Authority's targets. The targets are likely to be in the form of a weekly energy saving targets that are reviewed each week.

To reduce energy usage TLC would disconnect feeders (rolling outages) in a controlled manner to enable targets to be reached.

There are financial penalties for not meeting the targets specified by the System Operator.

Water heating load shedding is generally not an option for energy savings as this only defers usage and would not save energy.

6.1 Declaration of a Developing Event

The System Operator will endeavour to provide 9 days prior notice of the requirement for weekly energy savings and any increase in the weekly energy savings target.

To declare a developing event the System Operator will specify the energy savings target to be enforced for a specific region for a specified time-frame.

The System Operator is responsible for general media advertising of the need to conserve electricity and the impending rolling outages when they are requested.

6.2 Criteria for Rolling Outages

To ensure public health and safety is preserved and costs to economy are minimised the following table shows a desired criteria for selecting rolling outage feeders to be included in rolling outages.

Table 1 - Priority Loads

Priority	Priority Concern	Maintain Supply to:
1	Public health & Safety	Major hospitals, air traffic control centres, and emergency operation centres.
2	Important public services	Energy control centres, communication networks, water and sewage pumping, fuel delivery systems, major ports.
3	Public health & Safety	Minor hospitals, medical centres, schools, and street lighting.
4	Food production	Dairy farms and milk production facilities.
5	Domestic production	Commercial and industrial premises.
6	Consumer Disruption	Residential premises.

These priorities are intended as guidelines, and because rolling outages will be implemented on a feeder by feeder basis, it is not possible to discriminate between individual consumers on the same feeder. For example, a predominantly residential feeder may also have small pockets of commercial or industrial consumers.

6.3 AUFLS under Rolling Outages

The level of AUFLS during rolling outages needs to be maintained. The Lines Company will either:

- Exclude the current AUFLS feeders from its rolling outage plans, which means that supply to lower value loads may be maintained while higher value loads are cut, or
- Include AUFLS feeder shedding but limit the shedding to ensure that two AUFLS blocks of 16% are maintained. That is, if we shed 20% of our network load we would also shed up to 20% of the AUFLS load.
- Arm additional higher value load feeders to supplement the AUFLS load, and exclude these from its rolling outage plan.

6.4 Shutdown Notification

When requested to reduce demand with rolling outages, TLC plans to use the planned outage procedure as per the Shutdown Notification Procedure, to advise retailers in advance, of pending outages. The time and extent of advertised outages will be approximate.

6.5 Grid Emergency during a Developing Event

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, TLC would have the water heating load available for load reduction when required for the grid emergency. If water heating load is insufficient, the rolling outage feeders may have to be rearranged to comply with the grid emergency. After the grid emergency is over, the rolling outages pattern would continue.

6.6 Supply Restoration

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

The System Operator has advised that load changes of less than 25MW in any five minutes may be implemented by a network without their prior approval.

6.7 Communication with System Operator

All communications with the System Operator will be between The Lines Company's Control Room and Transpower's Regional Operating Centre (Northern and Central) using Transpower's TPSN telephone or normal communication systems.

Prior to notifying and implementing rolling outages, The Lines Company will consult with the System Operator to establish a process for load shedding and restoration.

6.7.1 Communication with the Public

The Lines Company will co-ordinate public messages with the System Operator, this co-ordination is to keep to a minimum the confusion between National and Local announcements.

The Local media and consumers will be informed as per The Lines Company's standard communications procedure informing them of planned interruptions to supply before and during the outages.

6.8 Staff Responsibilities

Within one day of declaration of a developing event, the Engineering Manager will notify the Authority of the updated contact details including telephone numbers and email address for each of the positions named in Table 2.

Table 2 - Staff Responsibilities

Responsible Person For :	Role
Receive communication from System Operator	Control Room Operator
Reporting to System Operator	Control Room Operator
Implement this plan	Network Manager
Revoking rolling outages	Network Manager
Weekly savings reporting	Control Room Operator
Retailer notification	Communications and Relationship Manager
Reporting to media, public agencies	Communications and Relationship Manager

6.9 Rolling Outages Strategy and Methodology

The Network Manager will review weekly targets and prepare plans for weekly rolling outages based on savings required. The plans will be forwarded to the Communications and Relationship Manager for retailers, consumer and media notification. Rolling outages will wherever possible disconnect feeders using priority listed in Table 1.

Planned energy savings will be based upon network energy usage for same period last year.

6.10 Target Monitoring

For load shedding to a weekly target, the Control Room Operator will monitor energy savings against the target and together with the Engineering staff review future load shedding to increase or decrease the amount of rolling outages to enable the weekly target to be met. The Control Room Operator will be responsible for daily and weekly reporting of consumption relative to target levels. The Control Room Operator will also be responsible for providing the predicted load for the next week on a seven day rolling basis. This prediction is to be by GXP for each half-hour.

6.11 Log of Rolling Outages

The Control Room Operator will log the times of disconnection and reconnection of all feeder interruptions. The log sheet to be used by Control Room Operator is shown in Appendix 1. These will be used to monitor the rolling outage program.

7. Rolling Outages

When instructed by the System Operator following a supply shortage declaration to reduce demand, rolling outages will be instigated by engineering staff as per this plan and outage strategy.

The Engineering staff will ensure load shedding schedules are prepared, system control rosters are adjusted as required and load is controlled / monitored to meet desired targets.

Schedules of estimated load shedding, restoration times and quantities are to be forwarded to the System Operator seven days before the planned outage; If significant variation is noticed, or expected, from the schedules provided to the System Operator then The Lines Company shall advise the System Operator of this change.

The Engineering staff will also produce a daily, rolling week-ahead forecast of half-hourly load at each GXP, taking into account the impact of the planned rolling outages. If there is any expected change to the forecast for a grid exit point of more than 20% for any trading period then The Lines Company shall advise the System Operator of this change as soon as practicable of becoming aware of the change.

Where possible, The Lines Company will try to comply with priorities in Table 1 in selecting feeders for rolling outages. The Lines Company will endeavour to keep rolling outages to any consumer no longer than 4 hours per day for a 5% savings target.

For savings more than 5%, longer outages may be necessary.

Outages will be programmed between 0800 and 1800 on all days. Night time is excluded from the cut period for safety reasons. Initially outages will be scheduled for mid-afternoon to limit the economic effects.

Timing of outages will be approximate and could vary daily due to network or System Operator constraints.

7.1 Feeder Selection

Feeders to be selected for disconnected are shown in Appendix 2. The table is based upon priority guidelines shown in Table 1. Generally feeders will be chosen initially from Priority 6. The number of feeders chosen for any week will depend upon the level of savings required to meet target.

Table 3 - Duration of Daily Outages per Consumer Group for 5% Savings

Consumer Group Priority	Maximum Duration	Days Per week	Percentage System Winter Energy	Minimum Energy Savings	System Cut Level
1			4.99%	0.0%	86.06%
2			8.28%	0.0%	81.07%
3			17.19%	0.0%	72.79%
4			23.33%	0.0%	55.6%
5	4hr	7	16.75%	2.79%	32.27%
6	4hr	7	15.52%	2.58%	15.52%
			Total	5.37%	

These % figures were obtained from the 'ETAP' Network model, the customer numbers are Basix Database information.

Table 4 - Duration of Daily Outages per Consumer Group for 10% Savings

Consumer Group Priority	Maximum Duration	Days per week	Percentage System Winter Energy	Minimum Energy Savings	System Cut Level
1			4.99%	0.0%	86.06%
2			8.28%	0.0%	81.07%
3			17.19%	0.0%	72.79%
4	4hr	7	23.33%	4%	55.6%
5	4hr	7	16.75%	2.5%	32.27%
6	6hr	7	15.52%	4%	15.52%
			Total	10.5%	

Table 5 - Duration of Daily Outages per Consumer Group for 15% Savings

Consumer Group Priority	Maximum Duration	Days per week	Percentage System Winter Energy	Minimum Energy Savings	System Cut Level
1			4.99%	0.0%	86.06%
2			8.28%	0.0%	81.07%
3			17.19%	0.0%	72.79%
4	5hr	7	23.33%	4.66%	55.6%
5	8hr	7	16.75%	5.58%	32.27%
6	8hr	7	15.52%	5.17%	15.52%
			Total	15.41%	

Table 6 - Duration of Daily Outages per Consumer Group for 20% Savings

Consumer Group Priority	Maximum Duration	Days per week	Percentage System Winter Energy	Minimum Energy Savings	System Cut Level
1			4.99%	0.0%	86.06%
2			8.28%	0.0%	81.07%
3	4hr	7	17.19%	2.865%	72.79%
4	8hr	7	23.33%	7.776%	55.6%
5	8hr	7	16.75%	5.583%	32.27%
6	8hr	7	15.52%	5.173%	15.52%
			Total	21.39%	

Table 7 - Duration of Daily Outages per Consumer Group for 25% Savings

Consumer Group Priority	Maximum Duration	Days per week	Percentage System Winter Energy	Minimum Energy Savings	System Cut Level
1			4.99%	0.0%	86.06%
2	3hr	7	8.28%	1.035%	81.07%
3	8hr	7	17.19%	5.73%	72.79%
4	8hr	7	23.33%	7.776%	55.6%
5	8hr	7	16.75%	5.583%	32.27%
6	8hr	7	15.52%	5.173%	15.52%
			Total	25.297%	

The outage durations are indicative only and will be reviewed daily to achieve the specified targets.

7.2 Contingent Events

If an unplanned event occurs, such as a Civil Defence emergency that could alter the planned rolling outages, Communications and Relationship Manager will be responsible for communication with retailers of any changes to the advertised program.

7.3 Consumer Liaison

For major consumers, with dedicated HV feeder supplies, short-term rolling outages may not be appropriate. As an alternative, longer single outages could be offered if that was easier for them to plan for.

Other consumers are advised to contact their retailer for information on the priority of the feeder they are supplied from and outage times.

7.4 Vulnerable Consumers

It is not feasible for The Lines Company to prevent rolling outages affecting individual vulnerable consumers. As The Lines Company direct bills their customers, we will notify vulnerable consumers of pending rolling outages giving as much advance notice as possible.

Appendix 2

CB No.	Feeder Name	kVA	Customer Numbers.	Load (%)
Priority Level 1				
512	Oparure	3336	923	4.19%
6062	Western	637	419	0.8%
		3972	1342	4.99%
Priority Level 2				
6774	Chateau	2042	138	2.56%
6625	Hirangi	684	370	0.86%
102	Te Kuiti Town	972	143	1.22%
784	McDonalds	2899	450	3.64%
		6597	1101	8.28%
Priority Level 3				
5880	Hakiaha	1460	290	1.83%
5005	Ohakune Town	1753	858	2.2%
123	Otorohanga	2771	1150	3.48%
683	Piopio	1052	1844	1.32%
5200	Rangipo / Hautu	2002	856	2.51%
103	Te Kuiti South	581	580	0.73%
5198	Turangi	1617	1101	2.03%
5003	Turoa	2067	440	2.59%
6337	Waiotaka	402	8	0.5%
		13705	7127	17.19%
Priority Level 4				
1272	Caves	733	322	0.92%
1271	Hangatiki East	2919	72	3.66%
1072	Huirimu	934	156	1.17%
105	Wharepapa	1406	405	1.76%
178	Maihihi	3237	898	4.06%
140	Bennydale	1930	477	2.42%
1	Mokai	1184	312	1.49%
2	Tihoi	821	207	1.03%
2092	Pureora	2284	170	2.82%
5132	Southern	407	612	0.51%
1748	Tirohanga	1131	232	1.42%
2102	Whakamaru	1652	576	2.07%
		18638	4439	23.33%

Appendix 2 – Cont.

CB No.	Feeder Name	kVA	Customer Numbers.	Load (%)
Priority Level 5				
684	Aria	406	189	0.51%
6755	Manunui	840	468	1.05%
682	Mokauiti	745	172	0.93%
104	Rangitoto	2560	730	3.21%
6125	Kuratau	1301	1316	1.63%
6063	Matapuna	2067	1039	2.59%
122	Gravel Scoop	1820	524	2.28%
1215	Oparure Quarry	1405	1	1.76%
513	Waitomo	2223	412	2.79%
		13367	4851	16.75%
Priority Level 6				
1413	Coast	1358	322	1.7%
686	Mahoenui	331	231	0.42%
2082	Mangakino	642	443	0.81%
1010	Mokau	824	517	1.03%
6121	Waihaha	375	317	0.47%
6134	Motuoapa	489	256	0.61%
5144	National Park	893	282	1.12%
5004	Tangiwai	1244	647	1.56%
5254	NihoNiho	81	47	0.1%
5290	Ohura	313	275	0.39%
5824	Tuhua	314	148	0.39%
5820	Ongarue	395	263	0.5%
5955	Northern	2290	1242	2.87%
6135	Oruatua	555	321	0.7%
5836	Otukou	199	72	0.25%
5152	Raurimu	1018	234	1.28%
609	Rural	549	105	0.69%
687	Te Mapara	370	134	0.46%
5032	Tokaanu	134	73	0.17%
		12374	6174	15.52%
Grand Total		68653	25034	86.06