
Security of Supply Participant Rolling Outage Plan



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Contents

1.	Purpose	3
2.	Definitions	3
3.	Background	3
3.1	Electricity Authority	3
3.2	Transpower	4
3.1	The Lines Company (TLC)	4
4.	Range of Events	4
4.1	Supply Shortage Declaration	4
4.2	TLC Key Contact Person	4
4.3	Major Incident	4
5.	Actions for Immediate Events	4
5.1	System Stability	4
5.2	Reserve Market	5
5.3	Disconnecting Customers	5
5.4	Transmission Grid Emergency	5
6.	Developing Events	6
6.1	Declaration of a Developing Event	6
6.3	AUFLS under Rolling Outages	6
6.4	Shutdown Notification	7
6.5	Grid Emergency during a Developing Event	7
6.6	Supply Disconnection and Restoration	7
6.7	Communication with System Operator	7
6.8	Staff Responsibilities	7
6.9	Rolling Outages Strategy and Methodology	8
6.10	Target Monitoring	8
6.11	Log of Rolling Outages	8
7.	Rolling Outages	8
7.1	Uninterruptable Load	9
7.2	Feeder Selection	9
	Appendix 1	12
	Appendix 2	13
	Controlled Document Review Details	16

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
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 TLC Key Contact Person

Key TLC personnel for the system operator to contact about matters relating to supply shortages, supply shortage declarations, directions and rolling outages.

Name	Function	Role	Contact – Mobile	Contact – Email
Control Room	Operational Contact	Control Room Operator	+64 27 294 7046	networkcontroller@thelines.co.nz
Warren Harris	Operational/ Administrative Contact	Operations Manager- Network	+64 21 649 284	Warren.Harris@thelines.co.nz
Gerhard Buitendach	Administrative Contact	General Manager- Network	+64 27 672 4087	Gerhard.Buitendach@thelines.co.nz

4.3 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 Incident 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 always have available two blocks of load each of 16% of its total load to be shed by AUFLS relays. The Lines Company has implemented a four-block system i.e., two blocks of 10% and two blocks of 6%.

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 10% 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 10% of The Lines Company's load.

5.3.4 AUFLS Zone 3

If Zone 2 tripping fails to restore frequency, the next stage, Zone 3 activates. This will disconnect a further 6% of The Lines Company's load.

5.3.5 AUFLS Zone 4

If Zone 3 tripping fails to restore frequency, the next stage, Zone 4 activates. This will disconnect a further 6% of The Lines Company's load.

5.3.6 Manual Shedding

AUFLS Zone 1, 2, 3 and Zone 4 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.

6. Developing Events

If the System Operator requests a load reduction for a planned developing event, TLC must reduce load to meet the those 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.

TLC will acknowledge, via email, receipt of a direction to save energy from the System Operator

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 criterion 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 10% and two AUFLES blocks of 6% 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 Disconnection and Restoration

Disconnection and restoration of load must be disconnected/restored in conjunction with the System Operator. This is to prevent overloading the transmission network and creating instability.

The Lines Company 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

6.7 (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). Communication with System Operator

Formal operational verbal/phone communications with the System Operator should be directed to the Transpower National Grid Operations Centre using normal communications methods. Operational queries can also be directed to the System Operator's National Coordination Centre as an alternative.

The Lines Company will contact the System Operator regarding administrative matters (such as supply shortage declarations, directions to save energy, acknowledgment of receipt of a direction to save energy, rolling outage monitoring, load shedding forecasts, media/public communications) using the following details: **Note: acknowledgment receipt should be in an email format***

Email: system.operator@transpower.co.nz

PH: 04 590 7000

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 Operation Manager will notify the System Operator 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	Operations Manager
Revoking rolling outages	Operations 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. This information will also be provided to the System Operator. 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.

Rolling outages at each GXP

Below a list of specified participant's GXPs at which rolling outages will/not occur.

Table 3 - Participant's GXPs at which rolling outages will/not occur

GXP	Reasons why rolling	
	Rolling outages may occur	outages will not occur
HTI0331	Yes	N/A
HTI1101	Yes	N/A
NPK0331	Yes	N/A
ONG0331	Yes	N/A
TKU0331	Yes	N/A

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 Uninterruptable Load

There are no special agreements with retailers or consumers on TLC's network that may adversely affect TLC's ability to comply with system operator's direction on disconnection and restoration of load.

7.2 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 4 - Duration of Daily Outages per Consumer Group for 5% Savings

Consumer Group Priority	Maximum Duration	Days per week	Percentage System Average Energy	Minimum Energy Savings	System Cut Level
1			3.07%	0.00%	85.71%
2		7	7.72%	0.00%	82.64%
3		7	17.52%	0.00%	74.92%
4		7	27.98%	0.00%	57.40%
5	4hr	7	15.48%	2.58%	29.42%
6	5hr	7	13.94%	2.90%	13.94%
			Total	5.48%	

85.71% & 15.48% - Total load is without Taharoa Iron Sands.

Table 5 - Duration of Daily Outages per Consumer Group for 10% Savings

Consumer Group Priority	Maximum Duration	Days per week	Percentage System Average Energy	Minimum Energy Savings	System Cut Level
1			3.07%	0.00%	17.01%
2	hr	7	7.72%	0.00%	24.73%
3	hr	7	17.52%	0.00%	42.25%
4	4hr	7	27.98%	4.66%	70.22%
5	4hr	7	15.48%	2.58%	85.71%
6	6hr	7	13.94%	3.49%	99.65%
			Total	10.73%	

85.71% & 15.48% - Total load is without Taharoa Iron Sands.

Table 6 - Duration of Daily Outages per Consumer Group for 15% Savings

Consumer Group Priority	Maximum Duration	Days per week	Percentage System Average Energy	Minimum Energy Savings	System Cut Level
1			3.07%	0.00%	102.72%
2	hr	7	7.72%	0.00%	110.43%
3	hr	7	17.52%	0.00%	127.95%
4	5hr	7	27.98%	5.83%	155.93%
5	8hr	7	15.48%	5.16%	171.41%
6	8hr	7	13.94%	4.65%	185.35%
			Total	15.64%	

85.71% & 15.48% - Total load is without Taharoa Iron Sands.

Table 7 - Duration of Daily Outages per Consumer Group for 20% Savings

Consumer Group Priority	Maximum Duration	Days per week	Percentage System Average Energy	Minimum Energy Savings	System Cut Level
1			3.07%	0.00%	188.42%
2	hr	7	7.72%	0.00%	196.14%
3	4hr	7	17.52%	2.92%	213.66%
4	8hr	7	27.98%	9.33%	241.64%
5	8hr	7	15.48%	5.16%	257.12%
6	8hr	7	13.94%	4.65%	271.06%
			Total	22.05%	

85.71% & 15.48% - Total load is without Taharoa Iron Sands.

Table 8 - Duration of Daily Outages per Consumer Group for 25% Savings

Consumer Group Priority	Maximum Duration	Days per week	Percentage System Average Energy	Minimum Energy Savings	System Cut Level
1			3.07%	0.00%	274.13%
2	1hr	7	7.72%	0.32%	281.85%
3	8hr	7	17.52%	5.84%	299.37%
4	8hr	7	27.98%	9.33%	327.34%
5	8hr	7	15.48%	5.16%	342.83%
6	8hr	7	13.94%	4.65%	356.77%
			Total	25.30%	

85.71% & 15.48% - Total load is without Taharoa Iron Sands.

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

7.3 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.

7.4 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.

7.5 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	Feeder Name	Load (KVA)	No. of Customer	Load (%)
PRIORITY LEVEL 1				
512	Oparure	2286	877	2.18%
6062	Western	934	422	0.89%
Total		<u>3220</u>	<u>1299</u>	<u>3.07%</u>

PRIORITY LEVEL 2				
8007	Chateau	3715	134	3.54%
6625	Hirangi	724	348	0.69%
2712	Te kuiti Town	1562	158	1.49%
2552	McDonalds	2096	453	2.00%
Total		<u>8097</u>	<u>1093</u>	<u>7.72%</u>

PRIORITY LEVEL 3				
5880	Hakiaha	1547	276	1.47%
5005	Ohakune Town	2782	933	2.65%
123	Otorohanga	3468	1163	3.30%
683	Piopio	1257	457	1.20%
6854/6848	Rangipo / Hautu	2101	860	2.00%
2612	Te Kuiti South	1296	573	1.23%
6851	Turangi Town 1	899	667	0.86%
6845	Turangi Town 2	1223	435	1.17%
5003	Turoa	3201	440	3.05%
6337	Waioata	613	6	0.58%
Total		<u>18388</u>	<u>5810</u>	<u>17.52%</u>

PRIORITY LEVEL 4				
1272	Caves ⁴	915	327	0.87%
1271	Hangatiki East	3296	70	3.14%
1072	Huirimu	705	155	0.67%
1052	Wharepapa	1639	396	1.56%
2572	Maihihi	4115	928	3.92%
2632	Benneydale	4077	415	3.89%
2529	Mokai	1334	326	1.27%
2546	Tihoi	705	154	0.67%
2522	Marotiri	610	50	0.58%
2459	Pureora	2324	220	2.21%
5132	Southern	819	580	0.78%
1748	Tirohanga	1581	247	1.51%
2482	Whakamaru	1867	606	1.78%
2048	Miraka	3468	3	3.30%

2047	Paerata	1905	10	1.82%
Total		<u>29360</u>	<u>4487</u>	<u>27.98%</u>

PRIORITY LEVEL 5				
684	Aria	514	243	0.49%
6755	Manunui ²	1423	551	1.36%
682	Mokauiti	286	164	0.27%
2642	Rangitoto ³	2755	709	2.63%
6125	Kuratau	1981	1326	1.89%
6063	Matapuna ²	2323	987	2.21%
122	Gravel Scoop ²	1924	524	1.83%
1215	Oparure Quarry ³	1522	3	1.45%
513	Waitomo ⁴	1619	434	1.54%
	Taharoa Sands*	15000	1	14.29%
6673	Sawmill Winstone	1900	2	1.81%
Total		<u>31248</u>	<u>4944</u>	<u>29.78%</u>

PRIORITY LEVEL 6				
1413	Coast	2313	314	2.20%
686	Mangaotaki	267	275	0.25%
2465	Mangakino	762	498	0.73%
2521	Mokau	1143	522	1.09%
2526	Mahoenui	152	100	0.15%
6121	Waihaha	591	320	0.56%
6134	Motuoapa	745	454	0.71%
6767	National Park ¹	1143	364	1.09%
5004	Tangiwai ¹	1143	659	1.09%
6818	Nihoniho	133	53	0.13%
6819	Ohura	343	326	0.33%
5824	Tuhua	229	128	0.22%
5820	Ongarue	343	246	0.33%
5955	Northern ¹	2530	1178	2.41%
6135	Oruatua	819	382	0.78%
5836	Otukou	143	64	0.14%
6766	Raurimu ¹	381	271	0.36%
2335	Rural ¹	316	115	0.30%
687	Te Mapara	762	225	0.73%
5032	Tokaanu ¹	210	82	0.20%
757	Mairoa	162	68	0.15%
Total		<u>14630</u>	<u>6644</u>	<u>13.94%</u>

Network Total		104944	24277	<u>100.00%</u>
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¹Feeder in AUFLS Block 1

²Feeder in AUFLS Block 2

³Feeder in AUFLS Block 3

⁴Feeder in AUFLS Block 4

Taharoa Sands* - Select Taharoa sands only if required.

Controlled Document Review Details

Person Responsible for Document:	Manager Operation – Network
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