Document Title
Top Energy Participant Rolling Outage Plan (PROP) 2019 Participation Year

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1 INTRODUCTION

This plan was written to comply with the System Operator Rolling Outage Plan (SOROP).

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 is rolling outages and how these are structured and implemented is discussed.

Reducing demand by disconnecting supply to customers would be a last resort after all other forms of savings including voluntary savings had been exhausted. Top Energy will always endeavour to keep supply on to customers.

This Participant Rolling Outage Plan (PROP) has been prepared as specified in sections 9.6 to 9.8 of the Electricity Industry Participation Code (The Code).

2 DEFINITIONS

AUFLS	Automatic Under Frequency Load Shedding
Feeder	A high voltage supply line typically supplying between 100 and 2000 customers
GXP	Transpower Grid Exit Point
GEN	Grid Emergency Notice
PROP	Participant Rolling Outage Plan (this plan)
The Regulations	Electricity Industry Act 2010 and Electricity Governance (Security of Supply) Amendment Regulations 2009
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
SOROP	System Operator Rolling Outage Plan
Supply Shortage Declaration	Declaration made by System Operator under Regulation 9
System Operator	Operator of the national electricity transmission grid

3 AUTHORISATION TO RECEIVE DIRECTION AND ACTIVATE

3.1 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.

3.2 Major Incident

Developing or immediate events will be classed by Top Energy as a major incident and Top Energy's management team will activate the appropriate contingency plan and will manage the incident accordingly.

Communication with retailers, civil defence and other stakeholders will be as per the notification procedures described in the Top Energy Emergency Management Plan.

3.3 Developing Events

Developing events are most likely to arise due to the predicted lack of stored energy available to meet national demand. This energy shortage will typically develop over time as consumption exceeds inflow. The System Operator is charged with ensuring that if such a situation develops energy savings are made to mitigate the impact on the economy.

If, during such an event, the System Operator requests a load reduction for a developing event, Top Energy must reduce supply to meet the System Operator's targets. The targets are likely to be a maximum MWh demand for a particular period or periods. To reduce energy usage, Top Energy would disconnect feeders or groups of feeders (rolling outage feeders) in a controlled manner to enable targets to be reached.

Water heating load shedding has limited application for energy savings as the energy consumption is often delayed rather than reduced.

3.4 Declaration of Developing Events

The System Operator will endeavour to provide nine 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 and 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.

3.5 Top Energy Staff Responsibilities

ROLE	PERSONNEL
Authorised to implement this plan	CEO General Manager Networks Network Operations Manager
Receive communication from System Operator regarding a supply shortage declaration	CEO or General Manager Networks Network Operations Manager
Implement this plan	Network Operations Manager
Preparation of load shedding schedules	Control Centre Manager
Customer notification	Operations Administrator
Weekly savings reporting	Network Operations Manager
Revoking rolling outages	Network Operations Manager
Reporting to System Operator	General Manager Networks
Reporting to CDEM and Lifelines	Network Operations Manager
Reporting to media, public agencies	CEO or General Manager Networks

3.6 Communication with System Operator

The System Operator can contact Top Energy using the following details:

Operational point of contact Top Energy Control Centre (24hours 7 days)	Managerial point of contact Business hours 0.800hrs to 17.00hrs week days
Top Energy Ltd PH +64 9 4070639 PH +64 9 4070629 ck@topenergy.co.nz P.O. Box 43, Kerikeri 0243	Top Energy Duty Manager 0800 867 363 (Ask to speak to the Network Operations Manager during normal working hours and the Duty Manager after hours)

4 IMPLEMENTING ROLLING OUTAGES

4.1 Criteria for Rolling Outages

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

Priority	Priority Concern	Maintain Supply to	Examples
1	Public health and safety	Major hospitals, and emergency operation centres	Kawakawa and Kaitaia hospitals (Energy main buildings)
2	Important public services and economic activities. (These will be targeted for voluntary savings)	Major industries, Ngawha Corrections Facility, major emergency services	AFFCO, Juken Nissho, Waipapa Pine, Mount Pokaka Timber,Top Energy Control Centre
3	District economic and social well being	Major commercial and public service centres, secondary school supplies	Kaitaia, Taipa, Kerikeri, Kaikohe, Paihia, Russell, Opononi/Omapere, and Kawakawa
4	Disruption to customers	General feeders	All remaining feeders

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, according to the following:

Priority 1	Any feeder that has one or more priority 1 connections
Priority 2	Any feeder that has one or more priority 2 connections
Priority 3	All feeders that affect more than 30% of a nominated significant commercial area
Priority 4	Remaining feeders

Rolling outage plans will focus on lower priority feeders to the extent possible, and the higher priority feeders being selected only at the higher required savings levels.

With that in mind, rolling outage feeders with the same priority and in either region (Northern & Southern area) are grouped together into rolling outage groups. This level of grouping simplifies the planning, management and notification of rolling outages and allows for more accurate control of load on what is a relatively small network. Rolling outage feeder priority groupings are listed in the table overleaf:

Breaker #	Feeder Name	Priority Group	Priority Concern
CB0207	Kawakawa	1	Public health and safety. Major hospitals, and emergency operation centres.
CB0405	Totara Nth		
CB0504	Rawene		
CB1107	Redan Rd		

Breaker #	Feeder Name	Priority Group	Priority Concern
171112	Bulls Gorge	2	Important public services and economic activities. (These will be targeted for voluntary savings.) Major industries, Ngawha Corrections Facility, major emergency services.
171122	Crossroads		
171132	Timber Mill		
CB0106	NRCF		
CB0304	AFFCO		
CB0409	Aerodrome Rd		
CB1405	North Mill2		
CB1406	Awanui		
CB1407	Triboard1		
CB1409	Triboard2		
CB1410	North Mill1		

Breaker #	Feeder Name	Priority Group	Priority Concern
181112	Kerikeri Rd	3	District economic and social well-being. Major commercial and public service centres, secondary school supplies.
181132	Cobham Rd		
181142	Inlet Rd		
181172	Ranui Ave		
181182	Hone Heke Rd		
181192	Shepherd Rd		
CB0107	Kaikohe		
CB0108	Awarua		
CB0111	Horeke		
CB0406	Riverview		
CB0407	Whangaroa		
CB0506	Opononi		
CB0606	Tii Bay		
CB0609	Joyces Rd		
CB1105	South rd		
CB1108	Oxford St		

Breaker #	Feeder Name	Priority Group	Priority Concern
CB1207	Tokerau		
CB1305	Te Kao		
CB1306	Pukenui South		

Breaker #	Feeder Name	Priority Group	Priority Concern
CB0105	Rangiahua	4	Disruption to customers, general feeders.
CB0109	Taheke		
CB0110	Ohaewai		
CB0206	Towai		
CB0208	Opua		
CB0209	Russell Express		
CB0210	Karetu		
CB0305	Tau block		
CB0307	Pokapu		
CB0308	Moerewa		
CB0408	Purerua		
CB0410	China Clay		
CB0605	Te Kemara Ave		
CB0607	Puketona		
CB0608	Onewhero		
CB1106	Kaitaia West		
CB1109	Herekino		
CB1110	Pukepoto		
CB1206	Oruru		
CB1208	Mangonui		
CB1408	North Rd		

4.2 Vunerable Customers and Priority Sites

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

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

4.3 Rolling Outages Strategy and Methodology

The Operations Manager and Control Centre Manager will review weekly targets and prepare plans for weekly rolling outages based on savings required.

The methodology is:

- Each distribution feeder exiting a zone substation (or switching station, or group of feeders where they belong to a parallel or ring supply) will be named as a "Rolling outage feeder".
- Rolling outage feeders will be assigned a priority according to the criteria specified in section 9. Feeders that belong to AUFULS block 1 and 2, or alternative AUFULS feeders where implemented, will be excluded from rolling outage groups unless sufficient load has been shed to maintain the 16% requirement.
- A set of switching instructions will be prepared for each rolling outage group.

- A plan will be prepared to target the required savings level, taking account of any under or over savings carried forward from earlier periods in the security of supply outage plan. As far as possible, groups should be selected depending on the saving level required, as follows:

Savings required	Priority groups used
0 to 5%	4
10%-15%	3,4
Greater than 15%	2,3,4

Further, as far as sensible, the total outage durations should be determined to meet the following relationship:

Group Priority	Relative duration (hrs)
4	5 to 8
3	5 to 8
2	8 above 15% savings
1	0

Rolling outages will implemented on Top Energy's 11kV feeders, rather than at TE's Kaikohe GXP.

To the extent possible, outages should be programmed to be held during daylight hours, between 8am and 6pm, but extending into the evening where necessary to achieve the required savings level or accommodate switching logistics.

Unless advised otherwise by the System Operator, the rolling outages plan must provide sufficient time for switching of load to ensure that Top Energy's load does not increase or decrease by more than 25MW in any 5 minute period. The Network Controllers carrying out switching are to monitor their activities in relation to this limit.

Having established the week ahead rolling outage plan and despite significant uncertainty in predicting customer and embedded generator behaviour during these types of events, Top Energy will use best endeavours to produce a rolling week ahead half hourly load for its total network. This will be updated daily to reflect any adjustments to our plan and forwarded electronically to the System Operator in spreadsheet format containing the following data and a separate sheet per day. Unless required to be advised via the POCP website.

Date	Trading period	Top Energy Southern Load	Est. Southern Embedded Generation (Ngawha)	Kaikohe GXP Load	Total Network Mwh	Target MWh	Predicted Variance
	1	MW Load	MW Load	MW Load	MW Load		
	2	MW Load	MW Load	MW Load	MW Load		
	etc	etc	etc	etc	etc		
		etc	etc	etc	etc		
	48	MW Load	MW Load	MW Load	MW Load		

If Top Energy is unable for some reason to meet the load disconnection/restoration ramp rates, or if there is expected to be a material departure (greater than 20%) from the previously provided half hourly Network load forecast / load profile, then Top Energy would communicate directly with the System Operator to ensure that real time security issues can be managed.

Indicative plans for savings using this methodology are:

5% Saving schedule					
Priority Ranking	Cuts per week	Cut durations	Total Hours	Energy Savings kWh	Weekly Savings %
4	5	5	25	783	5.13%
3	0	0	0	0	0.00%
2	0	0	0	0	0.00%
1	0	0	0	0	0.00%
			Estimated savings		5.13%

10% Saving schedule					
Priority Ranking	Cuts per week	Cut durations	Total Hours	Energy Savings kWh	Weekly Savings %
4	5	5	25	783	5.13%
3	5	5	25	748	4.90%
2	0	0	0	0	0.00%
1	0	0	0	0	0.00%
			Estimated savings		10.04%

15% Saving schedule					
Priority Ranking	Cuts per week	Cut durations	Total Hours	Energy Savings kWh	Weekly Savings %
4	5	8	40	1252	8.21%
3	5	7	35	1047	6.86%
2	0	0	0	0	0.00%
1	0	0	0	0	0.00%
			Estimated savings		15.08%

20% Saving schedule					
Priority Ranking	Cuts per week	Cut durations	Total Hours	Energy Savings kWh	Weekly Savings %
4	6	8	48	1503	9.86%
3	5	8	40	1196	7.85%
2	2	8	16	351	2.31%
1	0	0	0	0	0.00%
			Estimated savings		20.01%

25% Saving schedule					
Priority Ranking	Cuts per week	Cut durations	Total Hours	Energy Savings kWh	Weekly Savings %
4	6	8	48	1503	9.86%
3	6	8	48	1436	9.41%
2	5	8	40	879	5.76%
1	0	0	0	0	0.00%
			Estimated savings		25.03%

The following example illustrates this strategy in progress:

System Operator Request	Top Energy Action	Overall Load Reduction
Rolling Outages - Load Reduction required 5% for 1 week	In consultation with System Operator, identify outage times and requirements. Notify customers of intention to enact rolling outages in line with Top Energy's communication strategy. On the outage days, load shed feeders relative to the priority 4 group for 5 hours per day, for 5 days (normally Monday to Friday). At the end of each outage, restore system to normal.	**5% system load reduction across the week**
Rolling Outages - Load Reduction required 10% for 1 week	In consultation with System Operator, identify outage times and requirements. Notify customers of intention to enact rolling outages in line with Top Energy's communication strategy. On the outage days, load shed feeders relative to the priority 4 group, followed by the priority 3 group for 5 hours per day, for 5 days (normally Monday to Friday). At the end of each outage, restore system to normal.	**10% system load reduction across the week**
Rolling Outages - Load Reduction required 15% for 1 week	In consultation with System Operator, identify outage times and requirements. Notify customers of intention to enact rolling outages in line with Top Energy's communication strategy. On the outage days, load shed feeders relative to: • Priority 4 group for 8 hours per day, for 5 days (normally Monday to Friday), followed by • Priority 3 group for 7 hours, for 5 days (normally Monday to Friday). At the end of each outage, restore system to normal.	**15% system load reduction across the week**

System Operator Request	Top Energy Action	Overall Load Reduction
Rolling Outages - Load Reduction required 20% for 1 week	In consultation with System Operator, identify outage times and requirements. Notify customers of intention to enact rolling outages in line with Top Energy's communication strategy. On the outage days, load shed feeders relative to: • Priority 4 group for 8 hours per day, for 6 days (normally Monday to Saturday), followed by • Priority 3 group for 8 hours, for 5 days (normally Monday to Friday), followed by • Priority 2 group for 8 hours, for 2 days (normally Monday and Tuesday) At the end of each outage, restore system to normal.	**20% system load reduction across the week**
Rolling Outages - Load Reduction required 25% for 1 week	In consultation with System Operator, identify outage times and requirements. Notify customers of intention to enact rolling outages in line with Top Energy's communication strategy. On the outage days, load shed feeders relative to: • Priority 4 group for 8 hours per day, for 6 days (normally Monday to Saturday), followed by • Priority 3 group for 8 hours, for 6 days (normally Monday to Saturday), followed by • Priority 2 group for 8 hours, for 5 days (normally Monday to Friday) At the end of each outage, restore system to normal.	**25% system load reduction across the week**

For a developing event, Top Energy expects to implement this plan with direction from the System Operator within seven days, after receiving a formal Short Supply Declaration.

4.4 AUFLS Under Rolling Outages

The level of AUFLS during rolling outages needs to be maintained. Top Energy will either:

- Include AUFLS feeder shedding but limit the shedding to ensure that two AUFLS blocks of at least 16% of remaining load are maintained. That is, if we shed 20% of our network load we would also shed up to 20% of the AUFLS load or, if time permits,
- Arm additional higher value load feeders to supplement the AUFLS load, and exclude these from its rolling outage plan.

5 COORDINATION WITH GRID EMERGENCIES

5.1 Transmission Grid Emergency

In the event of a major transmission grid outage the ability of the Grid to deliver adequate power may require reductions to the load at some or all Grid exit points. The System Operator may request Top Energy to reduce load

under a grid emergency notice (GEN). Top Energy will as a first step shed all water heating load, and the System Operator will be advised. Top Energy currently has the capability to shed a maximum of 10% of concurrent water heating load dependant on the time of operation. If more shedding is required the System Operator will instruct Top Energy to disconnect load as per the emergency load shedding protocol. This will be carried out by feeder priority as detailed in section **Error! Reference source not found.** of this document.

The reduction in load required to meet a Grid emergency would be used to offset any load reduction required by the System Operator to meet a concurrent frequency or energy initiated event.

5.2 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, Top Energy 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 Top Energy to disconnect load as per the list of emergency load shedding feeders in section **Error! Reference source not found.** of this document.

After the Grid Emergency is cancelled the rolling outages pattern would continue at a reduced level reflecting any extra energy savings made during the Grid Emergency.

6 MAINTAINING PERFORMANCE OVER TIME

Metering information is collected from 11kV feeders and substations on Top Energy's network, allowing tracking of individual loads.

If an unplanned event occurs that will alter planned rolling outages, the Control Centre Manager will be responsible for all decisions. Where possible, any changes to the planned timetable should be published on the Top Energy website and communicated to retailers.

7 MONITORING AND REPORTING PERFORMANCE AGAINST TARGETS

7.1 Target Monitoring

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

For load shedding to a weekly target, the Network Business Analyst will monitor the System Operator report of our savings results to our target and together with the General Manager Networks or Network Operations Manager, review future load shedding to increase or decrease the amount of rolling outages to enable the weekly target to be met. In parallel (as a check) with the System Operator, the Business Analyst will be responsible for reporting the consumption relative to target levels (using our data sources) as required by the Directive issued by the System Operator.

In the case of daily or real time limits where the System Operator reporting will be too slow for real time action to be taken, the Network Operations Manager with the assistance of the Business Analyst will monitor our savings and adjust accordingly in the timeframe required. These savings will be calculated using GXP loads measured by our SCADA system and compared with the targets supplied by the System Operator when they are made available.

7.2 Log of Rolling Outages

Network Controllers will enter in the Rolling Outage Log, times of disconnection and reconnection of all feeder interruptions. The log sheet to be used by Network Controllers is shown in Appendix A.

8 LOAD RESTORATION

After any event the 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.

9 COMMUNICATIONS STRATEGY

9.1 Shutdown Notification

With the wide scale impact of rolling outages it is not feasible to use our standard planned outage notification process. When implementing a rolling outage plan, Top Energy will notify the outages in a number of ways:

- Public notices – Top Energy will place public notice advertisements (see in **Error! Reference source not found.**)
- Provide a rolling outage timetable showing the times and areas affected by rolling outages. The advertisement will provide details of our website page and contact details for customers that wish to seek more information.
- Top Energy website - The Outage Centre on the Top Energy webpage will show rolling outages in an event as they enter the outage (SOROP) schedule.
- Retailer notification – Top Energy will provide the rolling outage timetable to all electricity retailers together with a schedule showing the rolling outage group for all ICPs (it is not appropriate to filter the schedule for an individual retailer's ICPs as this places switching ICPs at risk).

Where possible, Top Energy will provide seven days notice of all rolling outage plans, generally publishing and issuing notifications on a Monday to apply from the following Monday.

9.2 Communication with the System Operator

All communications with the System Operator will be between Top Energy's Control Centre and Transpower's Regional Operating Centre using Transpower's TSX telephone or normal communication systems.

Prior to notifying and implementing a rolling outage plan, Top Energy will consult with the System Operator Security Coordinator to establish a process for shedding and restoration, which may include a MW load cap to operate under during restoration phases. Unless agreed with the System Operator, load shedding and restoration shall be no more than 25MW per 5 minutes to mitigate voltage fluctuations on the network.

If Top Energy wishes to issue a public message related to the requested rolling outages then the message will be sent to the System Operator for review before being released. Any such communication will give a time for response from the System Operator, so as their feedback can be included before Top Energy issues the message to the public.

10 APPENDIX A – ROLLING OUTAGE LOG

SUBSTATION _____ DATE _____

TOTAL MW OFF _____ ON _____

Feeder Name	CB Number	Time Opened	Time Closed	Load Shed A	Load Shed B

11 APPENDIX A – ROLLING OUTAGE PUBLIC NOTICE

Electricity Supply Interruptions

Please read - your supply may be affected

Top Energy is required to reduce electricity consumption with rolling power outages across the Far North to meet a 5% savings target set by the System Operator (TranspowerNZ) in response to the current energy crisis.

Voluntary savings have already helped us reduce the impact of rolling outages, and further savings may allow us to reduce these planned cuts further.

Outages will occur within the time periods noted in the schedule below. Wherever possible, we will delay cuts and restore power early, so please treat all lines as live.

Within each area we have prioritised individual circuits to minimise the cost and disruption to our community, and timed outages accordingly. To find out the priority group of the circuit for your connection, you can check your location against the outage plan map on our website (www.topenergy.co.nz), or call your electricity retailer.

YOUR SAFETY AND PROTECTION

It is important to ensure you keep safe around electricity even when it is off.

- Power may be restored at any time.
- Please leave all appliances off during power cuts, particularly ovens and cook tops.
- To prevent damage to computers and other electrical equipment turn power off at the wall prior to outages.
- Avoid using lifts.
- Ensure you have sufficient water to meet your needs
- Ensure your vehicles have sufficient fuel to meet your needs (as fuel may not be accessable from your normal fuel outlet

Are you reliant on power?

If your health may be affected by these outages you will need to make alternative arrangements, or contact your health care provider for assistance. Please note that telephones that rely on a mains supply may not operate during outages, so plan in advance.

Outage Schedule

Areas Affected	Priority Group	Monday (date)	Tuesday (date)	Wed (date)	Thursday (date)	Friday (date)	Saturday (date)	Sunday (date)
Rangiahua	4	8am - 11am	9am- 12pm	1pm - 4pm	2pm- 5pm	3pm - 6pm	8am - 11am	9am- 12pm
Towai	4	9am- 12pm	1pm - 4pm	2pm- 5pm	3pm -6pm	8am - 11am	9am- 12pm	8am - 11am

Connections in priority groups other than those listed (and those with a *reserved* priority) are not scheduled for rolling outages in this period.