



**SECURITY OF SUPPLY  
PARTICIPANT OUTAGE PLAN**

## SECURITY OF SUPPLY - PARTICIPANT OUTAGE PLAN

### 1 PURPOSE OF THIS DOCUMENT

This plan was written to comply with Electricity Commission's Security of Supply Outage Plan (SOSOP).

Under the regulations, participant outage plans (POP) are required to specify the actions would be taken to reduce the consumption of electricity to:

- reduce electricity consumption when a supply shortage is declared by the Electricity Commission
- comply with requirements of the Electricity Commission's Security of Supply Outage Plan (SOSOP)
- comply with Electricity Governance (Security of Supply) Regulations 2008 and subsequent amendments; and
- Supplement the Electricity Commission's Security of Supply Outage Plan.

Reducing demand by disconnecting supply to consumers would be a last resort after all other forms of savings, including voluntary savings had been employed. Westpower will always endeavour to keep consumers supplied.

Westpower will only disconnect consumers when directed to by the Electricity Commission. The procedures outlined are in response to major generation shortages including dry year scenarios. How an event is declared and how the Electricity Commission communicates its requests are detailed.

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

### 2 DEFINITIONS

AUFLS	Automatic Under Frequency Load Shedding
Commission	Electricity Commission
Electricity Act	Electricity Act 1992 and subsequent amendments
Feeder	A high voltage circuit typically supplying up to 2000 consumers
GXP	Transpower Grid Exit Point
GEN	Grid Emergency Notice
POP	Participant Outage Plan (this plan)

## 2 DEFINITIONS

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.
SOSOP	Security of Supply Outage Plan (Electricity Commission)
Supply Shortage	Declaration made by the Electricity Commission under regulation 9
System Operator	Operator of the national electricity transmission grid

### 3 BACKGROUND

#### 3.1 Electricity Commission

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

A function of the Commission under the Electricity Act is to use reasonable endeavours to ensure security of electricity supply. The Commission's activities include forecasting supply and demand, developing and publishing guideline hydro levels for security of supply, contracting for reserve energy, and improving the ability of consumers to manage price risks in the market.

#### 3.2 Transpower

Transpower is a State Owned Enterprise, which owns and operates New Zealand's National Grid - the network of high voltage transmission lines and substations that transports electricity from where it is generated to distribution line companies such as Westpower.

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.

#### 3.3 Westpower

Westpower is the electricity network company that owns and maintains the electricity lines, cables and substations that deliver electricity to consumers in the West Coast region between Reefton, Greymouth and the Glacier regions in South Westland. GXP points in the Westpower area are as follows.

Grid Exit Point	Asset Owner	Voltage (kV)	Present Maximum Demand (MW)
Greymouth	Westpower	66/11	13.326
Hokitika	Westpower	66/33/11	17.798
Kumara	Westpower	66/11	9.856
Dobson	Transpower/ Westpower	110/66/33/11	15.653
Otira	Transpower	66/11	0.678
Reefton	Westpower	110/33/11	7.872
Atarau	Transpower	110	3.976

Peak demand in the Westpower area during the 2009/2010 year was 53MW.

## 4 SUPPLY AND DEMAND

Transpower, as the System Operator, controls the transmission network to match generation with consumer demand. Constraints on the ability to manage this may be caused by:

- low lake levels reducing hydro generation;
- failure of a large generator; and
- a fault on critical transmission circuit.

The first two causes above could lead to an energy shortage, while the third could lead to a shortage of transmission capacity.

### 4.1 Load Reduction by Westpower

Westpower has some ability to reduce load by turning off domestic water heaters via ripple control in the West Coast region.

Further reductions in load would require disconnecting consumers.

### 4.2 Range of Events

Events that could lead the Commission to make a supply shortage declaration can in general terms be categorised as;

Developing Event: Events that evolve over time, for example low hydro lake levels.

Immediate Event: Events that occur with little or no warning, usually as a result of a transmission line or major generation failure.

### 4.3 Significant Incident

A Developing or Immediate event will be classed by Westpower as a significant incident and the Asset Manager will assemble a team of senior managers and staff to manage the incident.

Communication with retailers will be as per normal notification procedures.

Local Authorities, civil defence and other stakeholders will be notified of significant events by the Asset Manager.

## 5 ACTIONS FOR IMMEDIATE EVENTS

Transpower, as the System Operator, is required to keep enough reserve generation to cover the risk of the largest connected generator tripping (or HVDC link failure). 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 complete failure of the electricity network.

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.

### 5.1 Disconnecting Customers

#### 5.1.1 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 have available at all times two blocks of load, each of 16% of its total load to be shed by automatic under frequency relays. In the South Island Transpower has installed these relays on selected 33kV feeders at the GXPs. In the Westpower distribution area only Dobson Substation has these relays fitted.

#### 5.1.2 AUFLS Zones 1 & 2

If system frequency fails to recover after Reserve market load shed, AUFLS Zone 1 shedding by Transpower will occur. This will disconnect automatically up to 16% of Westpower's load. Zone 2 load blocks do not exist in the Westpower area.

#### 5.1.3 Manual Load Shedding

If AUFLS Zone 1 tripping fails to stabilise frequency the System Operator will shed more load. Once the frequency has stabilised the System Operator will advise the Westpower System Control when load can be restored.

## 5.2 Supply Restoration

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

## 5.3 Electricity Commission Declaration

If the Electricity Commission declares a supply shortage either due to Immediate or Developing events, rolling outages may be implemented as per Sections 6 & 7.

## 5.4 Transmission Grid Emergency

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

Westpower would commence with shedding water heating load and then if necessary shed feeders as per Emergency Load Shedding & Restoration procedures.

If a Immediate event is in place, the grid emergency will take precedence.

# 6 DEVELOPING EVENTS

If the Commission requests through the System Operator a load reduction for a planned Developing event, Westpower would reduce demand to meet the Commissions targets. The targets are expected to be a weekly energy savings target that is reviewed each week. To reduce energy usage Westpower would disconnect HV feeders (rolling outages) in a controlled manner to enable targets to be reached.

There may be financial penalties for not meeting the targets specified by the Commission.

The shedding of water heating load is not a viable option for energy savings as this only defers usage and would not save energy.

## 6.1 Declaration of Developing Event

If time permits, the Commission will endeavour to provide nine days prior notice of the requirement for weekly energy savings. This notice however may not always be available. It is Westpowers plan to use the standard planned outage notification procedure to retailers. Any increase in the weekly energy savings target would also need nine days prior notice.

When declaring a supply shortage, the Commission would need to request through the System Operator that a specific weekly energy savings target was to be enforced for a specific region for a specified time-frame. A notification system similar to the GEN procedure would be appropriate.

The Commission is expected to handle 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 feeders to be included in rolling outages.

Priority	Priority Concern	Maintain Supply to:
1	Public health and 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, and major port.
3	Public health and 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	Disruption to consumers	Residential premises.

Table 1. Priority Loads

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 Criteria

Currently, the same criteria for rolling outages as shown in Table 1 are also used to select 33kV feeders (zone substations) for AUFLS tripping. Thus, AUFLS load blocks are predominantly from lower priority load categories however some higher priority consumers would also be affected. AUFLS relays are installed at Dobson Sub on the 66/33kV transformers, therefore all load supplied out of Dobson on the 33kV Bus would be shed. This would affect Rapahoe, Ngahere and Arnold Substations together with the loss of 3MW approx generation at Trustpowers Arnold Power Station.

For system security reasons, AUFLS blocks are excluded from rolling outages. Therefore all 33kV/11kV feeders fed off the Dobson 33kV Bus have not been used in the 'supply shortage' rolling outages. An exemption for AUFLS blocks may be available but notice is only likely to be advised several hours before the commencement of rolling outages. The short notice would make AUFLS exemption unusable, as it would be too late to amend the publicly available outage schedule and so AUFLS exemption will not be considered.

#### 6.4 Shutdown Notification

When requested to reduce demand with rolling outages, Westpower plans to use the planned outage procedures, to advise retailers in advance, of pending outages. The time and extent of advertised outages will be approximate.

#### 6.5 Vulnerable consumers and Priority Sites

Westpower will endeavour to give retailers as much advance notice as possible of pending rolling outages to enable them to notify vulnerable consumers.

#### 6.6 Grid Emergency during a Developing event

If the System Operator declares a Grid Emergency during a Developing or Immediate event, the Grid Emergency will take priority. As water heating load generally would not be used to reduce load in a Developing or Immediate event, Westpower 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.

#### 6.7 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 maybe implemented by a network without their prior approval.

#### 6.8 Communication

Westpower will keep media and consumers informed of planned interruptions to supply before and during the outages. Media will be informed as per Westpower's standard communications procedure, and the retailers will be responsible for consumer notification.

##### 6.8.1 Communication with System Operator

All communications with the System Operator will be using Transpower's TPSN telephone or standard telecommunications systems in Greymouth.

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

## 6.8.2 Communication with the Commission

The Commission can contact Westpower using the following details:

Westpower Ltd  
 Fax (03) 7682766  
 Ph (03) 7689300  
 P.O. Box 375 Greymouth 7800  
 16 Tainui St, Greymouth

Westpower will contact the Commissions Emergency Response Project Manager for administrative purposes using the following details:

Electricity Commission  
 Fax (04) 460 8879  
 Ph (04) 4608860  
 P.O. Box 10041  
 Level 7, ASB Bank Building, 2 Hunter St  
 Wellington

## 6.9

### WESTPOWER Staff Responsibilities

Role	WESTPOWER Person Responsible
Receive communication from Commission	Asset Manager
Receive communication from System Operator	System Controllers
Implement this plan	Network Manager (Stations)
Weekly savings reporting	Network Manager (Comms)
Retailer notification	System Controllers
Revoking rolling outages	Network Manager (Stations)
Reporting to Electricity Commission	Asset Manager
Reporting to media, public agencies	Chief Executive

Table 2 - WESTPOWER Staff Responsibilities

Within one day of declaration of a supply shortage, the Network Manager will notify the Commission of the updated contact details including telephone numbers and email address for each of the positions named in Table 2.

## 6.10 Rolling Outages Strategy and Methodology

The Network Manager (Stations) and the Network Manager (Comms) together with the System Controllers will review weekly targets and prepare plans for weekly rolling outages based on savings required. The plans will be forwarded to the retailers for 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 the same period the previous year.

## 6.11 Target Monitoring

For load shedding to a weekly target, the Asset Administrator will monitor energy savings against target and, together with the Network Manager, review future load shedding to increase or decrease the amount of rolling outages to enable the weekly target to be met. The Network Manager (Comms) will be responsible for daily and weekly reporting of consumption relative to target levels. The Network Manager (Comms) 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.

As part of the monitoring process, Westpower is required to report compliance to the Commission, as well as daily reporting to the System Operator. Daily 'week-ahead' forecasts of expected targets are to be provided to the Security Co-ordinator (at System Operator).

## 6.12 Log of Rolling Outages

System Controllers will log times of disconnection and reconnection of all feeder interruptions and enter in the log. The log sheet to be used by System Controllers 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 the Network Manager as per this plan and outage strategy. The Network Manager will ensure load shedding schedules are prepared, system control rosters are adjusted as required, and load is controlled and 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 +/- 20% is noticed, or expected, from the schedules provided to the System Operator then Westpower shall advise the System Operator of this change.

## 7.1 Feeder Selection

Feeders are to be disconnected as follows. These lists are based upon priority guidelines shown in Table 1. Generally feeders will be chosen from lowest (Priority 6) through to highest (Priority 1).

The number of feeders chosen for any week will depend upon the level of savings required to meet target. (See Appendix 2)

Where possible, Westpower will try to comply with priorities in Table 1 to select feeders for rolling outages and will endeavour to keep rolling outages to a minimum to achieve a 5% savings target in each priority step.

5% Savings				
Priority	Cuts per week	Cut Duration (h)	Expected Weekly Savings (kWhr)	Energy Savings
1			0	0.00%
2			0	0.00%
3			0	0.00%
4			0	0.00%
5	5	2	123.70	2.09%
6	7	4	185.99	3.15%
			<b>309.68</b>	
Average Weekly winter volume			5907	
Estimated percentage savings				<b>5.24%</b>

10% Savings				
Priority	Cuts per week	Cut Duration (h)	Expected Weekly Savings (kWhr)	Energy Savings
1			0	0.00%
2			0	0.00%
3			0	0.00%
4	5	2	101.82	1.72%
5	5	5	309.25	5.24%
6	6	6	199.27	3.37%
			<b>610.34</b>	
Average Weekly winter volume			5907	
Estimated percentage savings				<b>10.33%</b>

15% Savings				
			Expected	Energy Savings
Priority	Cuts per week	Cut Duration (h)	Weekly Savings (kWhr)	
1			0	0.0%
2			0	0.0%
3			0	0.0%
4	5	2	101.82	1.72%
5	7	5	432.95	7.33%
6	7	8	371.97	6.30%
			<b>906.74</b>	
Average Weekly winter volume			5907	
Estimated percentage savings			<b>15.35%</b>	<b>15.35%</b>

20% Savings				
			Expected	Energy Savings
Priority	Cuts per week	Cut Duration (h)	Weekly Savings (kWhr)	
1			0	0.00%
2	6	7	66.82	1.13%
3			0	0.00%
4	6	2	148.44	2.51%
5	7	7	606.12	10.26%
6	7	8	371.97	6.30%
			<b>1193.36</b>	
Average Weekly winter volume			5907	
Estimated percentage savings				<b>20.20%</b>

25% Savings				
			Expected	Energy Savings
Priority	Cuts per week	Cut Duration (h)	Weekly Savings (kWhr)	
1			0	0.00%
2	7	7	77.96	1.32%
3			0	0.00%
4	7	4	356.38	6.03%
5	7	8	692.71	11.73%
6	7	8	371.97	6.30%
			<b>1499.02</b>	
Average Weekly winter volume			5907	
Estimated percentage savings				<b>25.38%</b>

Table 3. Forecast % load savings (based on Total System Load of 45MW including Dobson)

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.

Table 3 shows the planned cut duration for each specified savings level.

## 7.2 Contingent Events

If an unplanned event occurs, such as a Civil Defence emergency that could alter the planned rolling outages, System Controllers 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

Retailers maintain lists of consumers with health and safety issues. It is not feasible for Westpower to prevent rolling outages affecting individual vulnerable consumers. During rolling outages, general media releases will advise consumers with health problems as to their best course of action.



## APPENDIX 2

## Schedule of Feeders to be shed during SOSOP

Priority	Zone Sub	Area	Controlled by	CB	Load (MW)
6	Fox Glacier	Fox	Westpower	1	0.5
6	Fox Glacier	Fox	Westpower	L26	0.25
6	Greymouth	Rutherglen	Westpower	L45	1
6	Greymouth	Cobden	Westpower	L44	1
6	Greymouth	South Beach	Westpower	6	1

6	Hokitika	Blue Spur	Westpower	10	0.5
6	Kumara	Kumara village	Westpower	1	1.3
6	Reefton	Reefton	Westpower	5	2.5
6	Ross	Ross	Westpower	3	0.2
6	Wahapo	Okarito	Westpower	1	0.1

5	Globe	Environmental/Offices	Westpower	2	0.5
5	Pike	Ammenities	Westpower	7	1.3
5	Logburn	Coal Processing	Westpower	3	1.5
5	Logburn	Washbay	Westpower	2	0.75
5	Pike	Surface	Westpower	3	0.5
5	Greymouth	CBD2	Westpower	9	2
5	Pike	Mine Feeder 1	Westpower	1	0.5
5	Pike	Mine Feeder 2	Westpower	5	0.5

5	Franz Josef	CBD	Westpower	1	0.7
5	Globe	Plant General	Westpower	3	1
5	Globe	Flotation Area	Westpower	4	1.5
5	Hokitika	CBD	Westpower	12	1.8
5	Globe	Ball Mill	Westpower	39	3

4	Blackwater	Mawheraiti	Westpower	1	0.5
4	Hokitika	WMP	Westpower	5	2
4	Hokitika	Rimu/Takutai	Westpower	L4	0.2
4	Hokitika	Stafford	Westpower	L2	0.4
4	Whataroa	Whataroa	Westpower	1	0.45
4	Kumara	Taramakau	Westpower	L51	0.1
4	Franz Josef	Rural	Westpower	3	0.6

4	Harihari	Robertson Rd	Westpower	1	0.4
4	Logburn	Atarau	Westpower	1	0.4
4	Blackwater	Totara Flat	Westpower	L36	0.6
4	Ross	Birchfields	Westpower	1	0.2
4	Reefton	Inangahua	Westpower	L14	0.6
4	Hokitika	WMP	Westpower	9	2

4	Reefton	Cronadun	Westpower	4	0.4
4	Waitaha	Waitaha	Westpower	1	0.2
4	Hokitika	Kowhitirangi	Westpower	L6	1.35
4	Hokitika	WMP	Westpower	11	2
4	Harihari	Wanganui Flat	Westpower	3	0.4

2	Greymouth	Blaketown	Westpower	12	2
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