

**SECURITY OF SUPPLY**

**PARTICIPANT OUTAGE PLAN**

**Buller Electricity Limited**

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## 1. INTRODUCTION

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

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 Electricity Commission should communicate its requests are detailed.

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

## 2. PURPOSE

Under the regulations, participant outage plans (POP) are required to specify the actions that would be taken to;

- Reduce electricity consumption when requested 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 Electricity Governance (Security of Supply) Amendment Regulations 2009
- Supplement the Electricity Commission's Security of Supply Outage Plan

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

## 3. DEFINITIONS

<b>AUFLS</b>	Automatic Under Frequency Load Shedding
<b>BEL</b>	Buller Electricity Limited
<b>The Commission</b>	Electricity Commission
<b>Feeder</b>	A high voltage supply line typically supplying up to 2000 customers
<b>GXP</b>	Transpower Grid Exit Point
<b>GEN</b>	Grid Emergency Notice
<b>POP</b>	Participant Outage Plan (this plan)
<b>Regulations</b>	Electricity Governance (Security of Supply) Regulations 2008 and Electricity Governance (Security of Supply) Amendment Regulations 2009
<b>Rolling Outages</b>	Planned electricity disconnections spread over different parts of the network at differing times to avoid prolonged outages at any one location
<b>Security Coordinator</b>	the person responsible for system security at the System Operator
<b>SOSOP</b>	Security of Supply Outage Plan (Electricity Commission)
<b>Supply Shortage Declaration</b>	Declaration made by the Electricity Commission under regulation 9
<b>System Operator</b>	Operator of the national electricity transmission grid

## 4. BACKGROUND

### 4.1 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 Electricity Commission under the Electricity Act is to use reasonable endeavours to ensure the 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.

### 4.2 Transpower

Transpower is a State Owned Enterprise, tasked with owning and operating New Zealand's National Grid - the network of high voltage transmission lines and substations that transports bulk electricity from where it is generated to distribution line companies such as BEL.

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. 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.

### 4.3 Buller Electricity Limited

Buller Electricity Limited (BEL) is the electricity network company that owns and maintains the electricity lines and cables that deliver power to Westport and the Buller region (West Coast of the South Island between Karamea and north of Punakaiki).

BEL has some ability to reduce load by turning off domestic water heaters via ripple control, however further load reductions require consumers to be disconnected.

## 5. RANGE OF EVENTS

Events that could lead the Commission 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.

### 5.1 Major Incident

A Developing or Immediate event will be classed by BEL as a major incident and BEL's management team will activate the appropriate contingency plan and will manage the incident accordingly.

## 6. BEL STAFF RESPONSIBILITIES

If a supply shortage event is declared the BEL staff responsibilities are as outlined in Table 1. As soon as possible after the declaration of an event, BEL will notify the Commission of the updated details (including telephone numbers and email addresses) for each of the positions listed.

ROLE	BEL PERSONNEL
Receive communication from Commission	CEO or Operations Manager
Receive communication from System Operator	Operations Manager
Implement this plan	Operations Manager
Preparation of load shedding schedules	Operations Manager
Customer notification	Operations Manager
Weekly savings reporting	Operations Manager
Revoking rolling outages	Operations Manager
Reporting to Electricity Commission	Operations Manager
Reporting to media, public agencies	Operations Manager

Table 1 BEL Staff Responsibilities

## 7. COMMUNICATION WITH THE COMMISSION

The Commission can contact BEL using the following details:

### **Buller Electricity Ltd**

Fax : 03 788 8191  
 Phone : 03 788 8171  
 Postal Address : P.O. Box 243, Westport 7866  
 Physical Address : Robertson St, Westport 7825

Or as per the personnel email contact details listed on the company's website ([www.bullernetwork.co.nz](http://www.bullernetwork.co.nz)).

BEL will contact the Commission's Emergency Response Project Manager for administration purposes (including reporting performance against targets) using the following details:

### **Electricity Commission**

Fax : 04 460 8879  
 Phone : 04 460 8860  
 Postal Address : PO Box 10041, Wellington  
 Physical Address : Level 7, ASB Bank, 2 Hunter Street, Wellington

Or as per an appropriate email contact address.

## 8. IMMEDIATE EVENTS

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

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

## **8.2 Reserve Market**

Generators and load users with interruptible load such as distribution networks may offer in 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. BEL does not presently participate in this market.

### **8.2.1 Disconnecting Customers**

#### **8.2.1.1 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. With regard to the BEL Network the tripping relays are owned and operated by Transpower for the Westport GXP, while for the Robertson St GXP they are owned and operated by BEL.

#### **8.2.1.2 AUFLS Zone 1**

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

#### **8.2.1.3 AUFLS Zone 2**

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

#### **8.2.1.4 Manual Shedding**

If 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 BEL Control Centre when load can be restored.

## **8.3 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.

## **8.4 Transmission Grid Emergency**

The System Operator may request BEL to reduce load under a grid emergency notice (GEN). BEL will shed all water heating load and the System Operator will be advised. If more shedding is required the System Operator will instruct the Grid Owner to disconnect load.

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

If the Commission declares a supply shortage following a Grid Emergency, then BEL will respond by implementing rolling outages as described in the following "Developing Events" section.

# **9. DEVELOPING EVENTS**

If the Commission requests through the System Operator a load reduction for a planned Developing event, BEL must reduce supply to meet the Commission's targets. The targets are

likely to be in the form of a weekly energy savings target that is reviewed each week. To reduce energy usage BEL would disconnect feeders in a controlled manner to enable targets to be reached. There may be financial penalties for not meeting the targets specified by the Commission. Water heating load shedding is generally not an option for energy savings.

### 9.1 Notice of Developing Event

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

In a Developing Event the Commission will inform the System Operator who will then communicate the energy savings target to be applied for a specific region for a specified time-frame.

The Commission is expected to take responsibility for general media advertising of the need to conserve electricity and the impending rolling outages when they are requested.

If BEL plans to issue a public message related to rolling outages then this will be sent to the Commission for review before being released. Any such communication will give a time for response from the Commission, so as their feedback can be included before BEL issues the message to the public.

### 9.2 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.

Priority	Consumer Group	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 2 Consumer Group Priority**

These priorities are intended as guidelines. 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. Rolling outage plans will focus on higher priority feeders, the lower priority feeders being selected only at the higher required savings levels.

### 9.3 AUFLS Under Rolling Outages

The level of AUFLS during rolling outages needs to be maintained. Currently the same criteria for rolling outages is used to select the feeders for AUFLS tripping. BEL will either exclude the current AUFLS feeders from its rolling outage plans, or substitute the current AUFLS feeders with higher value feeders and exclude these from its rolling outage plan. This document is drafted assuming that the current AUFLS feeders are substituted with higher value feeders. It is seen as prudent to expose high value consumers to a low probability short term event, such as AUFLS, rather than have them included in rolling outages.

BEL uses modern NuLec Recloser equipment on all feeders and as a result the process of substituting AUFLS feeders is a matter of simply changing the programmable Recloser settings and arming this function.

In the event that it is not possible to substitute current AUFLS feeders with higher priority feeders, high priority feeders may need to be included in rolling outages to ensure savings targets are met.

#### 9.4 BEL Feeder Consumer Group Categories and AUFLS Feeders

The following Table identifies the BEL feeders assigned to each Consumer Group, the current AUFLS feeders, and the proposed AUFLS feeders for a Developing event rolling outage situation. It is noted that due to the small size of the BEL distribution network not all Consumer Group categories are deemed necessary, e.g. no feeders are assigned to groups 3 and 5.

Feeder	Load Type	Consumer Group	AUFLS Feeders
Solid Energy	Industrial	1	Current AUFLS feeder
Holcim	Industrial	1	
Russell	Commerical/Residential	2	Proposed AUFLS feeder
Pakington	Industrial	2	Proposed AUFLS feeder
Karamea	Rural	4	
Little Wanganui	Rural	4	Current AUFLS feeder
Seddonville	Rural	4	Current AUFLS feeder
Waimangaroa	Rural	4	Current AUFLS feeder
Whareatea	Rural	4	
Carters	Rural	4	
Cape	Rural/Residential	4	
Adderley	Rural	4	
Domett	Residential	6	
Derby	Residential	6	

**Table 3 BEL Feeder Consumer Group Categories and AUFLS Feeders**

#### 9.5 Shutdown Notification

After being requested to reduce demand with rolling outages, BEL plans to advise consumers and retailers in advance of pending outages. BEL will place public notice advertisements providing a rolling outage timetable showing the times and areas affected by rolling outages. Where possible, BEL will provide 7 days notice of all rolling outage plans, generally publishing and issuing notifications on a Monday to apply from the following Monday.

#### 9.6 Vulnerable Customers

Retailers maintain lists of consumers with health and safety issues. It is not feasible for BEL 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. BEL will endeavour to give retailers as much advance notice of pending rolling outages to enable them to notify vulnerable consumers.

#### 9.7 Communication with System Operator

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

### 9.8 Supply Restoration

Prior to notifying and implementing a rolling outage plan, BEL will consult with the System Operator Security Coordinator to establish a process for shedding and restoration.

### 9.9 Rolling Outages Strategy and Methodology

Following a supply shortage declaration by the Commission, and a direction to implement rolling outages communicated via the System Operator, rolling outages will be instigated by BEL as per this plan and outage strategy. The Operations 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. Planned energy savings will be based upon network energy usage for the same period the previous year.

Having established the week ahead rolling outage plan, BEL will produce a rolling week-ahead daily load forecast for each GXP. This forecast shall be forwarded to the System Coordinator (at the System Operator) and variation of this forecast of +/- 20% will be advised (as per SOSOP 11.3).

Outages will be programmed to be held during daylight hours, between 8am and 5pm, but extending into the evening where necessary to achieve the required savings levels. Initially outages will be scheduled for mid-afternoon to limit the economic effects. Where possible, BEL will try to comply with the Consumer Group Priorities given in Table 2.

Using the methodology indicative plans for savings 5-25% targets are summarised in Table 4 to Table 8. As the BEL load is dominated by two large industrial consumers (making up over 50% of the load), the savings plan will largely be determined by the level of savings that can be made by these two consumers.

Consumer Group Priority	Cut Duration (hours)	Cuts per Week	Daily Savings (MWh)	Percentage Savings
1-2	-	-	-	-
3-4	2	7	5.3	8.3%
5-6	4	7	6.9	16.7%
<b>Total</b>			<b>12.1</b>	<b>4.4%</b>

**Table 4 Duration of Daily Outages for Consumer Groups (5% Savings)**

Consumer Group Priority	Cut Duration (hours)	Cuts per Week	Daily Savings (MWh)	Percentage Savings
1-2	1	7	5.3	4.2%
3-4	3	7	7.9	12.5%
5-6	8	7	13.8	33.3%
<b>Total</b>			<b>27.0</b>	<b>9.8%</b>

**Table 5 Duration of Daily Outages for Consumer Groups (10% Savings)**

Consumer Group Priority	Cut Duration (hours)	Cuts per Week	Daily Savings (MWh)	Percentage Savings
1-2	2	7	10.6	8.3%
3-4	5	7	13.1	20.8%
5-6	10	7	17.2	41.7%
<b>Total</b>			<b>41.0</b>	<b>14.9%</b>

**Table 6 Duration of Daily Outages for Consumer Groups (15% Savings)**

Consumer Group Priority	Cut Duration (hours)	Cuts per Week	Daily Savings (MWh)	Percentage Savings
1-2	3	7	15.9	12.5%
3-4	6	7	15.7	25.0%
5-6	12	7	20.7	50.0%
<b>Total</b>			<b>53.3</b>	<b>19.1%</b>

**Table 7 Duration of Daily Outages for Consumer Groups (20% Savings)**

Consumer Group Priority	Cut Duration (hours)	Cuts per Week	Daily Savings (MWh)	Percentage Savings
1-2	4	7	21.2	16.7%
3-4	8	7	21.0	33.3%
5-6	15	7	25.8	62.5%
<b>Total</b>			<b>68.0</b>	<b>24.8%</b>

**Table 8 Duration of Daily Outages for Consumer Groups (25% Savings)**

### 9.10 Target Monitoring

For load shedding to a weekly target, the Operations Manager will monitor energy savings against the target and review future load shedding to increase or decrease the amount of rolling outages to enable the weekly target to be met. The Operations Manager will also be responsible for daily and weekly reporting of consumption relative to target levels, and providing predicted load (at GXP's for each half hour) for the next week on a 7 day rolling basis. As part of the monitoring process BEL is required to report compliance to the Commission (as per SOSOP 11.5) as well as daily reporting to the System Operator.

### 9.11 Log of Rolling Outages

System Controller 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 A. These will be used to monitor the rolling outage program.

### 9.12 Contingent Events

If an unplanned event occurs that will alter planned rolling outages, the System Controller will be responsible for all decisions. Where possible, any changes to the planned timetable should be communicated to retailers.

