

COUNTIES POWER PARTICIPANT OUTAGE PLAN

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. The main energy saving measure deployed in response to such a scenario is the use of rolling outages. The structure and implementation of these is discussed.

2 PURPOSE OF DOCUMENT

Participant outage plans ("POP") are required to specify the actions that would be taken to:

- reduce electricity consumption when a supply shortage is declared by the Electricity Commission;
- comply with requirements of the SOSOP;
- comply with Electricity Governance (Security of Supply) Regulations 2008 ("Regulations") and subsequent amendments; and,
- supplement the SOSOP.

Reducing demand by disconnecting supply to customers is a last resort after all other forms of savings, including voluntary savings, have been exhausted. Counties Power will always endeavour to maintain supply to customers.

3 DEFINITIONS

The terms used in this document are defined in Figure 1.

Figure 1: Definition of Terms

Term	Description
AUFLS	Automatic Under Frequency Load Shedding.
Electricity Act	Electricity Act 1992 and subsequent amendments.
Feeder	A high voltage circuit typically supplying up to 2000 customers.
GXP	Transpower Grid Exit Point.
GEN	Transpower Grid Emergency Notice.
POP	Participant Outage Plan (this plan).
Regulations	Electricity Governance (Security of Supply) Regulations 2008 and subsequent amendments.
Retailers	Electricity Retail Companies.
Rolling Outages	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	Declaration made by the Electricity Commission under Regulation 9.
System Operator	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 customers to manage price risks in the market.

4.2 Transpower

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

As System Operator, Transpower manages the real-time operation of New Zealand's electricity transmission system to enable generation to match the demand.

4.3 Counties Power

Counties Power is the electricity network company that owns, manages and operates the distribution network in the Franklin and Southern Papakura area covering an area of approximately 2,220km². The number of retailer customers served by the network (active ICPs) is approximately 36,447 with a maximum demand of approximately 96 MW and annual energy supplied from Bombay and Glenbrook GXP's is 485 GWh as at March 2010.

5 RANGE OF EVENTS

Events that could lead the Commission to make a supply shortage declaration are categorised as:

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

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

Both event types are classified by Counties Power as significant incidents and the management team will activate the appropriate contingency and management plan.

Communication with retailers, civil defence, local government authorities and other stakeholders will be carried out in accordance with normal notification procedures.

6 IMMEDIATE EVENTS

6.1 System Stability

Transpower, as the System Operator, is required to keep enough reserve generation to cover the risk of the largest connected generator tripping or of a failure of the HVDC link. They are also required to keep the system frequency at 50Hz. If a large generator trips, it may cause a reduction in frequency. If this is not rectified, consequential tripping of other generators can 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.

6.2 Reserve Market

Generators with reserve capacity and users with interruptible load (such as distribution networks) offer reserve capacity to the Instantaneous Reserves Market to cover failure risks. Counties Power offers part of its interruptible load, predominantly water heating, into the Reserve Market.

Generally water-heaters are only turned off for short periods, during which their inherent thermal capacity ensures limited impacts on customers. Once failed generation or transmission equipment is back in service, water heating and other controlled loads are gradually reinstated.

6.3 Disconnecting Customers

6.3.1 Automatic Under Frequency Load Shedding (AUFLS)

If 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 two blocks of load, each of 16% of its total load, available at all times to be shed by automatic under frequency relays. Transpower has installed relays at the following locations:

- Bombay GXP, on the Ramarama, Mangatawhiri, Pukekawa and Tuakau 33kV feeders
- Glenbrook GXP, on the Karaka 33kV feeder
- Counties Power's Waiuku 33kV incomers.

Also, to supplement these relays and to maintain the 16% load groups at all times, Counties Power has installed under-frequency relays on certain feeders.

AUFLS Zone 1 shedding will occur if the system frequency fails to recover after Reserve Market load shedding. This will remove at least 16% of Counties Power's load by disconnecting customers supply.

6.3.2 AUFLS Zone 2

If Zone 1 load-shedding fails to restore the system frequency, Zone 2 shedding will occur and disconnect a further 16% or more of Counties Power's load.

6.3.3 Manual Load Shedding

If AUFLS Zone 1 and Zone 2 trippings fail to stabilise the frequency, the System Operator will manually shed more load. Once the frequency has stabilised, the System Operator will advise Counties Power Control when load can be restored.

6.4 Supply Restoration

Restoration of disconnected load must be carried out in conjunction with the System Operator. This is to prevent overload of the transmission network and the creation of any further instability.

6.5 Electricity Commission Declaration

The Electricity Commission may declare a supply shortage and direct that rolling outages are required for some immediate events.

Should this be the case, rolling outages will be implemented in accordance with the procedures as described in Section 7 ("Developing Events") and Section 8 ("Implementation Plan for Rolling outages") of this plan.

6.6 Transmission Grid Emergency during Immediate Events

The System Operator may request Counties Power to reduce load under a grid emergency notice (“GEN”). Counties Power would commence by shedding controlled load. If this is insufficient, the rolling outage feeder classification may be rearranged to comply with the requirements of the specific GEN. After the grid emergency is over, the programmed rolling outages schedule will continue.

If an “Immediate Event” is in place, the grid emergency will always take precedence.

7 DEVELOPING EVENTS

If the Commission requests through the System Operator a load reduction for a planned “Developing Event”, Counties Power will reduce demand to meet the Commission's targets. The targets are expected to be a weekly energy savings target that is reviewed each week. To reduce energy usage, Counties Power will disconnect HV 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. The shedding of water heating load is not a viable option for energy savings as this effectively only defers usage.

7.1 Declaration of Developing Events

The Commission may declare a supply shortage and direct specified participants to implement rolling outages.

The Commission will endeavour to provide nine days prior notice of the requirement for weekly energy savings. Counties Power will use the standard planned outage notification procedure for retailers. Any increase in the weekly energy savings target will also require nine days prior notice.

The Commission will need to request through the System Operator that a specific weekly energy savings target is to be enforced for a specific region for a specified time-frame. A notification system similar to the GEN procedure is envisaged.

The Commission is expected to manage general media advertising relating to both the need to conserve electricity and of impending rolling outages when they are requested.

7.2 Criteria for Rolling Outages

To ensure public health and safety is preserved and economic costs are minimised, the criteria shown in Figure 2 are, as far as practicable, used for rolling outage feeder selection and prioritisation.

Figure 2: Customer Priority Groups

Priority	Priority Concern	Maintain Supply to:
1	Public health and safety	Emergency operation centres (e.g., Civil Defence, Police Stations)
2	Important public services	Communication networks, major water and sewage pumping, selected fuel delivery systems and major supermarkets in commercial districts
3	Public health and safety	Minor hospitals, medical centers and major schools
4	Food production	Dairy farms and milk production facilities, poultry processing, cool stores
5	Domestic production	Commercial and industrial premises
6	Disruption to consumers	Residential premises

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. These criteria are therefore considered as guidelines for prioritisation purposes only.

Rolling outages shall be carried out only between 0800 to 1800 for safety reasons.

7.3 AUFLS Criteria

As the level of AUFLS during rolling outages needs to be maintained, Counties Power will:

- As AUFLS Block 1 and 2 are being over-compensated at 24% and 29% respectively during 0800 to 1800 hours, AUFLS feeders are being included for all energy savings.
- The load-shedding will be regularly monitored to ensure that the two AUFLS blocks of 16% are maintained.

7.4 Shutdown Notification

When requested to reduce demand with rolling outages, Counties Power will use the planned outage procedure to advise retailers of pending outages in advance. It will not be possible to use our standard mail planned outage notification process for all customers because of the large volume of outage notifications required. Counties Power will therefore endeavour to advise customers in advance through media channels. The time and extent of advertised outages will be approximate because of normal demand variations.

7.5 Vulnerable Consumers and Priority Sites

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

7.6 Transmission Grid Emergency during Developing Events

If the System Operator declares a grid emergency during a “Developing Event” event, the grid emergency will take priority. As water heating control will not generally be used to reduce load in a “Developing Event”, Counties Power will have that capacity available for load reduction for the grid emergency.

If this is insufficient, the rolling outage feeder classification may be rearranged to comply with the requirements of the specific GEN. After the grid emergency is over, the programmed rolling outages schedule will continue.

7.7 Supply Restoration

Restoration of disconnected load must be carried out in conjunction with the System Operator. This is to prevent overload of the transmission network and the creation of any further instability. The System Operator has advised that load changes of less than 25 MW in any five minutes may be implemented by a network without their prior approval. Given total Counties Power network demand, it is unlikely that this limit will be approached other than in exceptional circumstances.

7.8 Communication

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

All communications with the System Operator will be between Counties Power's Control Room and Transpower's Regional Operating Centre using Transpower's telephone or as a back-up, the direct operator's line (via Telecom's exchange).

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

7.9 Staff Responsibilities

Within one day of declaration of a “Developing Event”, the Duty Operator will notify the Commission of the updated contact details including telephone numbers and email address for each of the positions named in Figure 3.

Figure 3: Staff Roles and Responsibilities

Role	Person Responsible
Receive communication from Commission	General Manager (Network)
Receive communication from System Operator	Duty Operator
Implement this plan	Planning Engineer
Weekly savings reporting	Business Analyst
Retailer notification	Customer Care Manager
Revoking rolling outages	Planning Engineer
Reporting to Electricity Commission	Planning Engineer
Reporting to media, public agencies	General Manager (Network)

7.10 Rolling Outages Strategy

The General Manager (Network), Planning Engineer and Operating Team will review weekly targets and prepare plans for weekly rolling outages based on required savings. The plans will be forwarded to the retailers for consumer and media notification.

The following method will be used:

- Rolling outage feeders will be assigned a priority according to the criteria specified in Figure 2 wherever possible.
- Switching instructions will be issued according to the level of savings required.
- Planned energy savings will be based upon network energy usage for the same period in the previous year.
- A plan will be prepared to target the required savings level, taking account of any under or over savings carried forward from earlier SOSOP periods. As far as possible, groups will be selected depending on the saving level required in Figure 4.
- As AUFLS Block 1 and 2 are being over-compensated at 24% and 29% respectively during 0800 to 1800 hours, AUFLS feeders are being included as shown in Figure 5.
- The priority group percentages depends on the following:
 - level of generation at Hampton Downs and it is assumed to be on 2MW for the period of 0800 to 1800 hours.
 - whether or not BHP New Zealand Steel's Mine Site, Pump Stations 1 and 2 feeders are in operation.

Figure 4: Priorities and Saving Levels

Savings required	Priority groups used
Up to 5%	6
10% to 20%	5, 6
25% and above	3, 4, 5, 6

7.11 Target Monitoring

The Business Analyst will monitor energy savings against weekly targets and, together with the Planning Engineer, review future load shedding to increase or decrease the rolling outage programme as necessary.

The Business Analyst will be responsible for daily and weekly reporting of consumption relative to target levels. The Business Analyst in conjunction with the Planning Engineer will also be responsible for providing the predicted load for the next week on a seven day rolling basis. This prediction will be prepared by GXP for each half-hour period.

The Business Analyst will supply the following information to the Security Coordinator at the System Operator:

- A daily rolling week-ahead load forecast (beginning at a time specified by the System Operator) that forecasts the reasonable expectation of the half-hourly load at each GXP. This forecast should take into account the impact of any rolling outages
- Any variation in the weekly load forecast of $\pm 20\%$ at each GXP
- The level of consumption relative to the target levels
- The nature and extent of rolling outages.

The Planning Engineer will also monitor the rolling outages and assess the degree of compliance with the POP daily, reporting on the level of compliance at a frequency directed by the Commission.

7.12 Log of Rolling Outages

Duty operators will log the times of disconnection and reconnection of all feeder interruptions and enter in the rolling outage log (Appendix A).

8 IMPLEMENTATION PLAN FOR ROLLING OUTAGES

When instructed by the System Operator following a supply shortage declaration to reduce demand, rolling outages will be implemented as per this plan. The Planning Engineer will ensure load shedding schedules are prepared, system control rosters are adjusted as required, and load is controlled and monitored daily to meet desired targets.

The Business Analyst will provide daily rolling week-ahead load forecast, schedules of estimated load shedding, restoration times and quantities to the System Operator seven days before the planned outage. If significant variation of $\pm 20\%$ in the weekly load forecast is noticed, or expected, from the schedules provided, then Counties Power shall advise the System Operator of this change.

The Planning Engineer will also report compliance to the Commission as detailed in Section 7.11.

Where possible, Counties Power will try to comply with priorities in Figure 2 to select feeders for rolling outages. Counties Power will endeavour to keep rolling outages to any consumer within 6 hours per day for a 5% savings target. For savings more than 5%, longer and more frequent outages is necessary.

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

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

8.1 Feeder Selection

The feeders to be disconnected are shown in Appendix B. This feeder schedule is based upon the priority guidelines shown in Figure 2.

The number of feeders chosen for any week will depend upon the required level of savings. The tables in Figure 5 show the consumer priority groups, outage duration and number of days to achieve the required savings level. The outage durations are indicative only and will be reviewed daily to achieve the specified targets.

Figure 5: Energy Saving Levels per Consumer Priority Group

5% Energy Savings Level

Consumer Priority Group	Average Feeder Load %	Hours	Days	Energy Savings %
6	8.6%	6	6	1.8%
6 AUFLS Zone 2	9.1%	6	6	1.9%
6.1 AUFLS Zone 1	7.1%	6	6	1.5%
Total savings:				5.1%

10% Energy Savings Level

Consumer Priority Group	Average Feeder Load %	Hours	Days	Energy Savings %
6	8.6%	8	6	2.4%
6 AUFLS Zone 2	9.1%	8	6	2.5%
6.1 AUFLS Zone 1	7.1%	8	6	1.9%
5	23.5%	6	4	3.2%
Total savings:				10.1%

15% Energy Savings Level

Consumer Priority Group	Average Feeder Load %	Hours	Days	Energy Savings %
6	8.6%	8	7	2.8%
6 AUFLS Zone 2	9.1%	8	7	2.9%
6.1 AUFLS Zone 1	7.1%	8	7	2.3%
5	23.5%	8	7	7.5%
Total savings:				15.5%

20% Energy Savings Level

Consumer Priority Group	Average Feeder Load %	Hours	Days	Energy Savings %
6	8.6%	10	7	3.5%
6 AUFLS Zone 2	9.1%	10	7	3.7%
6.1 AUFLS Zone 1	7.1%	10	7	2.8%
6.2 AUFLS Zone 1	5.3%	10	7	2.1%
5	23.5%	10	6	8.1%
Total savings:				20.2%

25% Energy Savings Level

Consumer Priority Group	Average Feeder Load %	Hours	Days	Energy Savings %
6	8.6%	10	7	3.5%
6 AUFLS Zone 2	9.1%	10	7	3.7%
6.1 AUFLS Zone 1	7.1%	10	7	2.8%
6.2 AUFLS Zone 1	5.3%	10	7	2.1%
5	23.5%	10	7	9.5%
4 AUFLS Zone 2	1.6%	10	7	0.6%
3	6.1%	10	6	2.1%
3.1 AUFLS Zone 2	2.4%	10	6	0.8%
Total savings:				25.1%

Certain critical installations are able to be supplied from more than one feeder as shown in Figure 6. These feeders will be shed at different times to enable the supply to these areas to be maintained.

Figure 6: Alternative Feeders

Installation	Normal Feeder	Alternative Feeder	Comment
Waikato Water Treatment Plant	River Road	Whangarata	Inform Watercare Operator before switching
Pukekohe Sewage Treatment Plant	Church Corner	Railway	Remote manual Switching
Bombay Motorway Service Area	Pukekohe East	Bombay	Automatic Changeover
Mercer Motorway Service Area	Mercer	Pukekawa	Automatic Changeover

8.2 Contingent Events

If an unplanned event occurs, such as a Civil Defence emergency that could alter the planned rolling outage schedule, the Customer Care Manager or Duty Operator will be responsible for communication of any changes to retailers.

8.3 Consumer Liaison

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

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

8.4 Vulnerable Customers

Retailers maintain lists of consumers with health and safety issues. It is not feasible for Counties Power 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.

9 COMMUNICATIONS WITH THE COMMISSION

The following contact details will be used for communications between Counties Power and the Commission, including that for the purposes of performance reporting against targets to the Commission's Emergency Response Project Manager:

Counties Power Ltd

Fax: 09 237 0919
Phone: 09 238 1764
Address: Glasgow Road, Private bag 4,
Pukekohe 2340

Electricity Commission

Fax: 04 460 8879
Phone: 04 460 8860
Address: P.O. Box 10041
Level 7, ASB Bank Building, 2 Hunter Street
Wellington

Appendix B: Rolling Outage Feeders Schedules

Sequence	Feeder	Priority Level	Consumer Priority Group	AUFLS Zone	Average Feeder Load %
1	CAPE HILL + 50% PUKEKOHE TOWN	6	6		6.8%
2	PAPAKURA SOUTH	6			1.8%
3	DRURYHILLS	5	5		5.4%
4	RED HILL	5			2.5%
5	BEACH ROAD	5			2.5%
6	HUNUA	5			2.6%
7	PUKEKOHE EAST	5			1.9%
8	KERI DOWNS	5			3.1%
9	MINESITE	5			3.2%
10	PUMP STATION 1	5			2.2%
11	PUMP STATION 2	5			0.2%
12	PUKEKOHE HILL	3		3	
13	ANCHOR FACTORY	3			2.2%
14	PUKEKOHE WEST	2	2		3.8%
15	BUCKLAND	2			3.3%
16	50% PUKEKOHE TOWN	1	1		1.4%
AUFLS Feeders (with under-frequency relay control at Counties Power Control Centre)					
17	PORT WAIKATO	6	6 AUFLS Zone 2	Zone 2	1.1%
18	MANUKAU HEADS	6		Zone 2	1.7%
19	WAIUKU SOUTH	6		Zone 2	2.4%
20	GLENBROOK	6		Zone 2	1.7%
21	GLEN MURRAY	6		Zone 2	0.7%
22	TE TORO	6		Zone 2	1.5%
23	WAIKU PA	6	6.1 AUFLS Zone 1	Zone 1	1.7%
24	TITI MAUKU	6		Zone 1	3.4%
25	PAKINGTON	6		Zone 1	2.0%
26	HINGAIA	4	4 AUFLS Zone 2	Zone 2	1.6%
27	TUAKAU	3	3.1 AUFLS Zone 2	Zone 2	2.4%
28	TEHIHI	6	6.2 AUFLS Zone 1	Zone 1	1.6%
29	ARARIMU	6		Zone 1	2.4%
30	GREAT SOUTH ROAD	6		Zone 1	1.2%