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Scanpower Limited  
*Participant Outage Plan*  
March 2010

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## **1.0 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 that 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. Scanpower will always endeavour to keep consumers supplied. Scanpower 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 should communicate its requests is detailed below. The main energy saving measure listed is rolling outages and how these are structured and implemented is also discussed below.

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## 2.0 DEFINITIONS

<i>AUFLS</i>	Automatic Under Frequency Load Shedding
<i>Commission</i>	Electricity Commission
<i>Developing Event</i>	An event that evolves over time, for example low hydro lake levels
<i>Duty Officer</i>	Scanpower staff member rostered in Control Centre
<i>EDN</i>	Electrical Distribution Network
<i>Electricity Act</i>	Electricity Act 1992 and subsequent amendments
<i>Feeder</i>	A high voltage circuit typically supplying up to 2000 consumers
<i>GXP</i>	Transpower Grid Exit Point
<i>GEN</i>	Grid Emergency Notice
<i>Immediate Event</i>	An event that occurs with no warning, for example a transmission line fault
<i>POP</i>	Participant Outage Plan (this plan)
<i>Regulations</i>	Electricity Governance Regulations 2008 and subsequent amendments
<i>Retailers</i>	Electricity Retail Companies
<i>Rolling Outages/Cuts</i>	Planned electricity disconnections spread over different parts of the network at differing times to avoid prolonged outages at any one location
<i>SOSOP</i>	Security of Supply Outage Plan (Electricity Commission)
<i>Supply Shortage Declaration</i>	Declaration made by the Electricity Commission under regulation 9
<i>System Operator</i>	Operator of the national electricity transmission grid

### **3.0 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 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.

#### **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 Scanpower.

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 *Scanpower***

Scanpower is the electricity network company that owns and maintains the electricity lines and cables that deliver electricity to consumers in the Northern Taranaki District through grid exit points at Woodville and Dannevirke. The peak demand on the Scanpower network is forecast to be 15.6 MW in 2010.

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## 4.0 SUPPLY AND DEMAND

### 4.1 *Background*

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.

### 4.2 *Load Reduction by Scanpower*

Scanpower has some ability to reduce load by turning off domestic water heaters via ripple control in Woodville and Dannevirke. Further load reductions would require disconnecting consumers.

### 4.3 *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.

### 4.4 *Significant Incident*

Both Developing and Immediate Events will be classed by Scanpower as a significant incident and the Chief Executive Officer will assemble a team of senior managers and staff to manage the incident.

Communication with retailers will be as per normal notification procedures, via the Retailer e-mail group.

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

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## 5.0 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 *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. Scanpower does not presently participate in this market.

### 5.2 *Disconnecting Customers*

#### 5.2.1 *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. Transpower has installed these relays on 11kV feeders at the GXPs and the total load of the selected feeders is disconnected by Transpower.

#### 5.2.2 *AUFLS Zone 1*

If system frequency fails to recover after Reserve market load shed, AUFLS Zone 1 shedding by Transpower will occur. This will disconnect at least 16% of Scanpower's load by disconnecting customers supply.

#### 5.2.3 *AUFLS Zone 2*

If zone 1 tripping fails to restore frequency, the next stage, zone 2 activates. Transpower would disconnect at least a further 16% of Scanpower's load.

#### 5.2.4 *Manual Load Shedding*

If AUFLS Zone 1 and Zone 2 tripping fails to stabilise frequency the System Operator will shed more load. Once the frequency has stabilised the System Operator will advise Scanpower Duty Officer when load can be restored.

### 5.3 *Supply Restoration*

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

#### **5.4 Electricity Commission Declaration**

For some Immediate Events, the Electricity Commission may declare that rolling outages are required to be implemented. In such a situation, the procedures for Developing Events will need to be implemented as per section 6 and 7.

#### **5.5 Transmission Grid Emergency**

The System Operator may request Scanpower to reduce load under a grid emergency notice (GEN). Scanpower would commence with shedding water heating load and then if necessary shed feeders as per Scanpower's feeder priority list.

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

## 6.0 DEVELOPING EVENTS

If the Commission requests through the System Operator a load reduction in response to a Developing Event, Scanpower would 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 Scanpower 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

The Commission will endeavour to provide nine days prior notice of the requirement for weekly energy savings. It is Scanpower’s plan to use the standard planned outage notification procedure to retailers. Any increase in the weekly energy savings target would also preferably have nine days prior notice although this may not be possible.

During a Developing Event, the Commission may 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 assume responsibility for general media advertising of the need to conserve electricity and the impending rolling outages when they are directed.

### 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.

Table 1 - Priority Loads

Priority	Priority Concern	Maintain Supply to:
1	Essential public services	Emergency operation centres, energy control centres, communication networks, water and sewage pumping and fuel delivery systems
2	Public health and safety	Medical centres, schools, and street lighting
3	Food production and delivery	Dairy farms and milk production facilities, supermarkets
4	Domestic production	Commercial and industrial premises
5	Disruption to consumers	Residential premises

These priorities are intended as guidelines, and because rolling outages will be implemented on a feeder by feeder basis, it is not possible to discriminate between individual consumers on the same feeder. For example, a predominantly residential feeder may also have small pockets of commercial or industrial consumers.

### 6.3 AUFLS Criteria

Currently, the same criteria for rolling outages as shown in Table 1 are also used to select 11kV feeders for AUFLS tripping. Thus, AUFLS load blocks are predominantly from lower priority load categories however some higher priority consumers would also be affected.

For system security reasons, feeders that are included in AUFLS blocks will be excluded from rolling outages to the extent necessary to maintain 16% AUFLS in each of zone 1 and zone 2. Though an exemption for AUFLS blocks may be available, 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 may not be considered.

#### **6.4 Shutdown Notification**

When requested to reduce demand with rolling outages, Scanpower plans to use the planned outage procedure 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**

Scanpower 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 Event, the grid emergency will take priority. As water heating load generally would not be used to reduce load in a Developing Event, Scanpower 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**

To prevent overloading the transmission network and creating 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. Scanpower's network falls within this category.

#### **6.8 Communication**

##### **6.8.1 Communication with the Media and Consumers**

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

##### **6.8.2 Communication with the System Operator**

All communications with the System Operator will be via the Central (Haywards) Regional Operating Centre using Transpower's TPSN telephone in Dannevirke. Prior to notifying and implementing rolling outages, Scanpower will consult with the Security Coordinator (at System Operator) to establish a process for load shedding and restoration.

## 6.9 Staff Responsibilities

Table 2- Staff Responsibilities

Role	Person Responsible	Contact Details
Receive communication from Commission	Chief Executive Officer	Phone (06) 374 8039 Fax (06) 374 8631 E-mail enquiries@scanpower.co.nz
Receive communication from System Operator	Duty Officer	Phone (027) 243 8805 Fax (06) 374 9593 E-mail enquiries@scanpower.co.nz
Implement this plan	Duty Officer	Phone (027) 243 8805 Fax (06) 374 9593 E-mail enquiries@scanpower.co.nz
Weekly savings reporting	Network Manager	Phone (027) 226 5407 Fax (06) 374 9593 E-mail enquiries@scanpower.co.nz
Retailer notification	Duty Officer	Phone (027) 243 8805 Fax (06) 374 9593 E-mail enquiries@scanpower.co.nz
Revoking rolling outages	Chief Executive Officer	Phone (06) 374 8039 Fax (06) 374 8631 E-mail enquiries@scanpower.co.nz
Reporting to Electricity Commission	Chief Executive Officer	Phone (06) 374 8039 Fax (06) 374 8631 E-mail enquiries@scanpower.co.nz
Reporting to media, public agencies	Chief Executive Officer	Phone (06) 374 8039 Fax (06) 374 8631 E-mail enquiries@scanpower.co.nz

Within one day of declaration of a Developing Event, 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 and the Chief Executive Officer 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 same period last year.

## 6.11 Target Monitoring

For load shedding to a weekly target, the Network Manager will monitor energy savings against target and review future load shedding to increase or decrease the amount of rolling outages to enable the weekly target to be met. The Network Manager will be responsible for daily updating and reporting of the weekly consumption relative to target levels. The Network Manager will also be responsible for providing the predicted load for the next week on a daily basis. This prediction is to be by GXP for each



## 7.0 ROLLING OUTAGES

When instructed by the System Operator, following a supply shortage declaration, to reduce demand, rolling outages will be instigated by the Duty Officer as per this plan and outage strategy. The Duty Officer 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 is noticed, or expected, from the schedules provided to the System Operator then Scanpower shall advise the System Operator of this change.

Where possible, Scanpower will try to comply with priorities in Table 1 to select feeders for rolling outages. Scanpower will endeavour to keep rolling outages to any consumer no longer than 4 hours per day for a 5% savings target. For savings more than 5% longer and more frequent outages may be necessary.

Outages will be programmed between 0800 and 1800 on all days. Night time is excluded from the cut period for safety reasons. Initially outages will be scheduled for mid-afternoon to limit the economic effects. Timing of outages will be approximate and could vary daily due to network or System Operator constraints. The table below shows the planned cut duration for each specified savings level. Cuts are based on five to seven days per week and the listed priorities are the highest priority loads expected to be cut as per Table 1.

*Table 3 - Rolling Cut Consumers Priority*

Savings Level	Highest Priority	Maximum Duration	Days per week
5%	4	6hrs	6
10%	3	6hrs	6
15%	2	6hrs	7
20%	2	6hrs	7
25%	2	10hrs	7

### 7.1 Feeder Selection

Feeders to be disconnected are shown in the Feeder Priority List. These tables are based upon priority guidelines shown in Table 1. Feeders will be chosen in descending order of priority subject to AUFLS and security of supply obligations. The number of feeders chosen for any week will depend upon the level of savings required to meet target.

*Table 4 – Feeder Priority List*

GXP	Switch Number	Feeder Name	System Load %	AUFLS Category	Priority
Woodville	10	Country	5%	Zone 1	4
Dannevirke	2742	Adelaide Rd	14%	Zone 1	4
Dannevirke	2622	North	8%	Zone 1	4
Woodville	9	Town 2	6%	Zone 2	3
Dannevirke	2762	Te Rehunga	7%	Zone 2	3
Dannevirke	2722	Weber	12%	Zone 2	3

Table 4 – Feeder Priority List Continued

GXP	Switch Number	Feeder Name	System Load %	AUFLS Category	Priority
Dannevirke	2662	Central	8%	NA	2
Woodville	11	Town 1	10%	NA	2
Dannevirke	2702	East	12%	NA	2
Dannevirke	2642	Mangatera	10%	NA	1
Dannevirke	2682	Pacific	8%	NA	1

### 7.2 *Contingent Events*

If an unplanned event occurs, such as a Civil Defence emergency that could alter the planned rolling outages. The Duty Officer will be responsible for communication with retailers of any changes to the advertised program.

### 7.3 *Consumer Liaison*

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

### 7.4 *Vulnerable Consumers*

It is not feasible for Scanpower to prevent rolling outages affecting individual vulnerable consumers. Scanpower maintains a list of consumers with health and safety issues. During rolling outages Scanpower’s Duty Officer will attempt to advise customers of outages affecting them. Media releases will also advise consumers with health problems as to their best course of action.