

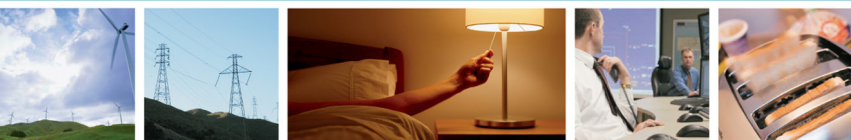
# System Performance Report

## To the Electricity Commission

### August 2010

#### *Purpose*

This System Performance Report summarises power system performance each month. The detailed reporting of system events is intended to provide an understanding of the nature of system events that occur in the normal course of the real time co-ordination of security and to identify emerging issues in system operation.



SYSTEM OPERATOR

*Keeping the energy flowing*

TRANSPOWER



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## 1. SUMMARY OF SYSTEM PERFORMANCE

This system performance report covers the month of August 2010.

### Principal Performance Obligations

The System Operator met the Principal Performance Obligations during the reporting period.

### Operational Management

No significant operational management matters during August. Two new co-ordination staff members commenced training during the month, joining two other trainees who commenced training in February. Minimum initial training time is 6 months.

### System Events

- Stratford generation ran back on 3<sup>rd</sup> August resulting in a momentary drop in frequency in the North Island to 49.43 Hz.
- Blenheim – Kikiwa Circuit 1 tripped on 13<sup>th</sup> August causing a loss of connection to Argyle of approximately 9 MW. Connection was restored after 201 minutes.
- Karapiro – Te Awamutu Circuit 1 tripped on 20<sup>th</sup> August resulting in a loss of supply to Te Awamutu of approximately 29 MW. Supply was restored after 42 minutes.
- Hawera 110 / 33 kV supply transformers T1 and T2 tripped on 20<sup>th</sup> August resulting in a loss of supply to approximately 16 MW of load on the 33 kV bus. The 110 kV Whareroa – Hawera Circuits 1 and 2 also opened due to the fault, resulting in Whareroa islanding from the grid. Whareroa successfully resynchronized to the grid after 68 minutes, and supply was restored to Hawera after 78 minutes.
- Ashburton 220 / 66 kV supply transformer T8 tripped on 30<sup>th</sup> August resulting in a loss of supply to the Ashburton 66 kV supply point of approximately 21 MW. Supply was restored after 67 minutes.
- Other noteworthy events occurring during the reporting period:
  - tripping of 66 kV Coleridge – Otira Circuits 1 & 2 on 1<sup>st</sup> August resulted in a loss of supply to Arthur's Pass and Castle Hill Substations. These starts are 'tee' connected into Coleridge – Otira Circuit 1;
  - tripping of Ohaaki generator G1 on 1<sup>st</sup> August;
  - tripping of Ohaaki generator G2 on 2<sup>nd</sup> August;
  - auto-reclose of 50 kV Te Kaha – Waiotahi Circuit 1 on 2<sup>nd</sup> August resulting in a momentary loss of supply to Te Kaha;
  - Kawerau Geothermal power station tripped on 6<sup>th</sup> August;
  - Glenbrook Co-gen power station tripped on 8<sup>th</sup> August;
  - Ohakune – National Park – Ongarue Circuit 1 tripped on 11<sup>th</sup> August resulting in a short loss of supply to National Park Substation;



- Benmore 220 / 16 kV inter-connecting transformer, T2 tripped on 11<sup>th</sup> August resulting in the islanding of Benmore generation on HVDC Pole 1;
- TWC Windfarm tripped on 16<sup>th</sup> August;
- Wairakei G9 and 14 units tripped on 16<sup>th</sup> August;
- Coleridge generator G2 tripped on 16<sup>th</sup> August;
- Matahina generator G2 tripped on 16<sup>th</sup> August;
- Rotokawa generation tripped on 17<sup>th</sup> August;
- Tuai generator G6 tripped on 18<sup>th</sup> August;
- Tauhara generators G1 & G2 tripped on 21<sup>st</sup> August;
- Rotokawa generation tripped on 27<sup>th</sup> August;
- Wairakei generator G13 tripped on 31<sup>st</sup> August;
- Tuai generator G6 tripped on 31<sup>st</sup> August.



## 2. PRINCIPAL PERFORMANCE OBLIGATIONS

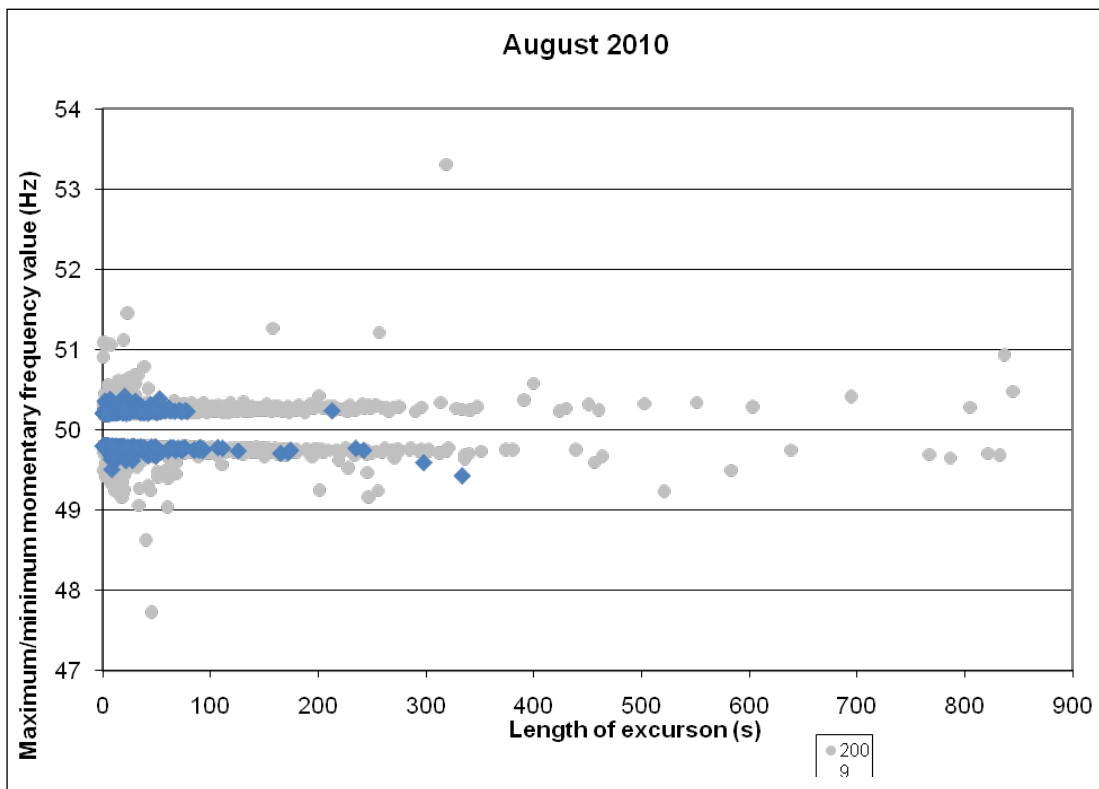
### 2.1 AVOID CASCADE FAILURE

No instances of cascade failure occurred during the reporting period.

### 2.2 FREQUENCY

Maintain frequency in normal band and recover quickly from a fluctuation

The chart below shows the maximum or minimum frequency reached and length of each frequency excursion outside the normal band (49.8 to 50.2 Hz) during the reporting period. The majority of excursions are within 0.4 Hz of the normal band and frequency typically returns to within the normal band within 2 minutes.



Manage Frequency and limit rate of occurrences during momentary fluctuations

The table below shows the total number of momentary fluctuations outside the frequency normal band, recorded in both Islands, over the last 12 months. The 12 month cumulative totals, grouped by frequency band, are compared to the frequency performance objective (PPO).

Frequency Band	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Annual rate	PPO target
55.00 >= Freq > 52.00													0	
52.00 >= Freq > 51.25		1			1						1		3	7
51.25 >= Freq > 50.50	6	4	1	1		2	1	2	1	1	1		20	50
50.50 >= Freq > 50.20	29 2	22 8	85	14 8	14 0	27 9	34 8	35 1	28 6	37 6	38 2	33 7	325 2	
50.20 >= Freq > 49.80														
49.80 >= Freq > 49.50	15 4	15 2	98	13 4	10 9	27 8	26 8	36 7	25 3	28 1	36 8	29 1	275 3	
49.50 >= Freq > 48.75	3	2		2	2	5	5	3	1	6	4	1	34	60
48.75 >= Freq > 48.00													0	6
48.00 >= Freq > 47.00													0	0.2
47.00 >= Freq > 45.00													0	0.2

Manage time error and eliminate time error once per day

The time error performance criteria are:

Time error must be managed within +/- 5 seconds.

Time error must be eliminated at least once every day.

Time Error Compliance Table		Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10
Time Error Management	NI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
	SI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Error Elimination	NI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

### 3. OPERATIONAL MANAGEMENT

#### 3.1 SECURITY NOTICES

The following table shows the number of Warning Notices, Grid Emergency Notices, Customer Advice Notices and Demand Allocation Notices issued over the last 12 months.

Notices issued	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10
Demand Allocation Notice												
Grid Emergency Notice	8	6		1	4	3		4	5	5	2	
Warning Notice	5	3	1								1	
Customer Advice Notice	7	41	16	11	18	31	16	12	20	10	17	11

#### 3.2 GRID EMERGENCIES

The following table shows grid emergencies declared by the System Operator in the reporting period.

Grid Emergencies			
Date	Time	Summary Details	Island
None			

A summary of grid emergencies that have occurred in the last 12 months is shown in the following table.

Island	Region	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Total
North Island	Northland									2				2
	Auckland		1			2	1							4
	Zone 1					1					1			2
	Waikato		1		1									2
	Bay of Plenty										2			2
	Hawkes Bay													0
	Taranaki											1		1
	Bunynthorpe													0
	Wellington	5							1			5		11
	North Island (all)	3	4				1			2	1	3		14
South Island & HVDC	Nelson Marlborough													0
	West Coast						1		1			1		3
	Christchurch													0
	Canterbury													0
	Zone 3													0
	Otago													0
	Southland								1					1
	South Island (all)									1				1
	HVDC								1					1



## CUSTOMER ADVICE NOTICES (CANs)

Eleven CANs (Customer Advice Notices) were issued in the reporting period:

- two related to a planned outage of HVDC Pole 1;
- two related to planned outages for the HVDC Bipole;
- four related to a change in HVDC Pole 1 capability;
- two advised of forecast standby reserve shortfall that had to be manually sent due to issue with the automatic process.
- two advised of a critical gas contingency; and
- one advised of a change to the Upper North Island stability constraint.

### 3.4 STANDBY RESIDUAL CHECK (SRC) NOTICES

A total of two hundred and forty-five SRC notices were issued during the reporting period based on the SDS (System Operator's own load forecasting tool). These SRC notices were in respect of trading periods on 1<sup>st</sup>, 9<sup>th</sup>-11<sup>th</sup>, 16<sup>th</sup>-20<sup>th</sup>, 23<sup>rd</sup>-31<sup>st</sup> of August.

### 3.5 VOLTAGE MANAGEMENT

Grid voltages did not exceed the EGR voltage ranges during the reporting period.

No contracted voltage support ancillary services were called upon during the reporting period.

### 3.6 OUTAGE MANAGEMENT

The following table shows the number of outages over the last 12 months where operational measures (generation agreements, load management agreements or grid re-configurations) were required to allow the outage to proceed. Load agreements generally require the distributor to manage load at one or more grid exit points. Generation agreements are required to ensure that sufficient regional generation is available to provide energy or reactive support during the outage to maintain security standards. Grid re-configurations typically involve splitting the network during the outage to manage post contingency power flows. Security of supply is sometimes reduced by grid re-configuration.



Island	Region	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Total
North Island	Northland	4	8	24	4	1	21	16	19	7	7	2	1	<b>114</b>
	Auckland	15	7	13	8	1	2	9	4	4	1	5	3	<b>72</b>
	Waikato	3	6	7	5	2	10	12	5	19	9	3	1	<b>82</b>
	Bay of Plenty	10	4	5	2	2	11	12	8	12	6	1	10	<b>83</b>
	Hawkes Bay	1	2	3	1	3	6	2	1	6	7		2	<b>34</b>
	Taranaki		1	3	1	1	5	1		8	4	1		<b>25</b>
	Bunynthorpe		5	3	1	3	5	9	16	5	5	2	2	<b>56</b>
	Wellington	7	4	7	6	2	7	11	6	4	9	5	11	<b>79</b>
<b>Total</b>		<b>40</b>	<b>37</b>	<b>65</b>	<b>28</b>	<b>15</b>	<b>67</b>	<b>72</b>	<b>59</b>	<b>65</b>	<b>48</b>	<b>19</b>	<b>30</b>	<b>545</b>
South Island	Nelson Marlborough	10	5	6	2	1	5	6	6	4	4			<b>49</b>
	West Coast	2	2	4			2	3	3	3	3	7	9	<b>38</b>
	Christchurch	4	4	3	4	2	1	2		3				<b>23</b>
	Canterbury		3	3			2	6	4		5	3		<b>26</b>
	Otago	1	5	2		3		2	4		4	6	7	<b>34</b>
	Southland		10	4	2	2	6	4	2	3		3	3	<b>39</b>
<b>Total</b>		<b>17</b>	<b>29</b>	<b>22</b>	<b>8</b>	<b>8</b>	<b>16</b>	<b>23</b>	<b>19</b>	<b>13</b>	<b>16</b>	<b>19</b>	<b>19</b>	<b>209</b>



### 3.7 CONSTRAINTS

#### SUMMARY: Security constraints binding during the month

The following table shows the binding constraints during the reporting period.

Additional information on security constraints can be found on the following website address: <http://www.transpower.co.nz/?id=5979>. This information includes constraint equations and a brief summary of their purpose.

Island	Region	Constraint Name	Description
North Island	Hamilton	ARI_HAM_1_and_2_ARI_RUNBACK_ENABLED_W_P_1A	The effect of this constraint is to manage flows through Arapuni-Hamilton 1 and 2 for a contingency of Arapuni-Hamilton 2 or 1 during high ARI generation. Arapuni Runback Scheme enabled.
South Island & HVDC	HVDC	DCNPole1Max	The purpose of this constraint is to limit the flow on HVDC Pole 1 to the Asset Owner's offered capability.
	Southland	ROX_T10_P_1_temp	The effect of this constraint is to manage flows through Roxburgh T10 for a contingency of Gore-Roxburgh 1 during north transfer or high ROX 110kV generation.
		BAL_BWK_1_O_1_temp	The effect of this constraint is to manage flows through Roxburgh T10 for a contingency of Gore-Roxburgh 1 during north transfer and high Roxburgh 110 kV generation when Balclutha-Berwick is out of service with the bus at Gore split. With this configuration Balclutha is supplied from Roxburgh while Edendale, Brydone and Gore are supplied from Invercargill.

#### Constraints binding during last 12 months

The following table shows the binding constraints binding during the reporting period with a duration of more than 4 trading periods and those binding for more than 48 trading periods during the previous 12 months.

Island	Region	Constraint	Reporting period		Previous 12 months	
			Number of trading periods that constraint bound	Percentage of trading periods	Number of trading periods that constraint bound	Percentage of Trading periods
North Island	Hamilton	ARI_HAM_1_and_2_ARI_RUNBACK_DISABLED_S_P_1	0	0.00%	56	0.32%
		ARI_HAM_1_and_2_ARI_RUNBACK_ENABLED_S_P_1	0	0.00%	54	0.31%
South Island	West Coast	WEST_COAST_SPLIT_O_1	0	0.00%	110	0.63%
	Otago	NSY_ROX_1_S_P_z	0	0.00%	337	1.92%
	Southland	BAL_BWK_1_O_1_temp	5	0.34%	0	0.00%
	HVDC	DCNPole1Max	14	0.94%	3381	19.30%
		DCNPole1Min	0	0.00%	2486	14.19%
		BEN_HAYP1max	0	0.00%	479	2.73%



## 4. SYSTEM EVENTS

### 4.1 SIGNIFICANT SYSTEM EVENTS

The following table shows significant events (frequency excursions and connection point events) which occurred during the reporting period.

#### Significant frequency excursions

Date	Time	Summary Details	Island	Freq (Hz)
3 August 2010	03:56	Stratford generation ran back resulted in a momentary drop in frequency in the North Island.	North	49.43

#### Connection point events

Date	Time	Summary Details	Generation/Load interrupted (MW)	Restoration time (minutes)
13 August 2010	07:10	Blenheim-Kikiwa 1 circuit tripped causing loss of connection to Argyle.	10	201
20 August 2010	08:50	Karapiro-Te Awamutu 1 circuit tripped causing loss of connection to Te Awamutu.	29	42
20 August 2010	23:15	Hawera T1 and T2 supply transformers tripped causing loss of connection to Hawera.	17	82
30 August 2010	16:09	ASB T8 tripped.	20	68

### 4.2 SYSTEM EVENTS DURING REPORTING PERIOD

System events that occurred during the reporting period are summarised below:

#### Contingent events

Event	Number	Summary
Loss of single AC transmission circuit	13	These related to trippings of Te Kaha-Waiotahi 1 (Auto Reclose) Stoke-Upper Takaka 1 & Motueka T6 Woodville-Dannevirke-Waipawa 2 Islington-Kikiwa 1 (Auto Reclose) x 2 Ohakune-Ongarue 1 Edgecumbe-Kawerau 1 Blenheim-Kikiwa 1 Masterton-Upper Hutt 1 (Auto Reclose) Karapiro-Te Awamutu 1 Hamilton-Waihou 2 (Auto Reclose) Naseby-Roxburgh 1 (Auto Reclose) x 2
Loss of HVDC pole	1	This related to trippings of Arcback on HVDC Valve Group VG1 on startup. No loss of transfer.
Loss of single generation units	20	These related to trippings of Ohaaki G1 & G2 tripped Stratford CCGT runback operations x 2 Kawerau Geothermal tripped Glenbrook Co-gen tripped Tararua Windfarm tripped Wairakei G9 & G 13 & G14 Coleridge G2 Matahina G2 x 2 Rotokawa generation x 2 Tuai G6 (KTW) x 2 & Tuai G7 x 1 Whareroa G1 Tauhara G1 & G2 Paerau Generation tripped
<b>Total during reporting period</b>	<b>34</b>	



### Extended contingent events

Event	Number	Summary
Loss of both HVDC poles	0	

### Other events

Event	Number	Summary
Loss of multiple AC transmission circuits	2	These events related to trippings of Coleridge-Otira1 & 2 tripped Carrington Street-Motunui 1 & Motunui-Stratford 1 (Auto Reclose)
Loss of bus bar section	1	These events related to trippings of Hawera T1, T2 and Whareroa 212 & 282
Loss of interconnecting transformer	1	These events related to trippings of Benmore T2 tripped
Loss of grid reactive plant	1	These events related to trippings of Haywards SC9
Loss of supply transformer	3	These events related to trippings of Lichfield T2 Bromley T2 AshburtonT8
Demand change	0	
Loss of multiple generation units	0	
HVDC Start/ Stop	1	This event related to a tripping of HVDC Pole 2 Converted Txfr T23
<b>Total during reporting period</b>	<b>9</b>	

### Other disturbances

Event	Number	Summary
Feeder trippings	37	Various locations
Excursion notice	1	This event related to a tripping of Tiwai Potline 4 tripping
<b>Total during reporting period</b>	<b>38</b>	



### 4.3 SYSTEM EVENTS – TREND

	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Total	Average Events per month
Contingent Event – transmission	16	22	4	12	51	20	10	15	23	17	11	13	214	17.8
Contingent Event – generation	11	14	13	15	8	10	13	13	8	14	13	20	152	12.7
Contingent Event - HVDC	0	15	2	1	4	7	0	0	1	1	2	1	34	2.8
Extended Contingent Event	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Other Event – AC transmission	1	1	0	1	5	0	1	0	0	2	0	2	13	1.1
Other Event – Busbar	1	0	2	1	2	1	2	1	1	1	0	1	13	1.1
Other Event – Demand	5	4	4	1	0	0	1	0	1	1	1	0	18	1.5
Other Event – Generation	2	0	1		1	0	0	2	0	2	2	0	10	0.8
Other Event – Interconnecting transformer	1	0	0	1	1	1	1	0	1	2	0	1	9	0.8
Other Event – Reactive plant	6	10	2	8	5	6	5	3	4	2	3	1	55	4.6
Other Event – Supply transformer	3	3	4	4	3	2	11	1	3	7	3	3	47	3.9

