System Operator Reports
October 2013

Contents

SYSTEM OPERATOR

TRANSPOWER

Keeping the energy flowing

System Operator Operational and System Performance Report to the Electricity Authority

Period from 1 October – 31 October 2013

Purpose of Report

This report summarises the results of the System Operator's review of its performance for the period 1 October – 31 October 2013, as required under Clause 3.14 of the Electricity Industry Participation Code 2010 ("the Code"). Any relevant operational issues are also provided for the information of the Authority. A separate detailed System Performance report will be provided to Authority staff.

1. Summary of Month from an Operational and System Performance Perspective

1.1. Operational

November operations were dominated by Pole 2 controls testing. A significant volume of testing was carried out. Flows across the HVDC link rose as high as 1000MW during the month. In contrast to Pole 3 testing earlier in the year and given the acquired knowledge of the Siemens control system (now also installed for Pole 2) the number of unexpected events during the testing (so far) has been notably lower (though there have been events – see below). The System Operator has been heavily involved working with the Grid Owner to organise and plan the testing. A number of new operational attributes (notably round power and SFK – system frequency control) have been included in the HVDC tests being carried out.

From the 10th of October Pole 2 ceased to be treated as a secondary contingent risk. HVDC testing is expected to continue throughout November.

One major storm event affecting Hawkes Bay and parts of the South Island occurred on 14th October. A number of losses of supply occurred. WDV_DVK_WPW_1 and 2 circuits tripped at 11:16 with loss of supply at Waipawa and Dannevirke (23MW); restoration (to the distribution companies) was completed by 12:21. A brief loss of supply occurred at Arthur's Pass (0.4MW) and Castle Hill (0.3MW) occurred on the same day.

On the 12th a brief loss of supply (1.9MW) occurred at Tekapo when the TIM_TKA circuit tripped.

Three IL events occurred. The first, on the 17th, occurred when Pole 2 tripped at 02:15. This resulted in a loss of 182 MW of load. North Island frequency fell to 49.77Hz and South Island to 49.15Hz. The second and third events occurred on the 29th. At 10:10 ramping issues with the HVDC resulted in an event where North Island frequency fell to 49.71Hz and South Island to 49.10Hz. Shortly thereafter a Pole 3 ramping issue (outside of testing) resulted in South Island frequency falling to 49.71Hz and then rising to 51:26Hz.

1.2. Market

During October there were no outages to the Market system that exceeded two hours.

2. Business Performance

Significant Project Update

	Status	Implementation date	Update
Dispatchable demand	On Track	April 2014	• Final build of SO software delivered from vendors on 21 October. This is a key milestone for the project and has been achieved earlier than planned. • Early build has enabled testing to start earlier. • Work on the training and business processes is continuing to plan

3. Security of Supply Update

The NZ aggregate storage levels are 161% of average for the time of year. The Hydro risk meter is currently set at "normal". In the unlikely event of significant equipment failure, the Security of Supply status could change quickly.

4. Compliance Report

There were no breaches of the principal performance obligations by the System Operator during October. There was one breach of the Policy Statement by the System Operator that was reported to the Electricity Authority during the month of October.

The breach related to the risk levels applied during the commissioning of a new generator at Norske Skog. The System Operator over procured reserves when incorrectly assigning the risk.

5 Ancillary Services

There were no issues arising in ancillary services during the month of October.

Ancillary Service Costs

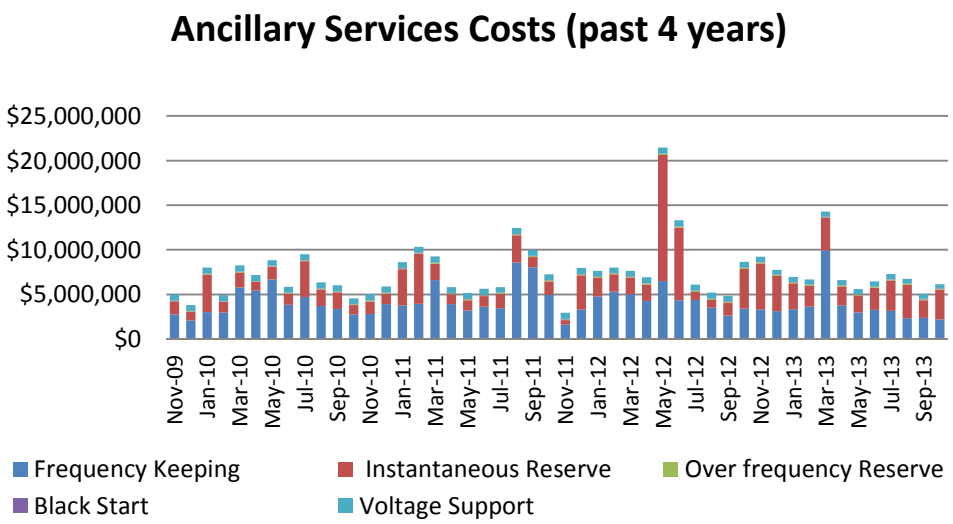
The costs of ancillary services for the month of October are set out in Appendix A (as required by clause 82.1 of the procurement plan).

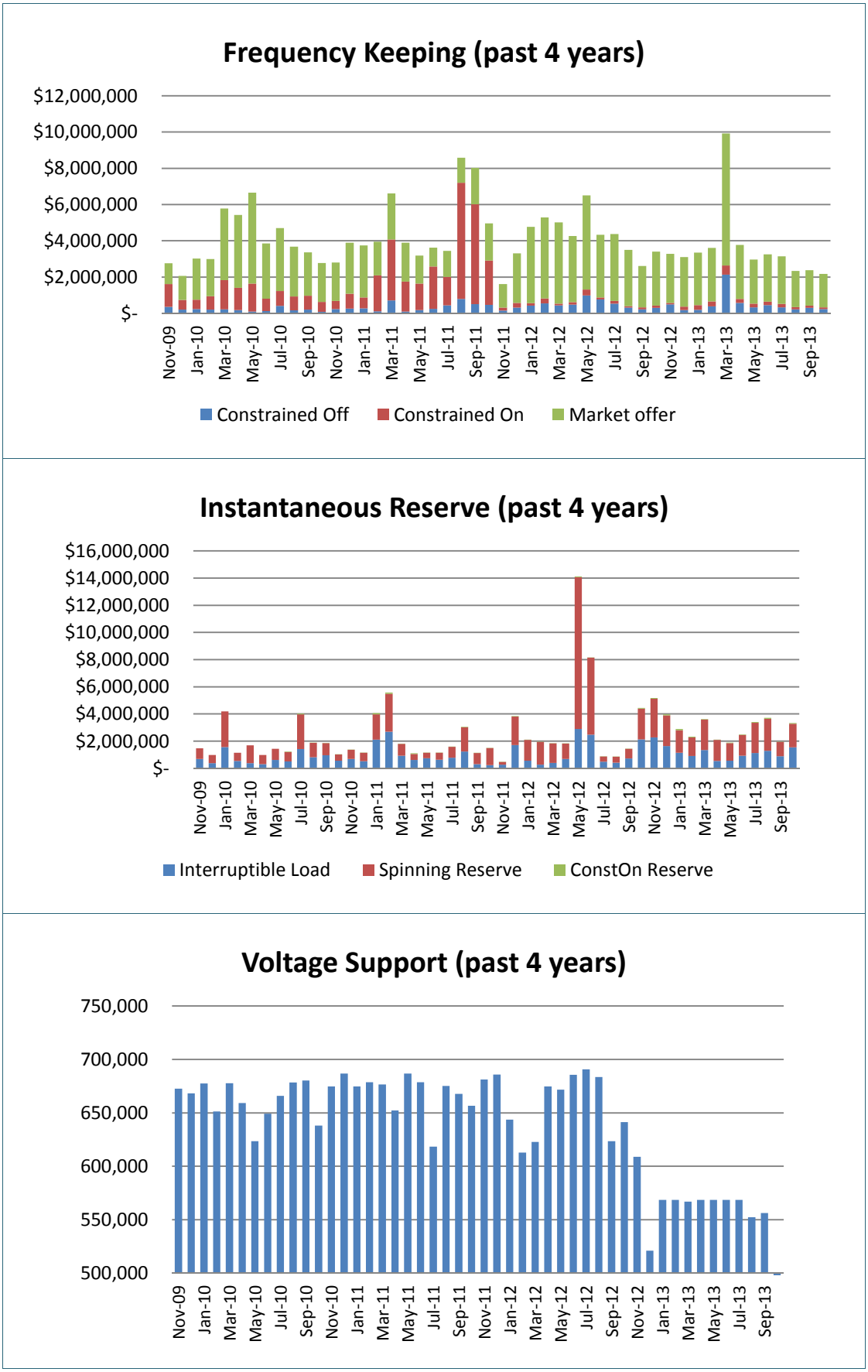
Code 7.10: Separation of Transpower Roles

In performing its role as System Operator, Transpower has not been materially affected by any other role or capacity Transpower has under the Code or under any agreement.

Appendix A – Ancillary Service Costs for 2013

		Cost	
Frequency Keeping	Constrained Off	$	234,114
	Constrained On	$	92,924
	Market offer	$	1,848,720
	Total monthly Cost	**$**	**2,175,758**
Instantaneous Reserve	Spinning reserve	$	1,744,602
	Interruptible Load	$	1,540,744
	Constrained On	$	45,006
	Total monthly Cost	**$**	**3,330,352**
Over Frequency Reserve	**Total monthly Cost**	**$**	**102,958**
Black Start	**Total monthly Cost**	**$**	**51,298**
Voltage Support	**Total monthly Cost**	**$**	**460,257**
All Ancillary Services	**Total monthly Cost**	**$**	**6,120,622**



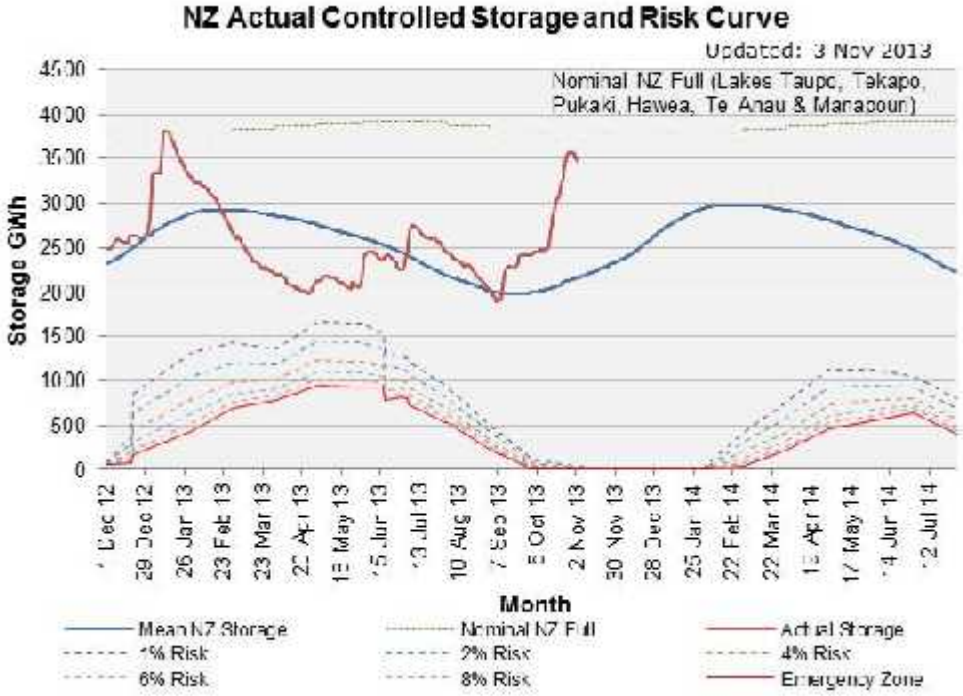

Frequency Keeping (past 4 years)
$12,000,000
$10,000,000
$8,000,000
$6,000,000
$4,000,000
$2,000,000
$-
Nov-09
Jan-10
Mar-10
May-10
Jul-10
Sep-10
Nov-10
Jan-11
Mar-11
May-11
Jul-11
Sep-11
Nov-11
Jan-12
Mar-12
May-12
Jul-12
Sep-12
Nov-12
Jan-13
Mar-13
May-13
Jul-13
Sep-13
Constrained Off
Constrained On
Market offer
Instantaneous Reserve (past 4 years)
$16,000,000
$14,000,000
$12,000,000
$10,000,000
$8,000,000
$6,000,000
$4,000,000
$2,000,000
$-
Interruptible Load
Spinning Reserve
ConstOn Reserve
Voltage Support (past 4 years)
750,000
700,000
650,000
600,000
550,000
500,000

Appendix B – Security of Supply

New Zealand Hydro Storage and Hydro Risk Curves

Aggregate primary New Zealand storage is 161% of average for this time of year.

The graph below compares New Zealand hydro storage to the hydro risk curves.



Hydro Storage and Generation

North Island Inflows over the last calendar month have been 107% of average.

South Island Inflows over the last calendar month have been 185% of average.

Measurements are based on daily inflow values.

Over the last 4 weeks hydro generation has met 62% of demand.

System Performance Report

To the Electricity Authority

October 2013

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

TRANSPOWER

Keeping the energy flowing

Transpower New Zealand Ltd The National Grid

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1. Summary of System Performance

This system performance report covers the month of October 2013.

Principal Performance Obligations

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

System Events

Planned testing of HVDC Pole 2 resulted in a number of frequency disturbances during the month, as follows:

- 3rd October at 14:15, the South Island frequency momentarily rose to 50.85 Hz due to a control system problem;
- 9th October at 14:49 a system ride-through test resulted in a momentary drop in North Island frequency to 49.37 Hz;
- 17th October at 02:15 a control system issue during a planned test resulted in the South Island frequency momentarily dropping to 49.15 Hz; this triggered the Tiwai AUFLS operation which was set at 49.2 Hz at the time, and this caused the SI frequency to over-recover to 51.85 Hz. The North Island frequency momentarily rose to 50.60 Hz due to the HVDC frequency modulation;
- 18th October at 12:50 a planned commissioning test resulted in the South Island frequency momentarily rising to 50 .52 Hz;
- 24th October at 12:11 a system ride-through test resulted in a momentary drop in North Island frequency to 49.29 Hz, and South Island frequency to 49.45 Hz;
- 29th October at 10:06 a control system problem during a routine dispatch of Pole 3 resulted in a momentary swing in frequency in the South Island from 49.10 Hz to 51.29 Hz;

On 3rd October at 23:12 the South Island frequency momentarily dropped to 49.45 Hz during the restoration of a Tiwai potline after a planned outage.

On 5th October at 03:02 the South Island frequency momentarily swung from 49.23 Hz to 50.97 Hz when HVDC Pole 3 was started as part of the normal dispatch process.

On 14th October at 11:37 110 kV Woodville – Dannevirke – Waipawa Circuit 2 tripped. This resulted in a loss of supply to Dannevirke and Waipawa Substations as the parallel Woodville – Dannevirke – Waipawa Circuit 1 had tripped a short time previously. Supply was restored to Waipawa Substation after 19 minutes and to Dannevirke Substation after 43 minutes.

Other noteworthy events occurring during the reporting period:

The unsettled weather experienced during spring continued into October resulting in a higher than average tripping count for the month.

On 12th October at 06:25 and again at 14:51 supply was lost to Tekapo A and Albury Substations when the 110 kV Timaru – Albury – Tekapo A Circuit tripped. Supply was restored after 25 minutes and 16 minutes respectively;

On 14th October at 01:33 66 kV Coleridge – Otira Circuits 1 & 2 tripped and auto-reclosed during a storm resulting in a momentary loss of supply to Arthurs Pass and Castle Hill Substations.

On 14th October at 11:02 110 kV Woodville – Dannevirke – Waipawa Circuit 1 tripped. This resulted in a loss of supply to Dannevirke and Waipawa Substations as the parallel Woodville

– Dannevirke – Waipawa Circuit 2 had tripped a short time previously. Supply was restored to Dannevirke Substation after 15 minutes and to Waipawa Substation after 16 minutes.

On 24th October at 13:49, 66 kV Cobb – Stoke Circuit 2 tripped. This resulted in a loss of supply to Motueka Substation as the transformer connecting Motueka to the parallel Stoke – Upper Takaka was out of service at the time for planned work. Supply was restored after 19 minutes.

2. Principal Performance Obligations

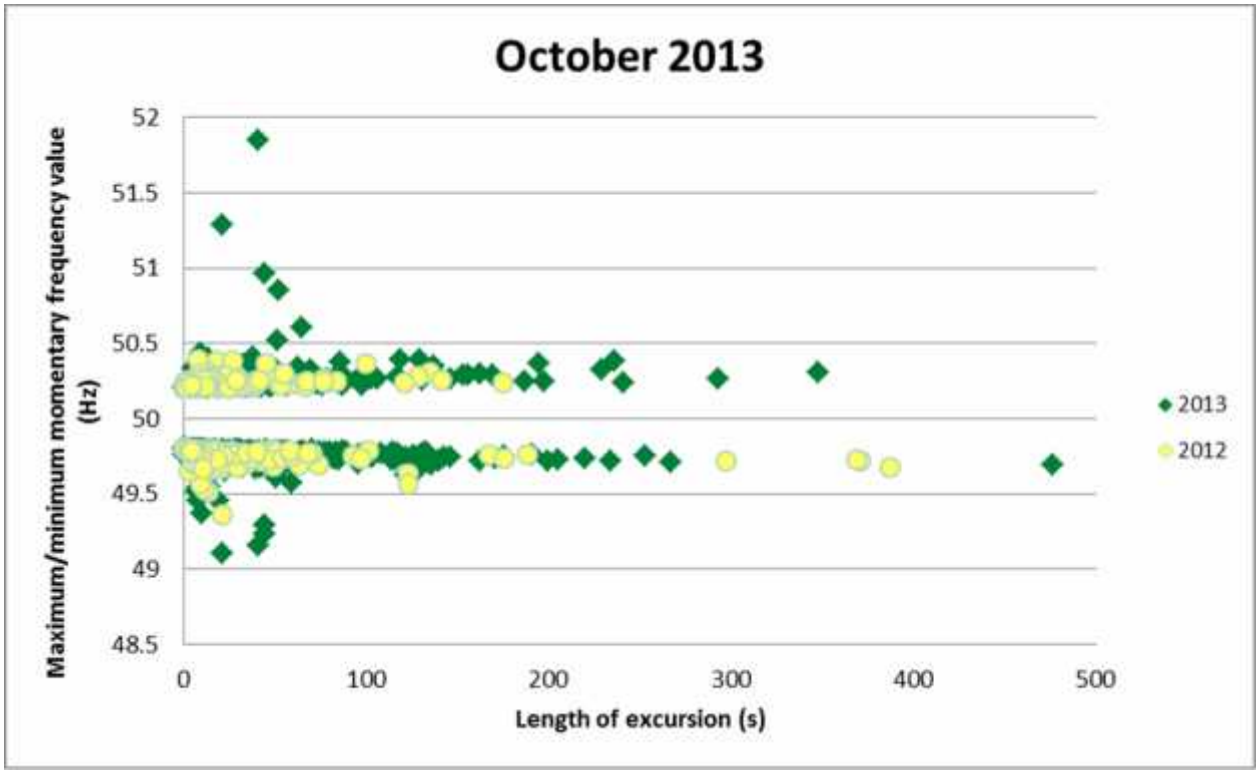
2.1 Avoid Cascade Failure

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.



Maintain Frequency and limit rate 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	Nov -12	Dec -12	Jan - 13	Feb - 13	Mar - 13	Apr - 13	May - 13	Jun - 13	jul - 13	Aug - 13	Sep - 13	Oct - 13	Annual rate	PPO target
55.00 > Freq >= 53.75														**0.2***
53.75 > Freq >= 52.00							1	1					**2**	**2***
52.00 > Freq >= 51.25					1	2						2	**5**	**7**
51.25 > Freq >= 50.50	1		1	2	2	4	8	2		1	4	4	**29**	**50**
50.50 > Freq >= 50.20	338	189	279	445	324	541	419	221	404	656	709	797	**5322**	
50.20 > Freq > 49.80														
49.80 >= Freq > 49.50	290	183	245	367	331	484	401	208	385	652	692	789	**5027**	
49.50 >= Freq > 48.75	2		1	1	2	6	9	4			2	7	**34**	**60**
48.75 >= Freq > 48.00				1	1	1	1						**4**	**6**
48.00 >= Freq > 47.00							1						**1**	**0.2**
47.00 >= Freq > 45.00														**0.2**

***** South Island.

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		Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct - 13	Oct-13
Time Error Management	NI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
	SI	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	
	SI	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 and Customer Advice Notices issued over the last 12 months.

Notices issued	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13
Demand Allocation Notice	-	-	-	-	-	-	-	-	-	-	-	-
Grid Emergency Notice	4	4	6	-	2	6	5	2	4	1	2	1
Warning Notice	1	-	-	-	1	-	3	2	3	1	-	-
Customer Advice Notice	30	24	30	35	39	43	67	41	27	15	31	63

3.2 Grid Emergencies

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

Date	Time	Summary Details	Island
14/10/13	11:40	A grid emergency was declared to allow the grid to be reconfigured to restore supply following the tripping of the 110 kV Woodville-Dannevirke-Waipawa Circuits 1 & 2.	N

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

Island	Region	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Total
North Island	Northland	-	1	-	-	-	-	-	-	-	-	-	-	**1**
	Auckland	1	-	1	-	-	-	-	1	-	-	-	-	**3**
	Zone 1	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Waikato	2	1	5	-	1	5	5	-	4	1	2	-	**26**
	Bay of Plenty	-	1	-	-	-	-	-	-	-	-	-	-	**1**
	Hawkes Bay	-	1	-	-	-	-	-	-	-	-	-	-	**1**
	Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Bunnythorpe	-	-	-	-	1	-	-	-	-	-	-	1	**2**
	Wellington	-	-	-	-	-	1	-	-	-	-	-	-	**1**
	North Island (all)	-	-	-	-	-	-	-	1	-	-	-	-	**1**
South Island & HVDC	Nelson Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	West Coast	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Christchurch	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Canterbury	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Zone 3	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Otago	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Southland	1	-	-	-	-	-	-	-	-	-	-	-	**1**
	South Island (all)	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	HVDC	-	-	-	-	-	-	-	-	-	-	-	-	**0**

3.3 CUSTOMER ADVICE NOTICES (CANS)

Sixty-three CANs (Customer Advice Notices) were issued in the reporting period:

- Forty-eight related to the HVDC:
  - Twenty-eight advised of the planned daily test schedules for the Pole 2 re-commissioning;
  - Eight advised of additional reserve requirements for specified commissioning tests;
  - Six related to HVDC capability limitations for defined periods;
  - Three related to a change to under-frequency reserve risk modelling;
  - And three advised of changes to the frequency keeping bands resulting from testing;
- Three related to under-frequency events on 5th, 17th, and 29th October;
- Three related to a temporary reduction in AC extended contingent risk modelled in the South Island;
- Two advised of temporary changes in the settings of Tiwai AUFLS relays;
- One advised of constraint information being published on POCP for a planned outage on 110 kV Arapuni – Kinleith 1on 4th November;
- One advised of the temporary classification of 220 kV Clyde – Twizel Circuits 1 & 2 as a single risk during an electrical storm on 14th October;
- One advised of switching to a single frequency keeper in the North Island due to a communications outage on 31st October;
- One advised of a disruption market services due to a communications outage on 31st October;
- One advised of the change of risk status of the Kinleith Cogeneration plant on 11th October;
- One advised of the classification of Te Mihi generation as an additional risk during the commissioning period;
- And one advised of the change to the shoulder rating period on the 20th October.

3.4 STANDBY RESIDUAL CHECK (SRC) NOTICES

Two hundred and twelve 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 1st – 5th, 7th – 11th, 14th – 15th, 17th – 19th, 21st – 23rd, 29th October.

3.5 VOLTAGE MANAGEMENT

Grid voltages did not exceed the Code voltage ranges 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	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Total
North Island	Northland	2	7	3	5	4	7	5	1	3	3	7	5	**52**
	Auckland	4	8	-	1	1	3	10	11	5	3	5	9	**60**
	Waikato	11	6	6	5	3	7	10	6	8	6	8	11	**87**
	Bay of Plenty	13	10	4	5	3	5	6	2	7	5	4	8	**72**
	Hawkes Bay	3	3	6	4	5	7	4	6	-	1	-	5	**44**
	Taranaki	3	1	2	7	1	6	1	3	-	-	-	3	**27**
	Bunnythorpe	9	1	1	7	7	3	3	4	1	3	3	5	**47**
	Wellington	9	11	12	16	10	13	11	9	4	4	9	8	**116**
Total		54	47	34	50	34	51	50	42	28	25	36	54	**505**
South Island	Nelson Marlborough	3	4	4	8	4	6	7	2	1	4	3	8	**54**
	West Coast	4	3	6	9	3	8	11	8	4	3	3	7	**69**
	Christchurch	3	3	2	5	5	7	3	2	3	2	4	8	**47**
	Canterbury	5	2	2	6	3	3	5	4	1	3	3	4	**41**
	Otago	1	-	-	2	2	4	5	-	2	4	5	2	**27**
	Southland	6	1	2	3	6	9	2	3	8	5	5	3	**53**
Total		22	13	16	33	22	37	33	19	18	21	23	32	**289**

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.systemoperator.co.nz/security-management#cs-147305*. This information includes constraint equations and a brief summary of their purpose.

Island	Region	Branch	Description	Total
North Island	Bunnythorpe	RPO_TNG1.1__OHK_WRK.1__OHK_WRK__RPO__LN	This is an SFT generated constraint. Its purpose is to protect Rangipo-Tangiwai 1 for a tripping of Ohakuri-Wairakei 1.	3
		RPO_TNG1.1__ATI_WKM.1__$ATIWKM1__RPO__LN	This is an SFT generated constraint. Its purpose is to protect Rangipo-Tangiwai 1 for a tripping of Atiamuri-Whakamaru 1.	10
	Edgecumbe	ATI_OHK.1__THI_WKM1.1__THIWKM1*__OHK__LN	This is an SFT generated constraint. Its purpose is to protect Atiamuri-Ohakuri 1 for a tripping of Te Mihi-Whakamaru 1.	2
		ATI_WKM.1__THI_WKM1.1__:S__THIWKM1*__ATI__LN	This is an SFT generated constraint. Its purpose is to protect Atiamuri-Whakamaru 1 for a tripping of Te Mihi-Whakamaru 1	4
		ATI_OHK.1__THI_WKM1.1__:S__THIWKM1*__OHK__LN	This is an SFT generated constraint. Its purpose is to protect Atiamuri-Ohakuri 1 for a tripping of Te Mihi-Whakamaru 1.	1
	Hawkes Bay	RDF_T3&T4_W_P_1	The effect of this constraint is to manage flows through Redclyffe T3 & T4 to prevent the in service transformer from overloading for a contingency of the other transformer.	2
South Island & HVDC	Christchurch	ISL_KIK_1_or_2_or_3_TOP_SOUTH_ISLAND_STABILITY_O_1	The effect of this constraint is to manage flows through the Islington-Kikiwa-1, 2 and 3 circuits for a contingency of either of the two remaining in service circuits. This is to ensure that voltage stability limits are not exceeded during periods when the load at the Top of the South Island is high and	5

			Islington-Kikiwa-1, 2 or 3 is out of service.	
	HVDC	BEN_HAYP2max	The purpose of this constraint is to limit the flow on HVDC from Benmore to Haywards to the Asset Owner offered capability for Pole 2.	66
		BEN_HAYmax	The purpose of this constraint is to limit the flow on HVDC from Benmore to Haywards to the Asset Owner offered capability for HVDC.	81
		HAY_BENP2max	The purpose of this constraint is to limit the flow on HVDC from Haywards to Benmore to the Asset Owner offered capability for HVDC.	1
		BEN_HAYP3max	The purpose of this constraint is to limit the flow on HVDC from Benmore to Haywards to the Asset Owner offered capability for Pole 3.	131
		HAY_BENP2min	The purpose of this constraint is to govern the flow on HVDC Pole 2 from Haywards to Benmore for Pole 3 commissioning purposes.	6
		HAY_BENP3min	The purpose of this constraint is to govern the flow on HVDC Pole 3 from Haywards to Benmore for Pole 3 commissioning purposes.	3
	Otago	NSY_ROX.1__CYD_TWZ2.1__CYD_TWZ2__ROX__LN	This is an SFT generated constraint. Its purpose is to protect Naseby-Roxburgh 1 for a tripping of Clyde-Twizel 2.	5
		NSY_ROX.1__CYD_TWZ1.1__CYD_TWZ1__ROX__LN	This is an SFT generated constraint. Its purpose is to protect Naseby-Roxburgh 1 for a tripping of Clyde-Twizel 1.	7
		NSY_ROX.1__CYD_TWZ2.1__CYDTWZ12__ROX__LN	This is an SFT generated constraint. Its purpose is to protect Naseby-Roxburgh 1 for a tripping of Clyde-Twizel 2.	6
	Southland	MAN_NMA3.1__INV_MAN.1__INV_MAN__MAN__LN	This is an SFT generated constraint. Its purpose is to protect Manapouri-North Makarewa 3 for a tripping of Invercargill-Manapouri 2	13
Grand Total				**346**

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	Bunnythorpe	RPO_TNG1.1__ATI_WKM.1__$ATIWKM1__RPO__LN	10	0.67%	5	0.03%
		RPO_TNG1.1__THI_WKM1.1__THI_WKM1__RPO__LN	0	0.00%	159	0.91%
	Edgecumbe	ATI_WKM.1__THI_WKM1.1__:S__THIWKM1*__ATI__LN	4	0.27%	0	0.00%
	Hawkes Bay	RDF_TX_ECE_TEMP_1	0	0.00%	56	0.32%
South Island & HVDC	Christchurch	ISL_KIK_1_or_2_or_3_TOP_SOUTH_ISLAND_STABILITY_O_1	5	0.34%	0	0.00%
	Otago	NSY_ROX.1__CYD_TWZ1.1__CYD_TWZ1__ROX__LN	7	0.47%	98	0.56%
		NSY_ROX.1__CYD_TWZ2.1__CYD_TWZ2__ROX__LN	5	0.34%	104	0.59%
		NSY_ROX.1__CYD_TWZ2.1__CYDTWZ12__ROX__LN	6	0.40%	12	0.07%
	Southland	INV__T1__220KV__GOR_ROX.1__GOR_ROX__XF	0	0.00%	93	0.53%
		ROX_T10_O_1	0	0.00%	136	0.78%
		MAN_NMA3.1__INV_MAN.1__INV_MAN__MAN__LN	13	0.87%	0	0.00%
	HVDC	BEN_HAYP2max	66	4.44%	72	0.41%
		HAY_BENP2max	1	0.07%	49	0.28%
		BEN_HAYmax	81	5.44%	50	0.29%
		BEN_HAYP3max	131	8.80%	85	0.49%
		BEN_HAYP3min	0	0.00%	59	0.34%
		HAY_BENP2min	6	0.40%	4	0.02%

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)
03/10/13	14:15	A control system problem encountered during HVDC commissioning resulted in a momentary rise in the South Island frequency.	S	50.85
03/10/13	23:12	Restoration of load after a potline outage at Tiwai resulted in a monetary drop in South Island frequency.	S	49.45
05/10/13	03:02	A planned start of HVDC Pole 3 resulted in a momentary swing in South Island frequency.	S	49.23 50.97
09/10/13	14:49	A planned reduction in Tokaanu generation as part of HVDC Pole 2 commissioning resulted in a momentary drop in North Island frequency.	N	49.37
17/10/13	02:15	A control system problem encountered during HVDC commissioning resulted in a momentary swing in the South Island frequency and a momentary rise in North Island frequency.	S S N	49.15 50.85 50.60
18/10/13	12:50	A planned tripping of HVDC Pole 3 commissioning resulted in a momentary rise in South Island frequency.	S	50.52
24/10/13	12:11	A planned reduction in Tokaanu generation as part of HVDC Pole 2 commissioning resulted in a momentary drop in both the North and South Island frequencies.	N S	49.29 49.45
29/10/13	10:06	A control system problem encountered during HVDC commissioning resulted in a momentary swing in the South Island frequency.	S	49.10 51.29

Connection point events

Date	Time	Summary Details	Generation / Load interrupted (MW)	Restoration time (minutes)
14/10/13	11:37	Woodville-Dannevirke-Waipawa Circuit 2 tripped while Circuit 1 was out of service resulting in a loss of supply to Dannevirke and Waipawa Substations.	DVK 10 WPW 13	43 19

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	24	These related to trippings of • Arapuni-Hangatiki-Ongarue 1 • Atiamuri-Tarukenga 2 • Atarau-Reefton-Inangahua 1 (auto reclose) • Bunnythorpe-Tangiwai 1 (1 x, 1 x auto reclose) • Cobb-Stoke 2 • Coleridge-Hororata 2 • Coleridge-Hororata 3 • Coleridge-Otira 2 (auto reclose) • Dobson-Reefton-Inangahua 2 (1 x , 1 x auto reclose) • Fernhill-Tuai 1 (2 x auto reclose) • Halfway Bush-Palmerston 1 (auto reclose) • Halfway Bush-Palmerston 2 (auto reclose) • Islington-Livingstone 1 (auto reclose) • Owhata-Te Matai-Tarukenga 1 (auto reclose) • Redclyffe-Wairakei 1 (auto reclose) • Timaru-Tekapo A 1 (2 x) • Woodville-Dannevirke-Waipawa 1 • Woodville-Dannevirke-Waipawa 2 (3 x)
HVDC	18	These related to • HVDC Pole 2 (3 x control system issues, 1 x tripping, 1 x start during commissioning testing) • HVDC Pole 3 (10 x auto-restarts, 3 x tripping during commissioning testing)
Supply Transformer	1	This related to tripping of • Tuai T15
Loss of grid reactive plant	8	These related to trippings of • Albany Static Var Compensator SVC7 • Haywards Synchronous Condensor SC1 • Haywards Static Synchronous Compensator STC31 (2 x, undergoing commissioning) • Kikiwa Static Synchronous Compensator STC2B • Otahuhu Synchronous Condensor GT2, GT4 • Stoke Capacitor Bank C34
Loss of single generation units	12	These related to trippings of • Highbank G1 • Kinleith Co-generation • Kumara generation • Manapouri G1 (planned as part of Pole 2 commissioning) • Tokaanu Generation (2 x, planned as part of Pole 2 commissioning) • Poihippi G1 • Paerau generation (2 x) • Rangipo G5 • Te Mihi G1 (2 x, undergoing commissioning)
Total during reporting period	**63**	

Extended contingent events

Event	Number	Summary
Loss of both HVDC poles	0	
Loss of interconnecting transformer	0	
Loss of bus bar section	0	
Total during reporting period	**0**	

Other events

Event	Number	Summary
Loss of multiple AC transmission circuits	3	These related to the tripping of • Coleridge-Otira 1 & 2 (auto reclose) • Hokitika-Otira 2 & Kumara-Otira 1 • Huntly-Stratford 1 (auto reclose), Stratford-Taumaranui 1
Demand change	1	This related to • Restoration of Tiwai load
Generation	0	
Loss of supply bus bar section	1	This related to the tripping of • Motueka 11 kV Bus
Total during reporting period	**4**	

Other disturbances

Event	Number	Summary
Feeder trippings	96	Various locations
Total during reporting period	**96**	

4.3 System Events – Trend

	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Total	Average Events per month
Contingent Event – transmission	12	16	22	9	13	23	24	27	19	16	64	24	**269**	22.4
Contingent Event – generation	24	3	8	14	15	12	7	14	17	17	10	12	**153**	12.8
Contingent Event – Supply transformer	2	2	0	3	2	10	3	1	3	3	5	1	**35**	2.9
Contingent Event – Reactive plant	4	3	3	6	2	6	5	6	10	6	7	8	**66**	5.5
Contingent Event - HVDC	5	0	0	2	5	11	9	13	0	0	4	18	**67**	5.6
Extended Contingent Event HVDC	0	0	0	0	0	0	0	0	0	0	1	0	**1**	0.1
Extended Contingent Event Inter-connecting Transformers	0	1	0	0	1	1	0	0	1	0	0	0	**4**	0.3
Extended Contingent Event Busbar	2	1	0	1	0	2	0	1	0	0	3	0	**10**	0.8
Other Event – AC transmission	0	0	3	1	0	1	2	1	2	1	5	3	**19**	1.6
Other Event – Demand	1	0	1	0	0	1	0	2	2	1	1	1	**10**	0.8
Other Event – Generation	0	0	1	4	3	1	1	2	0	0	2	0	**14**	1.2