

The adequacy of generation capacity for winter 2018

The New Zealand Generation Balance outlook
for adequacy of generation capacity for March-
September 2018

16 March 2018

Background

The Security and Reliability Council's (SRC) functions include offering advice to the Electricity Authority on the security of the power system.

The New Zealand Generation Balance (NZGB) reporting is an assessment of whether, given certain assumptions, there are any periods forecast during which normal security cannot be maintained (in other words, whether load can be supplied while still procuring desired levels of reserves). NZGB results are updated daily with a rolling 200-day outlook.

The main purpose of the NZGB reporting is that it initiates discussion and action with respect to the scheduling of generation and transmission outages. Such rescheduling might be to restore forecasts to normal security, or to improve the capacity margins by which normal security is achieved. Given the inherent uncertainty with taking a fixed set of assumptions about a complex system, increasing the minimum margins is likely of benefit to consumers if it comes at a low cost. Well-planned and coordinated outages are part of the efficient operation of the industry.

Interpreting NZGB base case results

NZGB reports its results in relation to 'N-1' and 'N-1-G' scenarios. 'N-1' represents the normal state of the power system, minus a key generator (such as Unit 5 at Huntly) or a key transmission asset (such as a single HVDC pole). 'N-1-G' represents the same situation, minus a (or another) key generator. They are scenarios that are used to 'stress test' the power system and model what would result.

The stress created by these scenarios is enhanced with a conservative demand forecast method. The system operator forecasts demand by identifying the maximum demand from an equivalent period (such as weekday evenings in July) from last year's actual demand. The maximum demand identified is then increased by 2% to create the final demand forecast. Taking forecasts for the morning of 29 May 2018 as an example, this 2% increase adds 87 MW to North Island load and 42 MW to South Island load. This is similar to the 132 MW capacity of Contact Energy's Wairakei geothermal generation, though HVDC and reserves assumptions could discount the effect of the additional South Island load.

The monthly NZGB report for March 2018 does not forecast any shortfalls

The NZGB monthly report for March 2018 is attached as appendix A. The results were current as at 6 March 2018. The following summary is based on the March 2018 report.

The high level conclusion from the March 2018 report is that "no generation short-fall is anticipated within the next 6 months"

- 24 July 2018 has the lowest 'N-1' margin of 826 MW.
- 17 July 2018 has the lowest 'N-1-G' margin of 217 MW.

The daily NZGB report on 14 March 2018 forecasts one day of shortfall against the 'N-1-G' scenario

As at the preparation of this paper, the daily NZGB results for 14 March 2018 forecast:

- 29 May 2018 has the lowest 'N-1' margin of 493 MW.
- 4 May 2018 has the lowest 'N-1-G' margin of -28 MW.

The system operator will attend this agenda item and will provide an update based on the latest data if there are significant changes. The secretariat will present NZGB results at the 22 June 2018 SRC meeting only if there is a substantial adverse change in results.

The SRC may wish to consider the following questions.

- | | |
|------------|---|
| Q1. | Does the result of the NZGB report give the SRC confidence in the suitability of power system capabilities for winter 2018? |
| Q2. | What further information, if any, does the SRC wish to have provided to it by the secretariat? |
| Q3. | What advice, if any, does the SRC wish to provide to the Authority? |



New Zealand Generation Balance – March 2018

Executive Summary

The New Zealand Generation Balance (NZGB) assessment indicates that no generation short-fall is anticipated within the next 6 months. However, if a major slow-starting North Island generating unit is not offered, with tight generation balance present on several days, shortfalls (N-1-G) can be expected.

To mitigate the risk of shortfall on dates where a tight generation balance margin is forecasted, market participants should:

1. avoid scheduling additional outages which may remove or constrain generation; and
2. adjust demand and generation offers to minimise the risk of shortfall.

The assessment uses data available at 06/03/18 and now incorporates September in the study, when tight margins are forecasted. Compared with the February 2018 report, there has been an increase in generation balance margins from March to May due to an increase in available generation, but tighter margins in July. The difference in the July margins is caused by the change in load forecast calculations used in this study, where the standard NZGB approach is used. The January and February forecasts for July excluded the significantly high historic loads experienced during the cold snaps of July 2017 to give a more probable estimation, but these are now included in the calculation to better represent the worst-case load.

Figure 1 shows generation balance margins from this study. To minimise the security of supply risk it is recommended the information in this graph be used for scheduling outages which remove or constrain generation.

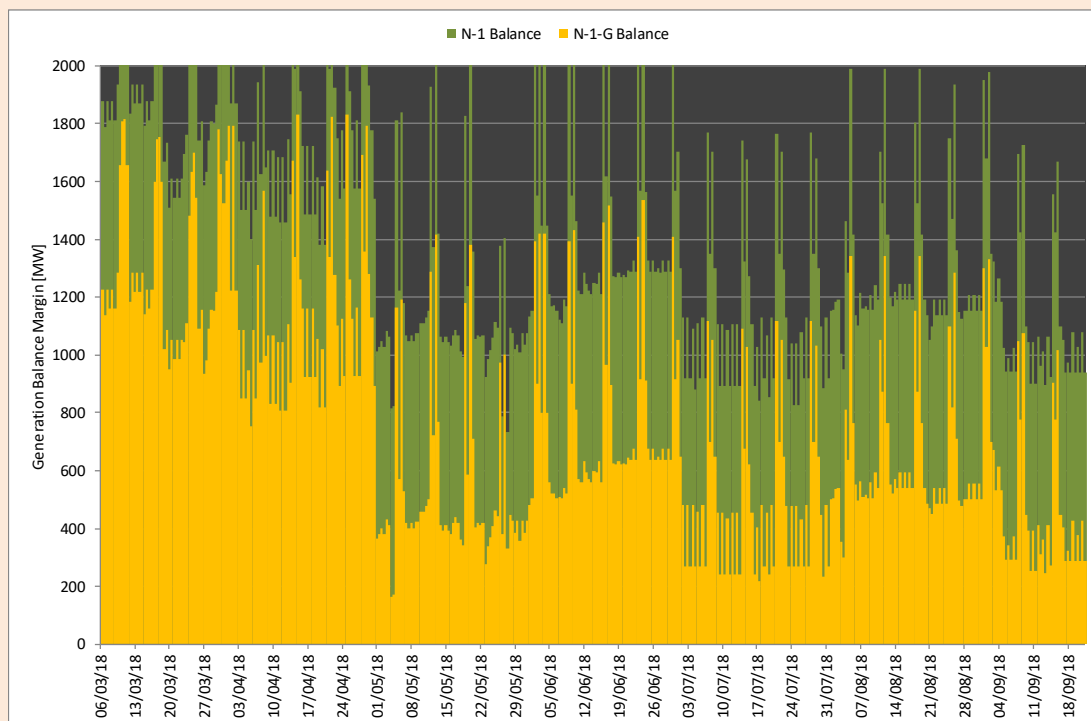


Figure 1: Generation balance study results for the period studied



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Generation balance for winter 2018

The generation balance study does not indicate any shortfalls (N-1 or N-1-G) for the winter months included in this assessment. In comparison to last month's study, the N-1 generation balance margins have slightly increased in the months of June and July (lowest being 826 MW), due to the decrease in generation outages, particularly in the South Island. However N-1-G generation balance margins have reduced in July due to the refined load forecast methodology and the low impact of South Island generation on the N-1-G margins during this period.

Additional sensitivity studies (undertaken to assess the impact of a major slow-starting generating unit not being offered) indicate there are several days in July, August, and September where generation balance shortfalls could be encountered. The results of the base and sensitivity studies for Winter 2018 are shown in Figure 2 and Figure 3 respectively.

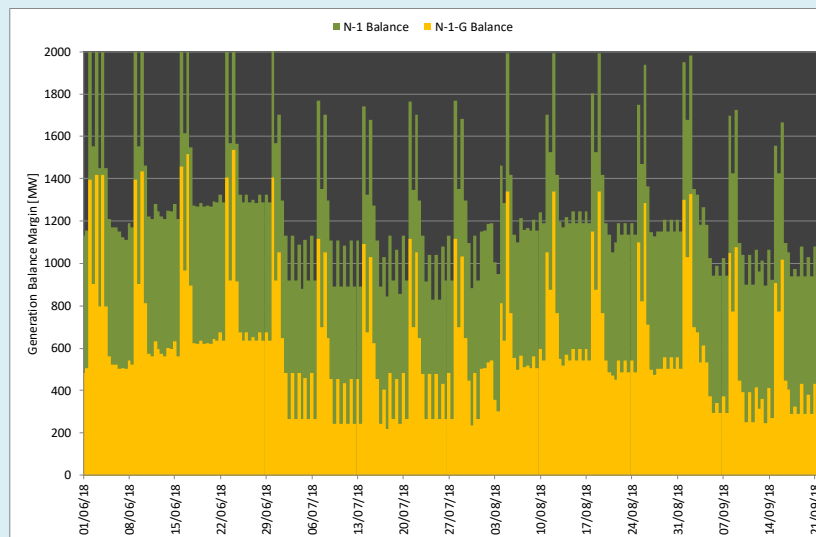


Figure 2: Generation balance base study results (winter months only)

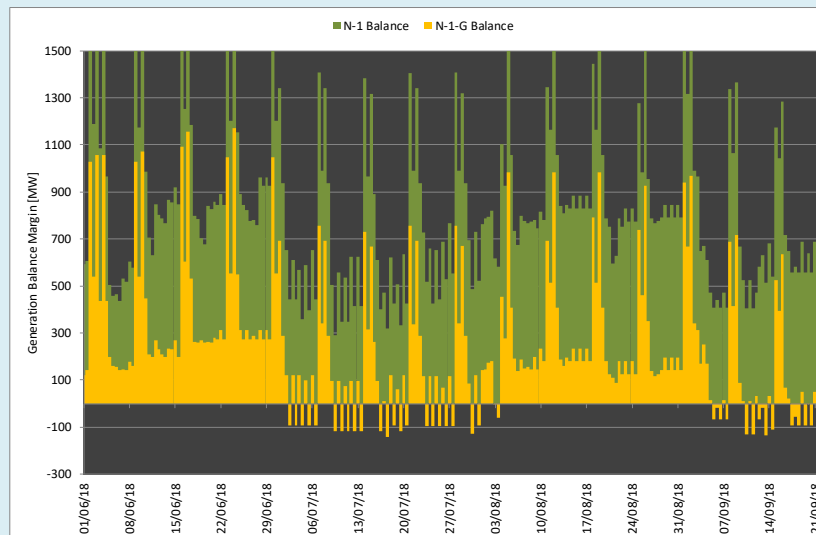


Figure 3: Generation balance sensitivity study results (winter months only)



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Low generation balance margins for the period studied

Low generation balance margins are anticipated for several days over the study period, with no shortfall (N-1 or N-1-G) forecasted. However, under sensitivity scenario conditions of a major, slow starting North Island generating unit not being offered, generation balance shortfalls (N-1-G) could be encountered on some dates. A summary of the results for these dates, as well as a summary of outages causing the low generation balance margins, are detailed in Table 1.

Table 1: Result of generation balance studies.

	Base Scenario		Worst Case Sensitivity Scenario		Equipment Outage Impact				
	N-1 Margin	N-1-G Margin	N-1 Margin	N-1-G Margin	Generation		Transmission		HVDC
Mon 14/05/18	1044	394	488	14	200	150	0	0	0
Tue 15/05/18	1044	394	488	14	200	150	0	0	0
Wed 16/05/18	1032	382	447	2	250	200	0	0	0
Fri 18/05/18	994	344	454	-19	250	150	0	0	0
Wed 23/05/18	925	275	291	-86	250	150	100	0	0
Thu 24/05/18	1018	368	367	-10	250	150	0	0	0
Tue 29/05/18	1021	385	174	-113	250	250	0	0	0
Wed 30/05/18	1009	359	238	-139	250	150	0	0	0
Thu 31/05/18	1035	385	264	-113	250	150	0	0	0
Mon 02/07/18	918	268	443	-92	0	100	0	0	0
Tue 03/07/18	918	268	443	-92	0	150	0	0	0
Wed 04/07/18	879	268	357	-92	0	200	0	0	0
Thu 05/07/18	918	268	399	-92	50	100	0	0	0
Fri 06/07/18	918	268	443	-92	0	100	0	0	0
Mon 09/07/18	893	243	292	-117	50	150	0	0	0
Tue 10/07/18	893	243	347	-117	50	150	0	0	0
Wed 11/07/18	893	243	347	-117	50	150	0	0	0
Thu 12/07/18	893	243	415	-117	50	50	0	0	0
Fri 13/07/18	893	243	415	-117	50	50	0	0	0
Mon 16/07/18	893	243	400	-117	50	150	0	0	0
Tue 17/07/18	843	217	321	-143	100	200	0	0	0
Wed 18/07/18	918	268	425	-92	0	150	0	0	0
Thu 19/07/18	855	242	333	-118	50	200	0	0	0
Fri 20/07/18	918	268	425	-92	0	150	0	0	0
Mon 23/07/18	916	266	516	-97	0	150	0	0	0
Tue 24/07/18	826	266	426	-97	0	250	100	0	0
Wed 25/07/18	828	268	445	-96	0	200	100	0	0
Thu 26/07/18	918	268	529	-96	50	150	0	0	0
Fri 27/07/18	918	268	554	-96	0	100	0	0	0
Mon 30/07/18	884	234	487	-126	50	150	0	0	0
Tue 31/07/18	918	268	521	-92	0	150	0	0	0
Wed 05/09/18	942	292	409	-68	400	50	0	0	0
Thu 06/09/18	942	292	409	-68	400	50	0	0	0
Fri 07/09/18	942	292	409	-68	400	50	0	0	0
Mon 10/09/18	901	251	403	-130	350	0	0	0	0
Tue 11/09/18	901	251	403	-130	350	0	0	0	0
Wed 12/09/18	963	313	474	-68	350	100	0	0	0
Thu 13/09/18	897	247	516	-134	400	100	0	0	0
Fri 14/09/18	922	272	541	-109	350	0	0	0	0
Mon 17/09/18	938	288	557	-93	350	150	0	0	0
Tue 18/09/18	938	288	557	-93	450	150	0	0	0
Wed 19/09/18	938	288	557	-93	300	150	0	0	0
Thu 20/09/18	938	288	557	-93	350	150	0	0	0
Fri 21/09/18	938	288	557	-93	300	150	0	0	0



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To mitigate the risk of shortfall, on dates where a tight generation balance margin is forecast, market participants should:

1. avoid scheduling additional outages which may remove or constrain generation; and
2. adjust demand and generation offers to minimise any risk of shortfall.

Changes since the February 2018 report

1. The South Island generation outages have decreased during the entire study period in comparison to the last month's study, generally improving the N-1 generation balance margins. Significant changes have occurred for 9 March, 4-16 April, and 12 July, where the available generation has increased by over 400 MW.
2. The North Island generation outages have reduced by approximately 100 MW for 23 April to 9 March and 10-23 July.
3. Outages at WKM which removed a THI-WKM circuit from service on 10-11th May have now moved, removing an impact of approximately 250 MW on the generation balance margins.
4. The load estimate for July has been updated, taking into consideration the increase in load due to historical weather events. This has resulted in increases of 200 MW for the North Island and 100 MW for the South Island load forecast.

Notable outages

Notable outages of generation and transmission equipment that impact the generation balance for the next six months are shown in Figure 4.

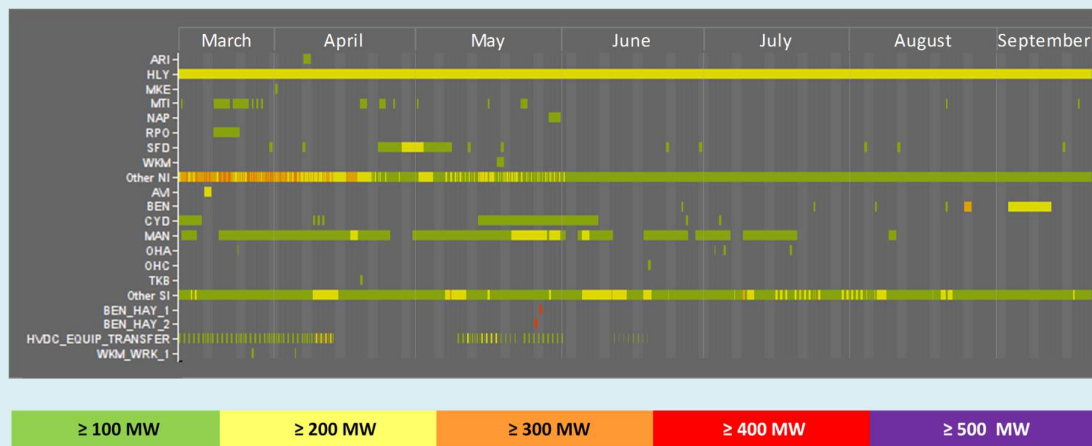


Figure 4: Significant generation and transmission equipment outages.

