Otahuhu and Huntly tripping event at 1 December 2006.

Summary

While the power system was being restored to a secure state after the tripping of the Otahuhu CCGT on 1 December 2006, a further loss of generation at Huntly 30 minutes later resulted in the System Operator declaring a Grid Emergency. North Island distributors were requested to shed up to 6% of demand.

Within an hour and a half of the event the system had largely recovered. Supply to the upper North Island was restricted for a further two hours as a result of the original event until a transmission circuit out for maintenance work was restored to service.

The System Operator has arranged for an independent audit review of its performance during this event. This review report will be published in early 2007 when complete.

Two graphs are attached to this event summary to help understand the sequence of events.

The Otahuhu CCGT Tripping at 10:50

System status prior to the event at 10:45 hrs:

- one of the four 220 kV transmission circuits from Whakamaru to Otahuhu (circuit 1) out till 21 December for planned work
- all four units at Huntly in service, Unit 3 ramping down for a maintenance shutdown at midday
- Otahuhu CCGT in service at 297 MW, having just completed a regular test
- total generation and HVDC injection into the North Island (NIPS) 3520 MW.

At 10:50 the Otahuhu CCGT tripped with the loss of 297 MW. North Island frequency fell to 49.19 Hz and the South Island to 49.40 Hz. As well as normal generator and HVDC reserve response, 257 MW of combined fast and sustained contracted interruptible load (IL) tripped in response to the frequency excursion. As interruptible load had been triggered, reserves dispatch for a further contingent event was suspended immediately after the event, initially until 11:30.

The Otahuhu CCGT had just performed a regular plant test and, prior to the tripping, had ramped up from 207 MW.

As generation was re-dispatched following the event, instructions were issued to IL reserve providers to reconnect tripped load. By 11:17 all IL providers had been advised they could reconnect tripped load.

At this time total Huntly output was 815 MW, the HVDC was transfer was 850 MW into the North Island and total injection into the North Island was 3300 MW.

Loss of generation at Huntly at 11:21

At 11:21 Huntly unit three tripped with the loss of 90 MW. Frequency fell to 49.6 Hz and remained below 49.8 Hz until 11:33. As there was no instantaneous reserves dispatch scheduled during this time, HVDC and generation response to the low system frequency was from generator governor response and dispatch instructions.

During the 12 minute period from 11:21 the North Island system load increased by 120 MW as participants restored IL (as previously advised to do so). Huntly station output increased by 20 MW, then reduced by 80 MW due to reported problems with unit four. HVDC transfer increased to 915 MW and then settled at 900 MW. The Waikato river hydro stations increased output by 80 MW. (Refer to Graph 2)

Inability to return the System to a Secure State at 11:30

At 11:30, with the loss of 500 MW of generation at Huntly and Otahuhu, the power transfer into Auckland on the Whakamaru to Otahuhu route was in excess of the secure power system constraint limit. There was also insufficient energy and reserve to cover a further loss of generation or the extended contingent event (loss of HVDC Bipole). Action was taken by the System Operator to:

- suspend the dispatch of reserve for a contingent event until 12:30
- declare a grid emergency at 11:42
- request to North island distributors to shed up to 6% of demand.

It is understood the 6% load reduction by distributors was met through shedding controllable load such as water heating. No unplanned disconnection of demand was required by distributors.

System Recovery 12:00 to 12:30

At 12:00 system conditions had stabilised in response to the demand reduction request. Distributors in the lower part of the North Island were advised by the System Operator any shed load could be restored.

By 12:30 there was sufficient additional generation available to permit the return to full dispatch of instantaneous reserves in the North Island and thereby the ability to cover a contingent event.

Upper North Island Restrictions

With the loss of Otahuhu generation and reduced generation at Huntly co-incident with the outage of the Otahuhu-Whakamaru 1 circuit into Auckland, there was still insufficient generation to meet demand in the upper North Island. Distributors in the upper North Island were requested to maintain the 6% load reduction.

At 12:30 the Grid Owner initiated a recall the Otahuhu_Whakamaru 1 transmission circuit outage which was initially forecast to take 2-3 hours. At 13:30 the North Island-wide Grid Emergency ended and was replaced with Grid Emergency notice for the upper North Island only, extending to 15:00.

At 14:38 the Otahuhu-Whakamaru 1 circuit was returned to service and the Grid Emergency ended. Permission was given for any remaining shed load in the upper North Island to be reconnected.

The Otahuhu CCGT reconnected shortly afterwards and progressively ramped up to full output.

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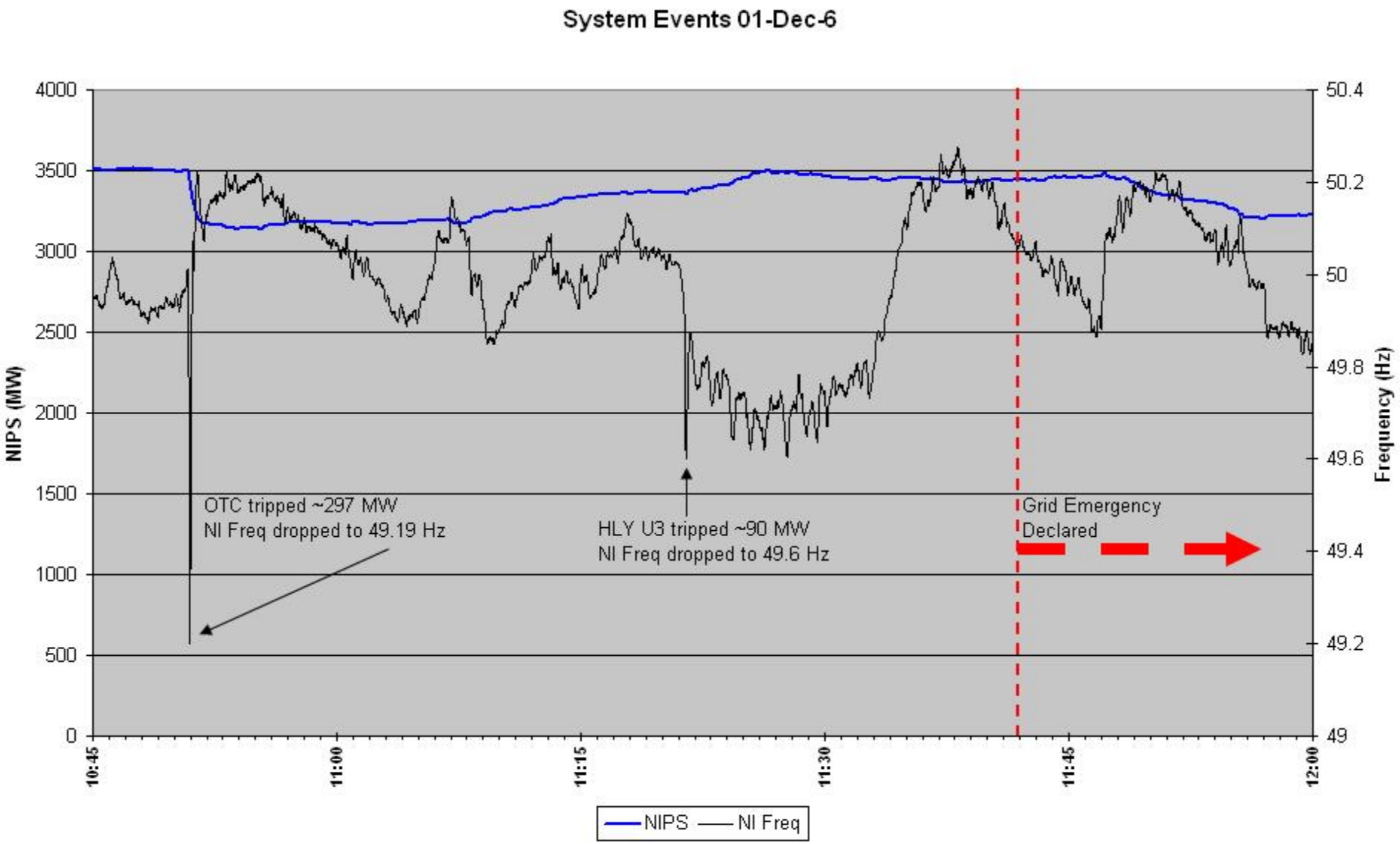
11 December 2006

Graph 1 - Frequency and North Island Power System Injection (NIPS) 10:45 to 12:00 on 1 December 2006



Graph 2 – As graph 1 including generation at Huntly, Otahuhu, Waikato, Whirinaki and HVDC transfer