

Draft determination of causer: 30 June 2023 under- frequency event

Consultation paper

4 December 2023

Executive summary

The normal frequency band in New Zealand is between 49.8 and 50.2 Hz. An under-frequency event occurs when the frequency falls below 49.25 Hz because of a loss of more than 60 megawatts (MW) injected into the grid. The Electricity Industry Participation Code 2010 (Code) requires the Electricity Authority Te Mana Hiko (Authority) to determine the causer of an under-frequency event and sets the process for making the determination.

The Authority's draft determination is that Genesis Energy Limited (Genesis) was the causer of the 30 June 2023 under-frequency event

The reasons for the draft determination are:

- (a) the interruption/reduction of energy injected into the grid occurred at Unit 5 of the Huntly power station, which belongs to Genesis
- (b) no other asset was identified as having caused or potentially caused the under-frequency event
- (c) in the system operator's view, Genesis is the causer of the under-frequency event
- (d) in reply to the system operator's letter, Genesis accepted that it was the causer.

Submissions are invited from interested parties

Clause 8.61 of the Code requires the Authority to consult with interested parties on the reason of its findings before making a final determination. Interested parties are invited to make a submission on the Authority's draft determination by 5pm on 18 December 2023. The Authority will then consider all submissions received and make a final determination on the causer of the under-frequency event.

The Authority also invites comment on the system operator's calculation of the megawatts of power lost during the event, which the system operator uses for calculating the under-frequency event charge.

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1. What you need to know to make a submission

What this consultation is about

- 1.1. This paper consults with interested parties on the Authority's draft determination that Genesis, as the generator that owns Huntly Unit 5, was the causer of the under-frequency event on 30 June 2023 at 1.42am.

How to make a submission

- 1.2. The Authority's preference is to receive submissions in electronic format (Microsoft Word) in the format shown in Appendix A. Submissions in electronic form should be emailed to compliance@ea.govt.nz with "Consultation paper—30 June 2023 under-frequency event" in the subject line.
- 1.3. If you cannot send your submission electronically, please contact the Authority (info@ea.govt.nz or 04 460 8860) to discuss alternative arrangements.
- 1.4. Please note the Authority intends to publish all submissions it receives. If you consider that the Authority should not publish any part of your submission, please:
 - (a) indicate which part should not be published,
 - (b) explain why you consider we should not publish that part, and
 - (c) provide a version of your submission that the Authority can publish (if we agree not to publish your full submission).
- 1.5. If you indicate part of your submission should not be published, the Authority will discuss this with you before deciding whether to not publish that part of your submission.
- 1.6. However, please note that all submissions received by the Authority, including any parts that the Authority does not publish, can be requested under the Official Information Act 1982. This means the Authority would be required to release material not published unless good reason existed under the Official Information Act to withhold it. The Authority would normally consult with you before releasing any material that you said should not be published.

When to make a submission

- 1.7. Please deliver your submission by 5pm on 18 December 2023.
- 1.8. Authority staff will acknowledge receipt of all submissions electronically. Please contact us via compliance@ea.govt.nz or 04 460 8860 if you do not receive electronic acknowledgement of your submission within two business days.

The Authority will consider submissions and make a final determination

- 1.9. The Code requires the Authority to consult with every generator, grid owner and other participant substantially affected by an under-frequency event in relation to a draft determination. The Authority has set the consultation period to 10 business days for this draft determination.
- 1.10. The Authority will consider submissions received and publish its final determination. The Code sets out provisions relating to any disputes regarding the Authority's determination. These requirements and provisions are in clauses 8.61(4), 8.62 and 8.63 of the Code.

2. Introduction

- 2.1. The Code requires the system operator to investigate the causer of an under-frequency event and provide a report to the Authority. The Authority must then publish a draft determination that states whether an under-frequency event was caused by a generator or grid owner, and, if so, the identity of the causer. The draft determination must include reasons for the findings.
- 2.2. These requirements are in clauses 8.60, 8.61(2) and 8.61(3) of the Code.

3. Genesis is the causer of the 30 June 2023 under-frequency event

- 3.1. The Authority's draft determination under clause 8.61 is that Genesis, as the generator that owns Huntly Unit 5, is the causer of the under-frequency event on 30 June 2023 at 1.42am.

The system operator investigated the causer of the under-frequency event

- 3.2. The system operator's report (dated July 2023) is attached as Appendix B.
- 3.3. The circumstances described in the report are summarised below:
 - (a) At 1.42am 30 June 2023, Huntly Unit 5 tripped removing 213 MW of generation.
 - (b) North Island frequency fell to 49.12 Hz and 49.22 Hz in the South Island.
 - (c) The frequency fall and the quantity of MW lost (greater than the 60 MW minimum) meant that an under-frequency event, as defined in Part 1 of the Code, had occurred because there was an interruption/reduction of energy injected into the grid.
 - (d) Instantaneous reserves in the North and South Islands responded, returning the frequency to the normal band within two seconds.
 - (e) Huntly Unit 5 tripped on protection settings caused by a fault on one phase of the synchronising circuit breaker. Genesis believes this is what caused the under-frequency event.
 - (f) No other event or asset operation was identified as occurring at or around the time of the under-frequency event.
 - (g) On 13 July 2023, the system operator requested the grid owner provide information on the circumstances of the under-frequency event. On 25 July 2023, the grid owner provided its assessment of the under-frequency event. The grid owner did not believe it was the causer of the 30 June 2023 under-frequency event.
 - (h) On 13 July 2023, the system operator wrote to Genesis requesting it provide information on its assessment of whether or not it was the causer of the under-frequency event. On 17 July 2023, Genesis replied, agreeing that it was the causer and provided the circumstances that led to the Huntly Unit 5 tripping.

The Authority considered the circumstances of the under-frequency event

- 3.4. The Authority has considered the system operator's report and correspondence with Genesis and the grid owner. The Authority's reasons for the draft determination that Genesis is the causer are:
- (a) An under-frequency event occurred on 30 June 2023 at 1.42am when frequency dropped to 49.12 Hz in the North Island and 49.22 Hz in the South Island.
 - (b) The interruption/reduction of electricity occurred at the grid injection point for Huntly Unit 5, which belongs to Genesis.
 - (c) No other asset was identified as potentially causing the under-frequency event.
 - (d) The system operator and Genesis agree that Genesis was the causer of the under-frequency event.
- 3.5. The Authority agrees with the system operator's findings on the causer of the 30 June 2023 under-frequency event having considered the relevant clauses of the Code and based on the information available at this time.

Q1. Do you agree with the draft determination that Genesis Energy Limited is the causer of the under-frequency event on 30 June 2023 at 1.42am? If not, please advise your view on the causer and give reasons.

4. The system operator has calculated the MW lost during the event based on its investigation

- 4.1. The Code sets out how to calculate the event charge payable by the causer of an under-frequency event. This in turn enables calculation of the rebates paid for under-frequency events (clauses 8.64 and 8.65 of the Code).
- 4.2. Central to the event charge calculation is determining the MW of injection lost at one or more grid injection points because of the under-frequency event. The system operator determines the MW lost as part of its investigation into an under-frequency event.
- 4.3. The system operator has determined the loss of injection into the grid for the 30 June 2023 event was 213 MW at the grid injection point for Huntly Unit 5, resulting in an event charge of \$191,250.
- 4.4. The system operator's calculation of the MW lost for this event is included in the report (Appendix B). The system operator's calculation does not form part of the Authority's draft determination. However, the Authority acknowledges that the calculation is central to determining the under-frequency event charge payable by the causer, and therefore also to the rebate (calculated by the clearing manager) paid for an under-frequency event. The Authority invites comment on the system operator's calculation of the MW lost.
- 4.5. Any comments received will be passed to the system operator.

Q2. Do you agree with the system operator's assessment that 213 MW was lost from the power system in the 30 June 2023 under-frequency event? If not, please advise your view on the MW lost and give reasons.

Appendix A Format for submissions

Submitter	
Questions	Comments
Q1. Do you agree with the draft determination that Genesis Energy Limited is the causer of the under-frequency event on 30 June 2023 at 1.42am? If not, please advise your view on the causer and give reasons.	
Q.2 Do you agree with the system operator's assessment that 213 MW was lost from the power system in the 30 June 2023 under-frequency event? If not, please advise your view on the MW lost and give reasons.	

Appendix B System operator causation report 30 June 2023

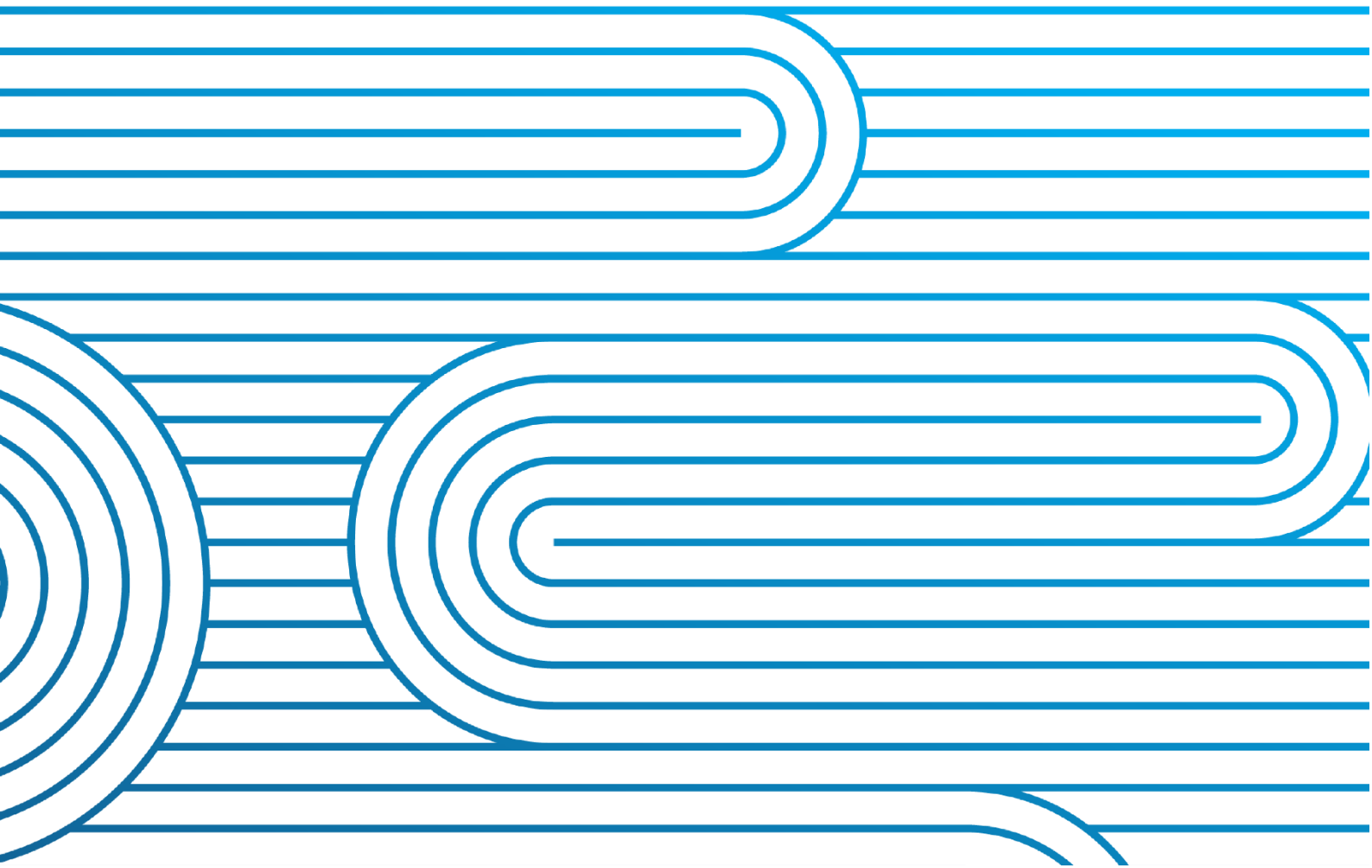
Causation Report

30th June 2023

Under-Frequency Event

System Operator event 4396

July 2023



IMPORTANT

Disclaimer

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PURPOSE

On 30th June 2023 a reduction of energy into the power system caused the system frequency in the North and South Islands to fall below 49.25 Hz, resulting in an under-frequency event.

Pursuant to clause 8.60 of the Electricity Industry Participation Code (**Code**), the System Operator investigated the event to assist the Electricity Authority (**Authority**) in determining a causer of the under-frequency event.

This Causation Report is provided to the Authority pursuant to clause 8.60(5) of the Code and includes the following:

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- The System Operator's recommendation of the causer of the under-frequency event.
- The System Operator's reasons for forming its view.
- The information considered in reaching this view.

EXECUTIVE SUMMARY

At 01:42:45 on 30th June 2023 Genesis Energy's Huntly Unit 5 tripped.

The disconnection of generation from Huntly Unit 5 removed 213MW of injection into the power system.

At 01:42:46 the North Island frequency fell to 49.12 Hz and at 01:42:47 the South Island frequency fell to 49.22 Hz. Either of the North or South Island frequencies falling below 49.25 Hz constitutes an under-frequency event, as defined in the Code.

Genesis has stated that it believes the tripping of Huntly Unit 5 was the cause of the under-frequency on 30th June 2023.

Investigation into the tripping and other system events supports Genesis' position that the trip of Huntly Unit 5 caused the under-frequency event.

Accordingly, the System Operator recommends Genesis be found as the causer of the under-frequency event on 30th June 2023.

SYSTEM EVENTS – 30TH JUNE 2023

Prior to the under-frequency event

According to the Grid Owner, there were no protection operations on any grid assets on 30th June 2023 that may have contributed to the frequency falling below 49.25 Hz. The Grid Owner confirmed that the Frequency Keeping Control (FKC) modulation on the HVDC was active when Huntly Unit 5 tripped.

The under-frequency event

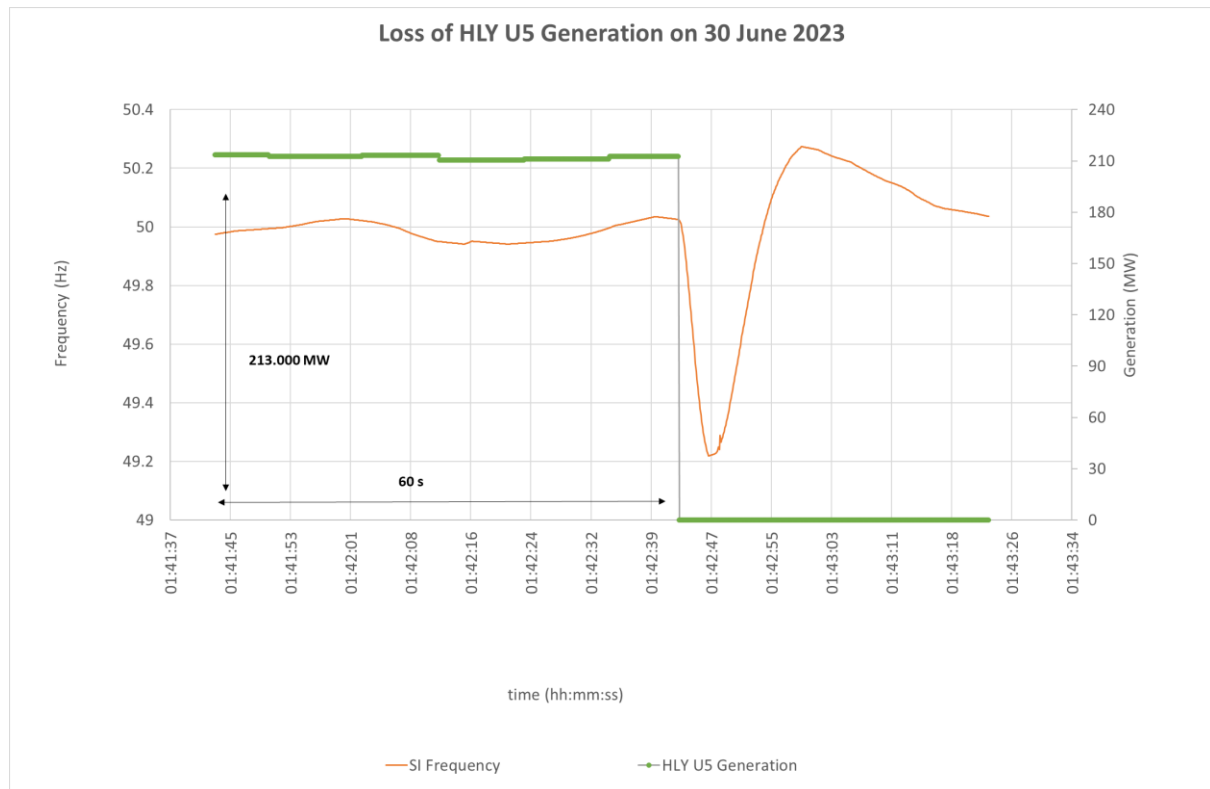
According to Genesis, Huntly Unit 5 tripped on protection settings caused by a fault on one phase of the synchronising circuit breaker. Genesis has confirmed that assessment and testing work is underway with Genesis bringing in experts from its partners in Japan to ensure repairs can be made as quickly and efficiently as possible.



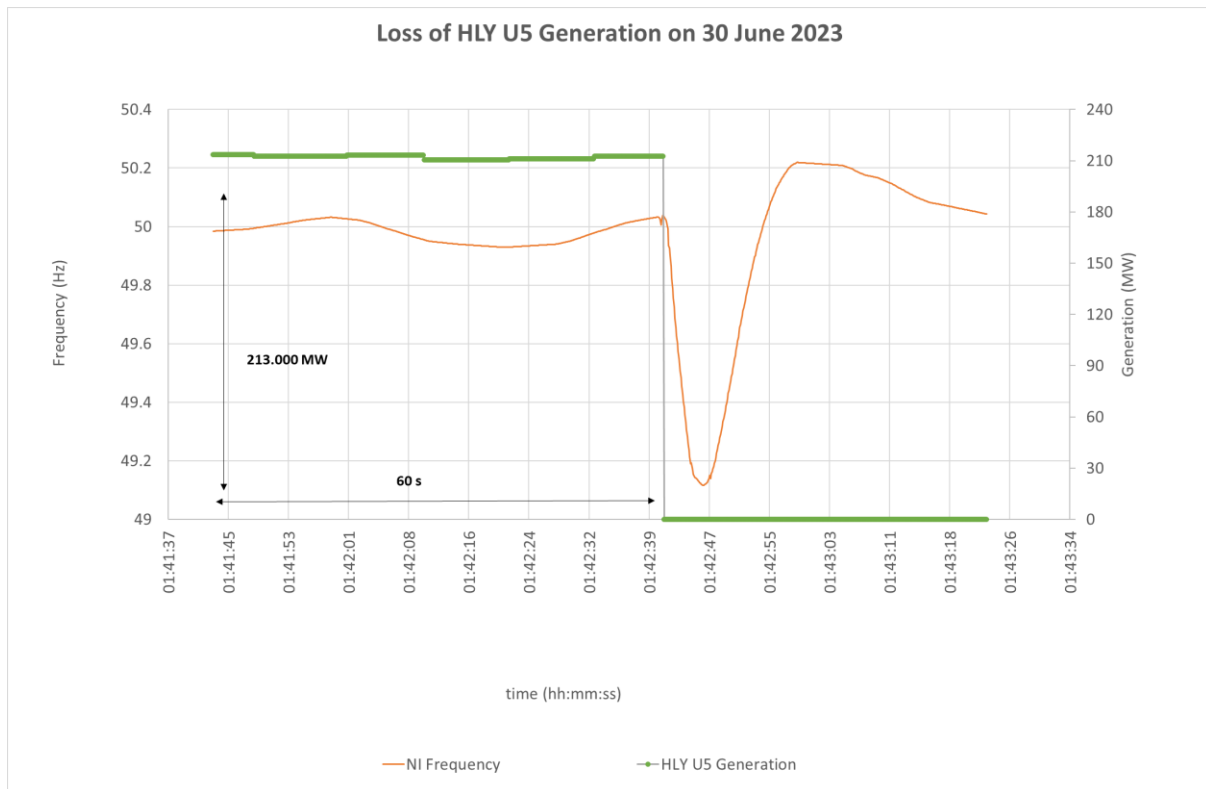
At 01:42:45 the disconnection of Huntly Unit 5 removed 213MW of generation injection into the power system. Consequently, this reduced the system frequency in the North Island below 49.25 Hz at 01:42:46 (49.12 Hz) and in the South Island at 01:42:47 (49.22 Hz).

Genesis confirmed the MW lost as 213.

South Island Frequency



North Island Frequency



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After the under-frequency event

At the time of the event, the System Operator had dispatched:

- North Island (generation) instantaneous reserve providers to be available to provide 122.8MW FIR and 132.9MW SIR.
- North Island interruptible load providers to be available to trip 69.3MW FIR and 58.7MW SIR.
- South Island (generation) instantaneous reserve providers to be available to provide 72.4MW FIR and 112MW SIR.

These reserve providers responded, returning the frequency to the normal band within two seconds.

Performance of instantaneous reserve providers in an under-frequency event is assessed by the System Operator to ascertain if these providers are meeting their respective ancillary service contracts. One ancillary service provider fell short of its contractual obligations by 3.34MW. The System Operator has reduced the contractual quantity of this provider to zero until it can demonstrate measures to prevent recurrence.

No other event or asset operation was identified as occurring at or around the time of the under-frequency event.

RATIONAL FOR RECOMMENDATION

Factors considered

Only one event occurred in close proximity to the North Island and South Island frequencies falling below 49.25 Hz, namely the tripping of Huntly Unit 5 at 01:42:45 on 30th June 2023.

Accordingly, assessment of this information confirms that only the tripping of Huntly Unit 5 can be linked with the North and South Island frequencies falling below 49.25Hz.

Genesis and the Grid Owner were both asked if they considered themselves the causer of the under-frequency event.

Genesis confirmed that the tripping of Huntly Unit 5 caused the under-frequency event.

The Grid Owner does not believe it caused the under-frequency event.

CALCULATION OF MW LOST

The purpose of this calculation is to determine the MW value provided to the clearing manager for the purposes of calculating the under-frequency event charge.

The System Operator follows the procedure 'Calculating the Amount of MW lost' (PR-RR-017) to determine the MW lost. This procedure follows the formula set out in clause 8.64 of the Code for calculating an event charge.

The event charge payable by the causer of an under-frequency event (referred to as "Event e" below) must be calculated in accordance with the following formula:

$$EC = ECR * (\sum_y (INT_{ye} \text{ for all } y) - INJ_d)$$

where

EC is the event charge payable by the causer

ECR is \$1,250 per MW

INJ_d is 60 MW

INT_{ye} is the electric power (expressed in MW) lost at point y by reason of Event e (being the net reduction in the injection of electricity (expressed in MW) experienced at point Y by reason of Event e) excluding any loss at point y by reason of secondary Event e

y is a point of connection or the HVDC injection point at which the injection of electricity was interrupted or reduced by reason Event e

As the ECR and INJ_d values are constants the values to calculate and complete the formula are y and INT_{ye}.

Using the event charge formula the calculation is as follows:

$$\text{Event Charge} = \$1250 * (213\text{MW} - 60\text{MW})$$

$$\text{Event Charge} = \$191,250$$

Appendix 1: CORRESPONDENCE

1.1 CONFIRMATION OF EVENT NOTICE



Customer Advice Notice

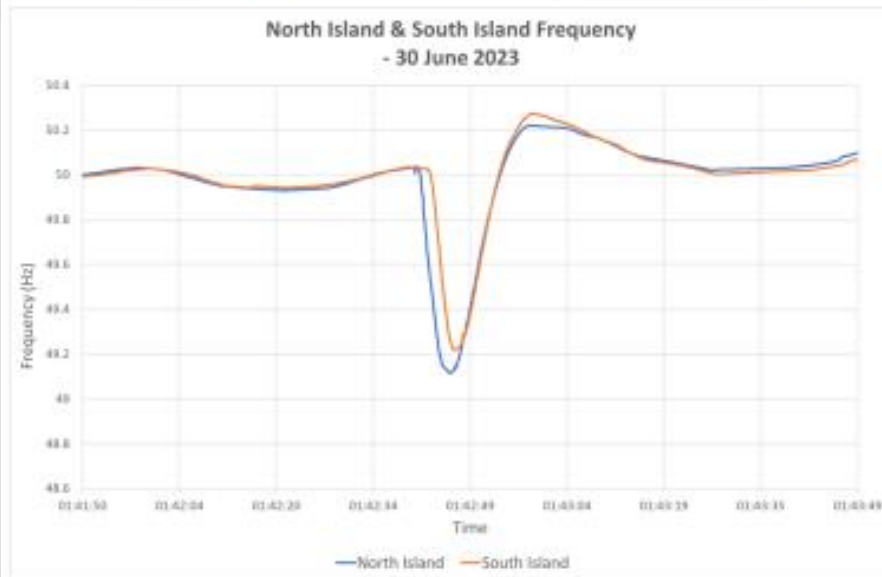
To: CAN NZ Participants **From:** The System Operator
Sent: 03-Jul-2023 10:37 **Telephone:** 0800 488 500
Ref: 4853172176 **Email:** NMData@transpower.co.nz

Revision of:

Under-Frequency Event Confirmation

The system operator wishes to advise market participants of an under-frequency event which occurred in the North Island and South Island on 30 June 2023.

Event ID	4396
Affected Islands:	North Island & South Island
North Island Minimum Frequency:	49.12 Hz
Time (start of UFE):	01:42:45
Time (of min. frequency):	01:42:46
South Island Minimum Frequency:	49.22 Hz
Time (start of UFE):	01:42:47
Time (of min. frequency):	01:42:47



Market Operations

Transpower NZ Ltd
 P.O. Box 1021,
 Wellington 6140,

A revision of this notice will be issued if there is any change to the situation above.

1.2 SYSTEM OPERATOR REQUEST FOR INFORMATION - GENESIS

**TRANSPower**

Waikoukou
22 Boulcott Street
PO Box 1021, Wellington
New Zealand
Telephone +64-4-590 7000
Facsimile: +64-4-495 7100
richard.renouf@transpower.co.nz

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13 July 2023

Steve Leppien
Genesis Energy
Private Bag 3131
Hamilton

Dear Steve,

30th June 2023 Under-Frequency Event

At 01:42 on 30th June 2023 an under-frequency event occurred in both the North and South Islands. We are investigating the event and require the following information from you:

- Could you provide information regarding the event and what you believe may have caused the under-frequency to occur on 30th June 2023.
- We have assessed the MW lost during the event as 213 MW at Huntly. Can you please confirm this assessment or provide data that indicates a different value of MW lost. We rely on SCADA data, but your data from site may be more accurate.
- Could you also confirm whether or not you could have been the causer of the under-frequency event as per the Code.

The information you provide will be used by the system operator to recommend to the Electricity Authority who the causer of the event was. The Electricity Authority will make the final determination of causer.

Please contact me if you require any further information.

Yours sincerely,

Richard Renouf
SO Compliance & Impartiality Manager

1.3 SYSTEM OPERATOR REQUEST FOR INFORMATION – GRID OWNER



Waikoukou
22 Boulcott Street
PO Box 1021, Wellington
New Zealand
Telephone +64-4-590 7000
Facsimile: +64-4-495 7100
richard.renouf@transpower.co.nz

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13 July 2023

Mao Reyes
Grid Compliance Manager
Grid Owner
Transpower
Wellington

Dear Mao,

30th June 2023 Under-Frequency Event

At 01:42 on 30th June 2023 an under-frequency event occurred in both the North and South Islands. We are investigating the event and require the following information from you:

- Could you provide information regarding the event and what you believe may have caused the under-frequency to occur on 30th June 2023.
- Could you also confirm whether or not you could have been the causer of the under-frequency event as per the Code.

The information you provide will be used by the system operator to recommend to the Electricity Authority who the causer of the event was. The Electricity Authority will make the final determination of causer.

Please contact me if you require any further information.

Yours sincerely,

A handwritten signature in blue ink, appearing to read "RJR".

Richard Renouf
SO Compliance & Impartiality Manager

1.4 GENESIS RESPONSE

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Genesis Energy Limited
The Genesis Energy Building
94 Bryce Street
Private Bag 3131
Hamilton 3204
New Zealand

T. 07 982 7909

17 July 2023

Richard Renouf
SO Compliance and Impartiality Manager
Transpower New Zealand Limited
P O Box 1021
WELLINGTON 6140

By email: [REDACTED]

Dear Richard,

RE: 30th June 2023 Under-Frequency Event

I refer your letter dated 13 July 2023 requesting information from Genesis to help identify the causer of the 30 June 2023 under-frequency event.

Information regarding the event

A Huntly Unit 5 protection trip was caused by a fault on one phase of the synchronising circuit breaker. Assessment and testing work is underway with Genesis bringing in experts from our partners in Japan to ensure repairs can be made as quickly and efficiently as possible.

Loss of Injection Figure:

Genesis concurs with Transpower's assessment of the loss of injection figure.

Causer:

Genesis considers it (Huntly Unit 5) was the causer of the 30 June 2023 under-frequency event.

Yours faithfully
GENESIS ENERGY LIMITED

A handwritten signature in black ink, appearing to read "Steve Leppien".

Steve Leppien
Regulatory and Quality Assurance Manager

1.5 GRID OWNER RESPONSE



Waikoukou
22 Boulcott Street
PO Box 1021
Wellington 6140
New Zealand
P 64 4 590 7000
F 64 4 590 6968
www.transpower.co.nz

25 July 2023

Richard Renouf
Compliance and Impartiality Manager
System
Operations
Transpower
Wellington

Dear Richard

30th June 2023 North and South Islands Under-Frequency Event

Thank you for your letter dated 13 July 2023 regarding the under-frequency event that occurred on 30th June 2023 in the North and South Islands. My understanding of the event is as follows:

- At 01:42 on 30th June Huntly unit 5 tripped, resulting in an under-frequency event occurring in the North and South Islands.
- Market participants were notified by a frequency excursion notice issued at 02:25 on 30th June, that Huntly generation had tripped and that the North and South Islands' frequency had fallen to 49.12Hz and 49.22Hz, respectively.
- A customer advice notice issued at 10:37 on 3rd July confirmed that an under-frequency event occurred in the North (01:42:45) and South (01:42:47) Islands on 30th June 2023.
- There were no protection operations of any grid assets and HVDC event on 30th June 2023 around the time when the Huntly generation tripped.
- The Frequency Keeping Control (FKC) modulation on the HVDC was active when Huntly unit 5 tripped.

Considering the above information, I do not believe that the Grid Owner was the causer of nor did its assets contributed to the under-frequency event that occurred on this day.

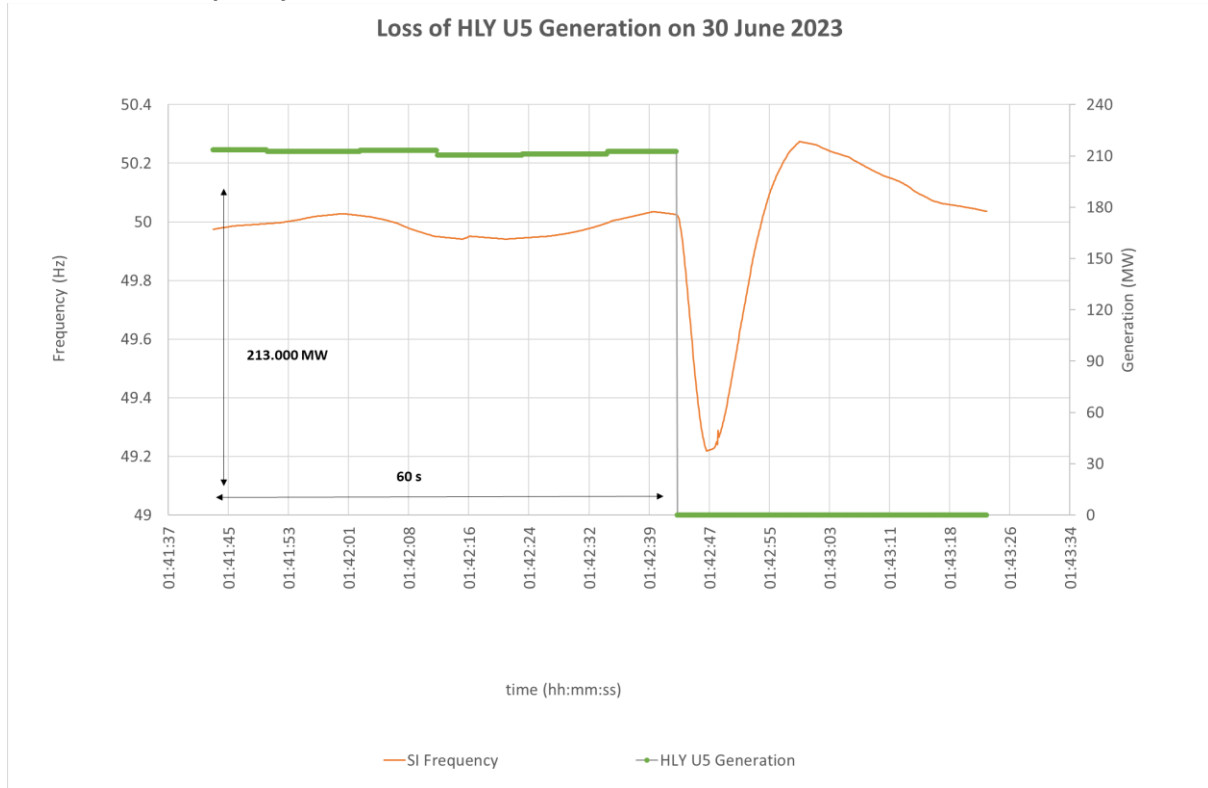
Yours sincerely

Mao Reyes
Grid Compliance Manager

Appendix 2: CHARTS

System Frequency (South and North Islands) and MW Trace 30th June 2023

South Island Frequency



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North Island Frequency

