

The Authority's draft determination of causer

All the papers w

1 March 2022 under-frequency event
Consultation paper

Submissions close: 5pm, 13 December 2022

Publishing date: 15 November 2022



Executive summary

An under-frequency event occurred on 1 March 2022

The normal frequency band in New Zealand is between 49.8 and 50.2 Hz. An under-frequency event (UFE) 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 (the Authority) to determine the causer (as defined in the Code) of a UFE and sets the process for making the determination.

The purpose of this paper is to:

- (a) set out the Authority's draft determination of the causer for the 1 March 2022 UFE
- (b) consult with interested parties on the draft determinations

The Authority's draft determination is that Genesis was the causer of the 1 March 2022 UFE

The Authority's draft determination under clause 8.61 of the Code is that Genesis Energy Limited (Genesis), as a generator, was the causer of the UFE on 1 March 2022.

The reasons for the draft determination are:

- (a) the interruption/reduction of energy occurred at Unit 2 at the Huntly power station, which belongs to Genesis
- (b) no other asset was identified as having caused or potentially caused the UFE
- (c) in the system operator's view, Genesis is the causer of the UFE
- (d) in reply to a system operator letter, Genesis accepted that it was the causer

Submissions are invited from interested parties

The Authority must consult with interested parties before making a final determination. Interested parties are invited to make a submission on the Authority's draft determination by 5 pm on 13 December 2022. The Authority will consider all submissions received and make a final determination on each UFE.

The Authority also invites comment on the system operator's calculations of the MW lost during the events, which the system operator uses for calculating the UFE charge.

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1 What you need to know to make a submission

What this consultation paper is about

- 1.1 The purpose of this paper is to consult with interested parties on the Authority's draft determination that Genesis Energy Limited, as the generator that owns Huntly Unit 2, was the causer of the UFE on 1 March 2022 at 2:57 pm.

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 UFEconsultations@ea.govt.nz with "Consultation Paper—1 March 2022 under-frequency event" in the subject line.
- 1.3 If you cannot send your submission electronically, post one hard copy to either one of the addresses below, or fax it to 04 460 8879.

Postal address

Submissions
Electricity Authority
PO Box 10041
Wellington 6143

Physical address

Submissions
Electricity Authority
Level 7, Aon Centre
1 Willis Street
Wellington

- 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
 - (c) provide a version of your submission that we can publish (if we agree not to publish your full submission).

- 1.5 If you indicate that part of your submission should not be published, someone from the Authority will discuss this with you before the Authority decides whether to not publish that part of your submission.

- 1.6 However, please note that all submissions that are received, including any parts that are not published, can be requested under the Official Information Act 1982. This means the Authority would be required to release material that it did not publish unless good reason existed under the Official Information Act to withhold it. Someone from the Authority would normally consult with you before releasing any material that you indicated should not be published.

When to make a submission

- 1.7 Please deliver your submissions by **5pm** on Tuesday **13 December 2022**.
- 1.8 The Authority will acknowledge receipt of all submissions electronically. Please contact the Authority info@ea.govt.nz or 04 460 8860 if you do not receive electronic acknowledgement of your submission within two business days.

2 Introduction

- 2.1 Clause 8.60 of the Code requires the system operator to investigate the causer of a UFE and provide a report to the Authority.
- 2.2 Clause 8.61(2) requires the Authority to publish a draft determination that states whether a UFE was caused by a generator or grid owner, and, if so, the identity of the causer. Clause 8.61(3) requires the Authority to give reasons for its findings in the draft determination.

3 The 1 March 2022 UFE draft determination

Genesis was the causer of the 1 March 2022 UFE

- 3.1 The Authority's draft determination under clause 8.61 is that Genesis, as the generator that owns Huntly Unit 2, was the causer of the UFE on 1 March 2022 at 2:57pm.

The system operator investigated the causer of the UFE

- 3.2 The system operator's report (dated April 2022) is attached as Appendix B.
- 3.3 The circumstances described in the report are summarised below:
- (a) At 2:57pm Huntly Unit 2 tripped removing 220.22 MW of generation, the frequency fell to 49.20 Hz in the North Island.
 - (b) The frequency fall and the quantum of MW lost (greater than the 60 MW minimum) meant that a UFE, as defined in Part 1 of the Code, had occurred.
 - (c) Interruptible load and instantaneous reserves in the North Island responded, returning the frequency to the normal band.
 - (d) Huntly Unit 2 tripped due to a boiler tube leak causing the furnace protection system to trip. Investigation into the tripping and other system events supports Genesis's position that the trip of Huntly Unit 2 caused the UFE. Genesis confirmed that following the trip, the issue at Huntly Unit 2 was identified and is being repaired, with the Unit on a maintenance outage.
 - (e) No other event or asset operation was identified as occurring at or around the time of the UFE.
 - (f) On 9 March 2022, the system operator wrote to Genesis setting out its view that Huntly Unit 2 tripped resulting in a loss of injection and requesting any information Genesis could provide. On 16 March 2022, Genesis agreed it was the causer.
 - (g) On 9 March 2022, the system operator requested the grid owner provide information on the circumstances of the UFE. On 11 March 2022, the grid owner provided some supporting information. The grid owner did not believe it (the grid owner) was the causer.

The Authority considered the circumstances of the UFE

- 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) a UFE occurred on 1 March 2022 at 2:57pm when frequency dropped to 49.20 Hz in the North Island
 - (b) the interruption/reduction of electricity occurred at the grid injection point for Huntly Unit 2, which belongs to Genesis

- (c) no other asset was identified as having caused or potentially caused the UFE
 - (d) the system operator and Genesis agree that Genesis was the causer of the UFE.
- 3.5 Having considered the relevant clauses of the Code, the Authority (based on the information available to us at this time) agrees with the system operator's findings on the 1 March 2022 UFE.

Q1. Do you agree with the draft determination that Genesis Energy Limited is the causer of the under-frequency event on 1 March 2022 at 2:57pm hours? If not, please advise your view on the causer and give reasons.

4 The Authority will consider submissions and make a final determination

- 4.1 Clause 8.61(4) of the Code requires the Authority to consult every generator, grid owner and other participant substantially affected by a UFE in relation to a draft determination. The Authority has allowed a consultation period of four weeks for this draft determination.
- 4.2 Accordingly, the deadline for submissions is 5 pm on 13 December 2022.
- 4.3 The Authority will consider submissions received and publish its final determination. Clauses 8.62 and 8.63 of the Code set out provisions relating to any disputes regarding the Authority's determination.

5 The system operator has calculated the MW lost during the event based on its investigations

- 5.1 The Code sets out how to calculate the event charge payable by the causer of a UFE. This in turn enables calculation of the rebates paid for UFEs (clauses 8.64 and 8.65 of the Code).
- 5.2 Central to the event charge calculation is determining the MW of injection lost at one or more grid injection points as a result of the UFE. The system operator determines the MW lost as part of its investigations into a UFE.
- 5.3 The system operator followed its procedure *PR-RR-017 Calculating the Amount of MW lost* to determine the MW value (provided to the clearing manager for calculating UFE charges).
- 5.4 The system operator has determined the loss of injection into the grid. The 1 March 2022 event was 220.22 MW at the grid injection point for Huntly Unit 2, resulting in an event charge of \$200,275.
- 5.5 The system operator's calculation of the MW lost is included in its report. The calculation does not form part of the Authority's draft determination. However, the Authority acknowledges that the calculation is central to determining the UFE charge payable by the causer, and therefore also to the rebate paid for a UFE. Accordingly, the Authority invites comment on the system operator's calculation of the MW lost.

Q2. Do you agree with the system operator's calculation that 220.22MW was lost from the power system in the 1 March 2022 UFE? If not, please advise your view on the MW lost and give reasons.

Appendix A Format for submissions

Submitter	
-----------	--

Question	Comment
<p>Q1. Do you agree with the draft determination that Genesis Energy Limited is the causer of the under-frequency event on 1 March 2022 at 2:57pm? If not, please advise your view on the causer and give reasons.</p>	
<p>Q2. Do you agree with the system operator's calculation that 220.22MW was lost from the power system in the 1 March 2022 UFE? If not, please advise your view on the MW lost and give reasons.</p>	

Causation Report 1st March 2022 Under-Frequency Event

System operator event 4258

April 2022

IMPORTANT

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PURPOSE

On 1st March 2022 a reduction of energy into the power system caused the system frequency in the North Island 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.

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

- 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 14:57:19 on 1st March 2022 Genesis Energy's Huntly Station Unit 2 generator (**Huntly Unit 5**) tripped.

The disconnection of generation from Huntly Unit 2 removed 220.22 MW of injection into the power system.

At 14:57:22 the North Island frequency fell to 49.20 Hz. The North Island frequency falling below 49.25 Hz constitutes an under-frequency event, as defined in the Code.

Genesis Energy has stated that it believes the tripping of Huntly Unit 2 was the cause of the under-frequency on 1st March 2022.

Investigation into the tripping and other system events supports Genesis's position that the trip of Huntly Unit 2 caused the under-frequency event.

Accordingly, the system operator recommends Genesis Energy be found as the causer of the under-frequency event on 1st March 2022.

SYSTEM EVENTS – 1ST MARCH 2022

Prior to the under-frequency event

According to the grid owner, there were no protection operations on any grid assets in the vicinity of Huntly either before or after Huntly Unit 2 tripped that may have contributed to the frequency falling below 49.25 Hz.

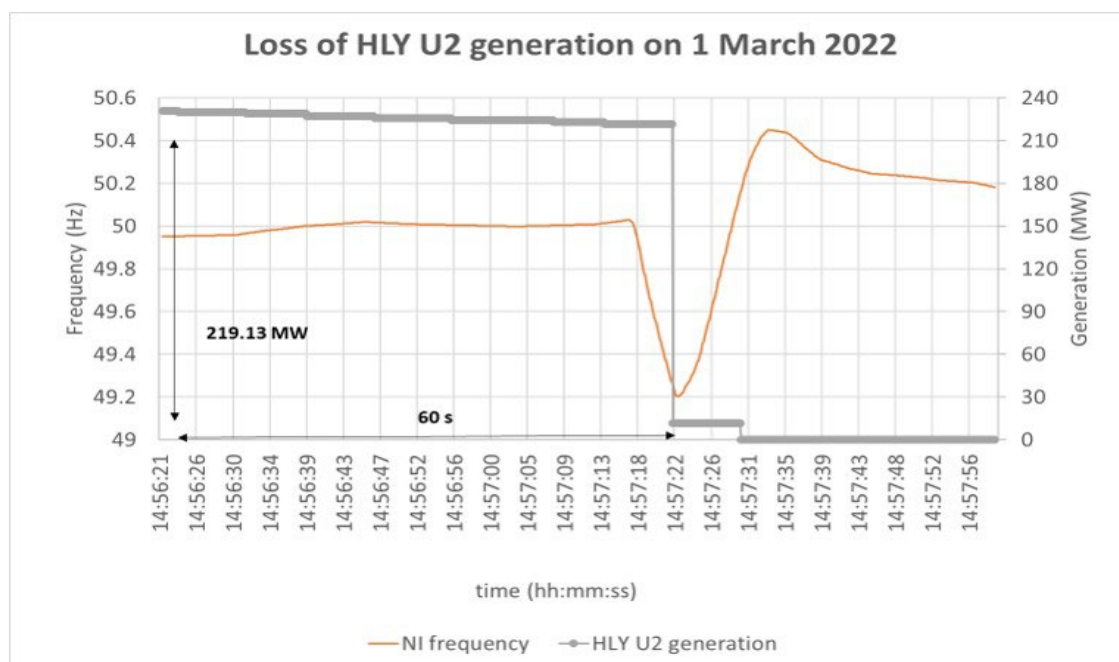
The under-frequency event

According to Genesis, Huntly Unit 2 tripped on furnace protection in response to a boiler tube leak. As at 16th March 2022 (the date of Genesis' response to the system operator), the unit is currently on an outage with repair work underway.

At 14:57:19 the disconnection of Huntly Unit 2 removed 220.22 MW of generation injection into the power system and, as a consequence, reduced the system frequency at 14:57:22 to 49.20 Hz in the North Island.

Genesis confirmed the MW lost as 220.22 and provided supporting SCADA data in its response to the system operator on 16th March 2022.

Please note Genesis' SCADA data confirmed the time that Huntly Unit 2 tripped (14:57:19) and the value of MW lost (220.22). The system operator's graph below does not precisely time the tripping of Huntly Unit 2 or the value of MW lost. This is because there is a time delay in the system operator's SCADA data (which resulted in the delayed recording of Huntly Unit 2 tripping) and it does not have the same resolution as Genesis' data (the system operator interpolates some of its data points).



After the under-frequency event

At the time of the event, the system operator had dispatched:

- North Island instantaneous reserve providers to be available to provide 72.60 MW FIR and 135.60 MW SIR;
- North Island interruptible load providers to be available to trip 142.78 MW FIR and 184.61 MW SIR.

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

Interruptible load providers are not required to respond until the frequency drops below 49.20 MW. Five interruptible load providers were scheduled for dispatch, two responded in full and three had partial responses, due to local frequency discrepancies being sufficiently close to 49.20 Hz. 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. Assessment confirmed that all ancillary service contract obligations were met satisfactorily. The responses of the interruptible load providers was consistent with their contractually agreed trip settings.

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

Genesis confirmed that following the trip, Huntly Unit 2 is on an outage with repair work underway.

RATIONAL FOR RECOMMENDATION

Factors considered

Only one event occurred in close proximity to the North Island frequency falling below 49.25 Hz, namely the tripping of Huntly Unit 2 at 14:57:19.

Accordingly, assessment of this information confirms that only the tripping of Huntly Unit 2 can be linked with the North Island frequency falling below 49.25Hz.

Genesis Energy and the grid owner were both asked if they considered themselves the causer of the under-frequency event.

Genesis Energy confirmed that the tripping of Huntly Unit 2 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:

$EC = ECR * (\sum y (INTye \text{ for all } y) - INJd)$ where

EC is the event charge payable by the causer

ECR is \$1,250 per MW

INJd is 60 MW

INTye 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 INJd values are constants the values to calculate and complete the formula are y and INTye.

To establish the amount of MW lost, SCADA data was extracted for the 60 seconds prior to the North Island frequency reaching 49.25 Hz for generation into the Huntly grid injection point. However, there is a time delay in the system operator's SCADA data and it does not have the same resolution as Genesis' data (the system operator interpolates some of its data points). Genesis confirmed the MW lost causing the North Island frequency to fall below 49.25 Hz as 220.22 MW and provided its supporting SCADA data. The system operator is comfortable to rely on Genesis' more accurate SCADA data (the system operator's revised calculation was 219.13MW).

Using the event charge formula the calculation is as follows: Event

Charge = \$1250 * (220.22MW – 60MW)

Event Charge = \$200,275

Appendix 1: CORRESPONDENCE

1.1 CONFIRMATION OF EVENT NOTICE

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Customer Advice Notice

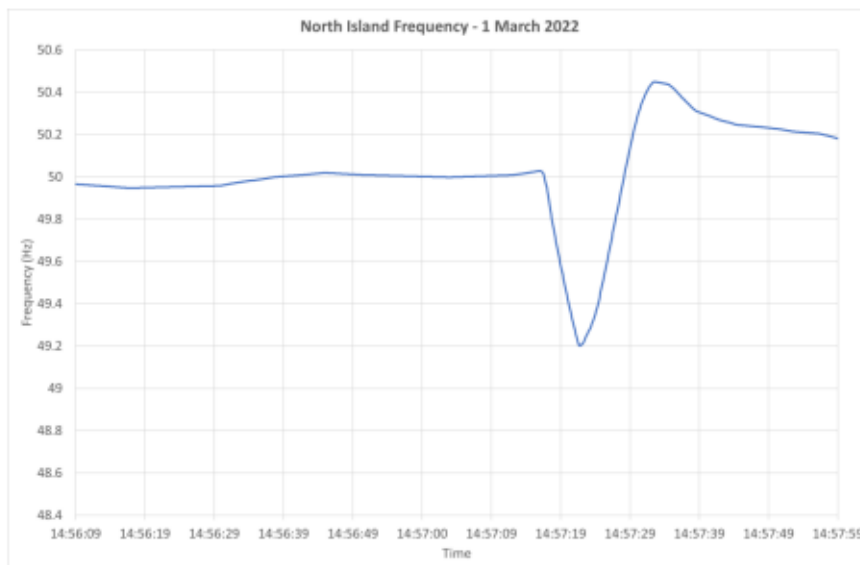
To: CAN NZ Participants, NCC Ops Managers, cm@nzx.com, robynne.purdy@transpower.co.nz
From: The System Operator
Sent: 03-mar-2022 09:12
Telephone: 0800 488 500
Ref: 4258011495
Email: NMData@transpower.co.nz

Revision of:

Under-Frequency Event Confirmation

The system operator wishes to advise market participants of the under-frequency event which occurred in the North Island on 01 March 2022.

Event ID	4258
Affected Islands:	North Island
North Island Minimum Frequency:	49.20 Hz
Time (start of UFE):	14:57:22
Time (of min. frequency):	14:57:22



Market Operations

Transpower NZ Ltd

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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9 March 2022

Steve Leppien
Genesis Energy
Private Bag 3131
Hamilton

Dear Steve,

1st March 2022 North Island Under-Frequency Event

At 14:57 on 1st March 2022 an under-frequency event occurred in the North Island. 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 1st March 2022.
- We have assessed the MW lost during the event as 228.91 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,

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

Richard Renouf
SO Compliance & Impartiality Manager

1.3 SYSTEM OPERATOR REQUEST FROM 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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9 March 2022

Kent Murrell
Compliance Manager
Grid Owner
Transpower
Wellington

Dear Kent,

1st March 2022 North Island Under-Frequency Event

At 14:57 on 1st March 2022 an under-frequency event occurred in the North Island. 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 1st March 2022.
- 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 ENERGY RESPONSE



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

T. 07 982 7909

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16 March 2022

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

By email: Richard.Renouf@transpower.co.nz

Dear Richard,

RE: 01 March 2022 North Island Under-Frequency Event

I refer your letter dated 09 March 2022 requesting information from Genesis to help identify the causer of the 01 March 2022 North Island under-frequency event.

Information regarding the event

Huntly Unit 2 tripped on furnace protection in response to a boiler tube leak. The unit is currently on an outage with repair work underway.

Loss of Injection Figure:

Genesis has assessed the MW lost during the event as 220.22MW using the methodology defined in Section 4.2 of the Transpower PR-RR-017 Providing Under Frequency Event Causer Recommendations procedure. The data supporting this assessment is attached.

Causer:

Genesis considers it (Huntly Unit 2) was the causer of the 01 March 2022 North Island 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

11 march 2022

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Richard Renouf
Compliance and Impartiality Manager
System Operations
Transpower
Wellington

Dear Richard

01 March 2022 North Island Under-Frequency Event

Thank you for your letter of 9 March 2022 regarding the under-frequency event that occurred on 01 March 2022. My understanding of the event is as follows:

- At 14:57 on 01 March 2022 Huntly unit 2 tripped, resulting in an under-frequency event occurring in the North Island.
- Market participants were notified by a frequency excursion notice issued at 15:14 on 01 March, that Huntly generation had tripped and that the North Island frequency had fallen to 49.20Hz.
- A customer advice notice issued at 09:12 on 03 March 2022 confirmed that an under-frequency event occurred in the North Island at 14:57 on 01 March 2022.
- There were no protection operations of any grid assets in the vicinity of Huntly either before or after Huntly unit 2 tripped.

Considering the above information, I do not believe that the Grid Owner was the causer of the under-frequency event that occurred at 14:57 on 01 March 2022.

Yours sincerely

Kent Murrell
Grid Compliance Manager

System Frequency and MW Trace 1st March 2022

