

Draft determination of causer: 23 October (5.42pm) 2025 UFE

Consultation paper

3/08/2026

Executive summary

An under-frequency (UFE) event occurred on 23 October 2025 at 5.42pm. The purpose of this paper is to set out the Electricity Authority Te Mana Hiko's (Authority) draft determination of causer for the UFE. It invites feedback from affected industry participants on the draft determination of causer and the System Operator's calculation of megawatts of power lost during the event.

The normal frequency band in the New Zealand power system is between 49.8Hz and 50.2Hz. A UFE occurs when the frequency falls below 49.25Hz because of a loss of more than 60 megawatts (MW) of power injected into the grid.

The Electricity Industry Participation Code 2010 (Code) requires the Authority to determine the causer of a UFE and sets out the process for making the determination.

The Authority's draft determination is that the System Operator was the causer of the UFE on 23 October 2025 at 5.42pm

The Authority's draft determination is that the System Operator was the causer of the UFE because it omitted to:

- (a) assess the planned outage of the TAB-WRK-1 circuit in October 2025 in the manner required by clause 3 of Technical Code D of Schedule 8.3 against the System Operator's principal performance obligation to dispatch assets made available in a manner that avoids cascade failure of assets resulting in a loss of electricity to consumers arising from a frequency or voltage excursion;¹ and
- (b) when giving a reasonable opinion on the design and configuration of the transmission grid owner's asset connection with the TAB G1 generating unit when this asset was commissioned,² include consideration of the voltage angle conditions that could be reasonably expected to arise during routine switching of the TAB-WRK-1 circuit.

If the System Operator carried out the assessments and considerations required by the Code, it would have identified the significant voltage angle that exists across circuit breaker 662 (CB662) in its open state when the geothermal units at Tauhara are operating at high levels of output. The System Operator would then have been in a position to require the grid owner to take measures to manage the risk to connected generation before closing the CB662. The closure of CB662 at 5.42pm on 23 October 2025 would not have proceeded in the manner that it did, and the generating units would not have tripped.

The Authority considers the System Operator's omissions caused TAB G1 and TAC G1 to trip, causing the interruption to electricity supply, which caused the UFE.

Submissions are invited from affected parties

Under clause 8.61 of the Code, the Authority must consult with every participant substantially affected by a UFE on its draft determination before making its final determination.

We invite affected participants to make a submission on our draft determination by 5pm, **31 August 2026** to compliance@ea.govt.nz. We also welcome feedback on the System Operator's calculation of the megawatts of power lost during the event, which the System Operator uses for calculating the UFE event charge. After reviewing all submissions, the Authority will make a final determination on the causer of the UFE.

¹ Clause 7.2A(1)(a) of the Code.

² Clause 8.25(1) of the Code.

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1 What you need to know to make a submission

What this consultation is about

- 1.1 This paper sets out the Electricity Authority Te Mana Hiko's (Authority) draft determination that Transpower as system operator (System Operator) was the causer of the under-frequency event (UFE) at approximately 5.42pm on 23 October 2025.
- 1.2 It invites feedback from industry participants substantially affected by the UFE on the draft determination of causer.

How to make a submission

- 1.3 The Authority welcomes submissions in Microsoft Word in the format shown in **Appendix A** to compliance@ea.govt.nz with "Draft determination of causer: 23 October (5.42pm) 2025 UFE" in the subject line by 5pm, 31 August 2026.
- 1.4 We will acknowledge receipt of all submissions via email. Please contact compliance@ea.govt.nz or 04 460 8860 if you do not receive acknowledgement of your submission within two business days.
- 1.5 If you cannot send your submission electronically, please contact compliance@ea.govt.nz or 04 460 8860 to discuss alternative arrangements.
- 1.6 Please note the Authority intends to publish all submissions it receives. If you consider 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 the Authority can publish (if we agree not to publish your full submission).
- 1.7 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.
- 1.8 Please note 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.

The Authority will consider submissions and make a final determination

- 1.9 The Electricity Industry Participation Code 2010 (Code) requires the Authority to consult with every participant substantially affected by an under-frequency event for a draft determination. The minimum consultation period is 10 business days. Due to the complex nature of this event, the Authority considers it appropriate to consult for 20 business days.
- 1.10 The Authority will consider all submissions received and publish its final determination.
- 1.11 Clause 8.62 of the Code sets out provisions for any disputes on the Authority's determination.

2 Introduction

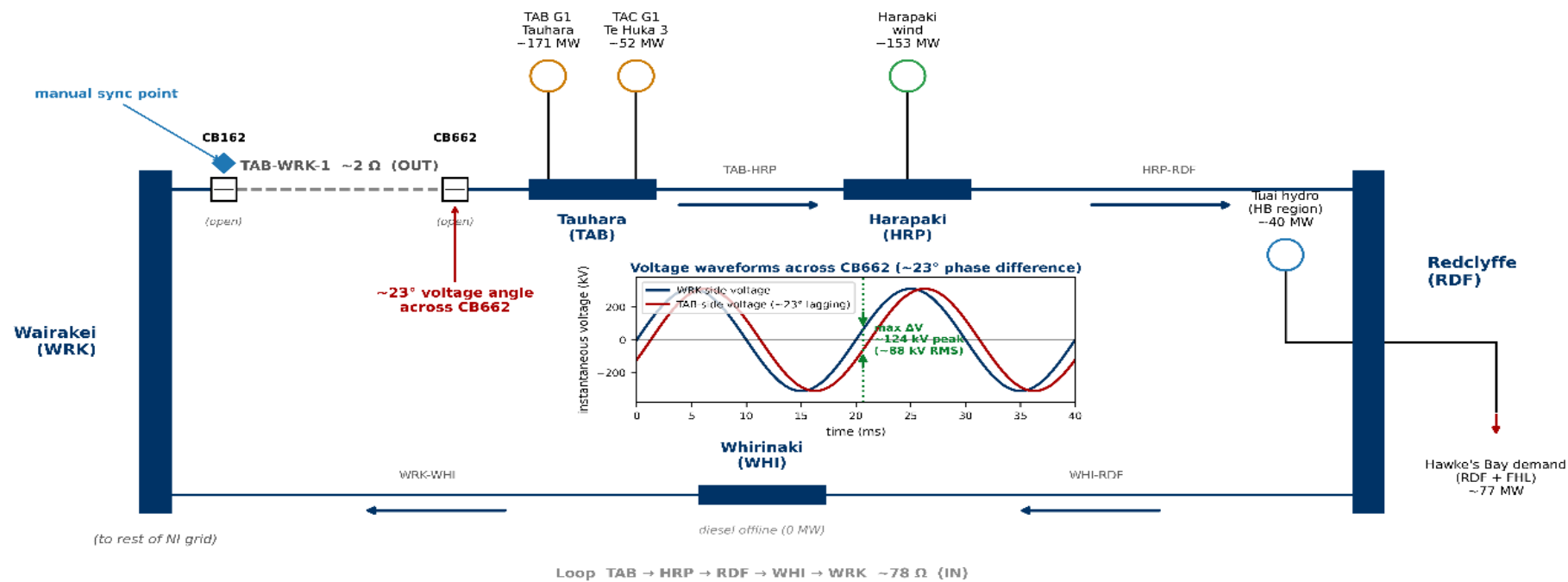
- 2.1 Clauses 8.60 and 8.61 of the Code contain provisions for investigating and determining the causer of a UFE. The System Operator is required to investigate the causer of a UFE and provide a report to the Authority.
- 2.2 Where the causer of a UFE is not identified in the System Operator's report, or the alleged causer as identified in the System Operator's report denies it was the causer, the Authority must publish a draft determination which states whether a UFE was caused by a participant, and, if so, the identity of the causer.
- 2.3 The draft determination must include the reasons for the findings.

3 The System Operator investigated the causer of the UFE

- 3.1 The System Operator provided two reports to the Authority in respect of the 23 October 2025 UFE:
 - (a) a causation report dated 13 March 2026 under clause 8.60(5) of the Code in which the System Operator identified the causer of the UFE (Causation Report) and
 - (b) a supplementary engineering report dated 13 March 2026 providing the System Operator's underlying technical analysis (Engineering Report).
- 3.2 The Causation Report and the Engineering Report is attached as **Appendix B**.

System Operator's summary of circumstances of the UFE

- 3.3 The circumstances in which the 23 October 2025 UFE occurred are set out in the Causation Report and the Engineering Report.
- 3.4 The circumstances are summarised below:
 - (a) immediately prior to the UFE, the Tauhara-Wairakei-1 (TAB-WRK-1) circuit was out of service on planned outage
 - (b) with TAB-WRK-1 out of service, the impedance between TAB and WRK through the parallel Hawke's Bay loop was approximately 78 ohms, but with TAB-WRK-1 in service it is approximately 2 ohms
 - (c) Tauhara (TAB G1) and Te Huka 3 (TAC G1) power stations, owned by Contact Energy Limited (Contact), were generating during the outage – TAB G1 was generating approximately 171MW and TAC G1 was generating approximately 52MW
 - (d) at approximately 5.42pm, TAB-WRK-1 was ready to be returned to service
 - (e) the breaker at the Wairakei end (CB162) was closed, energising the circuit, and then the breaker at the TAB G1 end (CB662) was closed
 - (f) immediately before CB662 was closed, the voltage angle across the open breaker contacts was approximately 23 degrees
 - (g) within seconds of CB662 closing, TAB G1 and TAC G1 both tripped, causing the system frequency to drop to a minimum of 49.2Hz
 - (h) the frequency was restored to normal by 5.43pm.
- 3.5 The Authority has produced the diagram in Figure 1 to show the double circuit line and the circuit affected by this UFE.



- 3.6 On the information available to the Authority, the UFE was resolved without widespread impact. However, Contact has noted in its response to the System Operator (attached to the Causation Report) its generators may have been damaged as a result of the UFE. We do not have specific analysis to indicate whether this is the case or not.

Background conditions prior to the UFE

- 3.7 On 23 October 2025, there was severe weather across most of Aotearoa. A grid emergency was declared at 7.43am for the upper South Island, followed at 7.45am by loss of supply to the upper South Island when the Islington-Kikiwa 1 circuit tripped. A managed restoration of supply took approximately 5.5 hours, with the Grid Emergency lifted at 1.28pm.
- 3.8 HVDC Pole 2 tripped at 9.21am and was on unplanned outage from 9.24am.
- 3.9 HVDC Pole 3 then tripped at approximately 10.12am. When HVDC Pole 3 tripped, the North Island frequency dropped to 49.02Hz, causing a UFE (the [23 October 2025 10.12am UFE](#)).
- 3.10 On 18 February 2026, the Authority published its final determination that the grid owner was the causer of that event.
- 3.11 The HVDC was returned to service at reduced capability at 11.13am, with full capacity restored by approximately 2pm.
- 3.12 Two North Island circuits auto-reclosed at 5.16pm and 5.20pm, shortly before the closure of CB662 at 5.42pm. The System Operator notice database records 30 notices for the day, the second-highest in the past 13 years on record below 8 December 2019.

System Operator's reasons for identifying Contact Energy Limited as the causer of the UFE

- 3.13 In the Causation Report, the System Operator identified Contact as the causer of the UFE. This finding was supported by the Engineering Report.
- 3.14 The reports identify the root cause of the UFE as the operation of Contact's protection relays — TAB G1 tripping on differential protection following current transformer (CT) saturation, and TAC G1 tripping on a questionable rate of change of frequency (RoCoF) reading. Both reports treat Contact's protection operation as the proximate cause and treat the surrounding contributing factors as matters external to the question of causer.
- 3.15 On 16 December 2025, during the System Operator's investigation, Contact responded to the System Operator's questions related to the UFE. In its response, Contact denied that it was the causer of the UFE. It considered that the "out of sync closing" of the TAB-WRK-1 circuit caused the TAB G1 and TAC G1 generators to trip which subsequently caused the UFE. It explained:
- (a) When the TAB-WRK-1 circuit was closed, TAB G1's output increased from net 163 megavolt-ampere (MVA) to 334 MVA. This surge on the circuit closure was due to the 23 degree voltage angle difference between the high-impedance grid connection at TAB G1 versus the low impedance grid connection at WRK. The surge caused saturation of a current transformer in the TAB G1 differential protection, and the differential protection relay subsequently tripped the generator.
 - (b) TAC G1 tripped because the grid disturbance caused by the TAB-WRK-1 circuit closure caused its RoCoF protection to operate.

- 3.16 In Contact's view, set out in its response to the System Operator, the UFE was a systems issue due to the high impedance of the Hawkes Bay transmission loop back to WRK via Redclyffe. Contact submitted that the System Operator and grid owner were responsible for system studies and resulting procedures relating to this grid issue. Contact raised concerns that no consideration was given to the risk to its assets prior to the manual operation of the CB662 circuit breaker.
- 3.17 The System Operator disagreed with Contact's view in the Causation Report. The System Operator noted while the TAB-WRK-1 circuit closure created a system disturbance, the disturbance and resulting torque transient at the generators did not cause the TAB G1 and TAC G1 generation to trip. Instead, the System Operator's view is the generators were tripped by protection systems that were not expected to operate in these conditions:
- (a) in the case of TAB G1, the CT used for generator protection would not be expected to saturate at the level of current experienced by the generator
 - (b) in the case of TAC G1, the RoCoF protection tripped when there was a significant change of voltage angle, but no significant RoCoF.
- 3.18 The System Operator disagreed that this was solely a grid issue and that no consideration was given to Contact's assets. The System Operator noted neither the grid owner nor the System Operator could have known that closing CB662 would cause Contact's protection relays to operate, and the specific protection operation resulting in the generation tripping could not have been identified in either grid owner or System Operator studies. Specifically, the System Operator's view is that:
- (a) to identify the issue with the saturation of the CT at TAB G1 requires a detailed model of the exact CT, and the System Operator and grid owner do not have this information
 - (b) to identify the issue with the TAC G1 RoCoF reading requires the detailed algorithm used by the generator protection relay, to which neither the System Operator nor the grid owner have access.
- 3.19 The System Operator added:
- (a) its connection studies are carried out on the as-built design to determine the impact of the connecting generator on the System Operator's ability to meet its Code requirements. These studies do not include detailed modelling of protection systems
 - (b) at the design stage, the grid owner and the asset owner can consider any potential concerns about step changes in voltage angle at the terminal busbar. Contact could have raised the concerns it noted in its letter of 16 December 2025 earlier, and it was not aware of Contact doing so.

4 Contact denies that it was the causer of the UFE

- 4.1 As set out above, in its letter of 16 December 2025, Contact denied that it was the causer of the UFE. To summarise, Contact considered that the closing of the TAB-WRK-1 circuit, with inadequate consideration to how it would affect TAB G1 and TAC G1, caused the generation to trip which subsequently caused the UFE.
- 4.2 Contact indicated it met with the grid owner, and following this, on 15 December 2025, the grid owner changed the settings for TAB to reduce the risk of recurrence. Specifically, the grid owner agreed with Contact to reduce the synch check on the TAB line circuit breaker from 20 to 10 degrees for the auto reclose function; and for any manual reclose action to require the TAB unit to be ramped down to 0MW to manage the risk to the unit.

- 4.3 These changes were intended to reduce the voltage angle across CB662 at the moment of closure, which reduces the risk of a recurrence of the conditions that caused the generators to trip. The Authority notes that these measures are materially the same as the operating policy that would have resulted from the assessments the Authority considers should have been undertaken as identified below in this determination.

5 The draft determination is the System Operator was the causer of the 23 October 5.42pm UFE

- 5.1 The Authority's draft determination under clause 8.61 is that the System Operator was the causer of the UFE at approximately 5.42pm on 23 October 2025.

The Authority considered the circumstances of the UFE

- 5.2 The Authority has considered the System Operator's Causation Report, Engineering Report, and correspondence with the grid owner and agrees:
- (a) with the description of the circumstances leading up to the UFE
 - (b) that a UFE occurred at about 5.42pm on 23 October 2025.
- 5.3 The Authority does not agree with the System Operator's finding that Contact was the causer of the UFE.
- 5.4 The central issue for this determination is not whether Contact's generators tripped or whether their protection systems operated. The key question is whether another participant's act or omission caused those generators to trip. The Authority's view is that the UFE occurred because the System Operator did not identify and manage the voltage angle conditions that arose during the TAB-WRK-1 outage and return to service. Those omissions allowed the switching event to proceed in a manner that caused the generators to disconnect.

The System Operator's omissions caused the UFE

- 5.5 Clause 1.1 of the Code defines a causer in relation to an under-frequency event as:

if the under-frequency event is caused by an interruption to or reduction of electricity supply, or an increase in electricity demand, from a single participant's asset or assets, the participant, unless another participant's act or omission or property causes the interruption to or reduction of electricity supply or the increase in electricity demand, in which case the other participant is the causer
(...)

- 5.6 This definition contemplates, in the first instance, that a UFE is caused by interruption caused to or reduction of electricity supply from a single participant's assets, which in this instance would be Contact. However, the definition is qualified by the second part – "unless another participant's act or omission or property causes the interruption to or reduction of electricity supply".
- 5.7 The Authority considers that the second part of the definition applies in this instance. The Authority's draft determination is that it was the System Operator's omissions that are the underlying reason for the UFE. In summary, this is because the System Operator omitted to discharge its responsibilities under clause 3 of Technical Code D of Schedule 8.3 of the Code, clause 8.25(1) of the Code, and clause 7.2A(1)(a) of the Code.

- 5.8 The System Operator holds responsibility under the Code to:
- (a) assess planned outages for how they will impact the System Operator's ability to plan to comply, and to comply with its principal performance obligations (clause 3 of Technical Code D of Schedule 8.3)
 - (b) provide its reasonable opinion on how the design and configuration of a grid owner's assets, and associated protection arrangements, are consistent with maintaining the System Operator's ability to comply with its principal performance obligations (clause 8.25(1))
 - (c) dispatch assets in a manner that avoids cascade failure of assets resulting in a loss of electricity to consumers arising from a frequency or voltage excursion (clause 7.2A(1)(a)).
- 5.9 The Authority considers the System Operator omitted to discharge its responsibilities under clause 3 of Technical Code D of Schedule 8.3 and clause 7.2A(1)(a) in the following way:
- (a) at the time of the planned outage of the TAB-WRK-1 circuit and its return-to-service on 23 October 2025, the System Operator did not assess the outage in the manner required by clause 3 of Technical Code D of Schedule 8.3 of the Code, against its principal performance obligation under clause 7.2A(1)(a) (as set out below).
- 5.10 The Authority considers the System Operator omitted to discharge its responsibilities under clause 8.25(1) of the Code in the following way:
- (a) at the time of the connection of the TAB G1 generator to the grid in 2024, the System Operator's reasonable opinion under clause 8.25(1) of the Code did not consider the voltage angle conditions which would arise during routine switching of the TAB-WRK-1 circuit (as set out in paragraphs 5.17 to 5.20 below).
- 5.11 The Authority considers that, had the System Operator performed its obligations under the Code, the UFE would not have occurred.
- 5.12 We detail our reasons for this view below.

The System Operator's obligations in respect of planned outages and the design and configuration of assets

- 5.13 The System Operator's obligations under the Code in relation to this UFE include:
- (a) obligations in respect of the planned outage of the TAB-WRK-1 circuit; and
 - (b) obligations in respect of the connection of TAB G1 to the grid.

The System Operator's Code obligations in respect of the planned outage

- 5.14 Clause 3 of Technical Code D of Schedule 8.3 of the Code requires the System Operator to assess all outages notified to it under clause 2. It must assess the extent to which the outage will impact on the System Operator's ability to plan to comply, and to comply, with the principal performance obligations.
- 5.15 The principal performance obligation engaged here is clause 7.2A(1)(a) of the Code, which requires the System Operator to dispatch assets made available "in a manner that avoids cascade failure of assets resulting in a loss of electricity to consumers arising from... a frequency or voltage excursion".
- 5.16 The Authority's view is that the duty under clause 3 of Technical Code D of Schedule 8.3 to assess a planned outage against the principal performance obligations extends through to the return-to-service of the outage. Clause 3 refers to "all outages" without temporal

qualification, and an outage is not complete until the assets are returned to service. The conditions that arise at the moment of return-to-service, including any voltage excursion of the kind that clause 7.2A(1)(a) is directed at, are therefore part of the outage that the System Operator must assess under clause 3.

The System Operator's Code obligations at the time of the connection

- 5.17 The Authority's view is that the same principal performance obligation on the System Operator under clause 7.2A(1)(a) was also engaged at the time the TAB G1 generator was connected to the grid in 2024. Clause 8.25(1) of the Code provides:
- Each grid owner must ensure that the design and configuration of its assets (including its connections to other persons) and associated protection arrangements are consistent with the technical codes and, in the reasonable opinion of the system operator, with maintaining the system operator's ability to comply with the principal performance obligations. In reaching this opinion, the system operator must have regard to the potential impact of the design or configuration of those assets or associated protection arrangements on its compliance with the principal performance obligations and achievement of the dispatch objective.
- 5.18 The System Operator is required by clause 8.25(1), when forming the reasonable opinion contemplated by the first sentence, to have regard to the potential impact of the design or configuration of the connecting asset on its compliance with the principal performance obligations.
- 5.19 Clause 2(1)(c) of Technical Code A of Schedule 8.3 reinforces that gatekeeper function by providing that an asset owner must meet "any other reasonable requirements of the system operator, identified during planning studies, which are required for the system operator to plan to comply, or to comply, with its principal performance obligations". This clause assumes that the System Operator is conducting planning studies capable of identifying such requirements.
- 5.20 The Authority's view is that these provisions placed an obligation on the System Operator at the time of the connection of the TAB G1 generator in 2024 to form a reasonable opinion which required consideration of the impact of the connection's configuration on the System Operator's compliance with clause 7.2A(1)(a), including consideration of the voltage angle conditions that would arise on routine switching of the TAB-WRK-1 circuit.
- 5.21 The Engineering Report at section 7.2.1 recommends that the System Operator consider updating its guidelines for generator connection studies to include consideration of potential voltage angle differences at points of network switching, and the associated transients that the generation would be exposed to. The Authority treats that recommendation as the System Operator's own recognition that voltage-angle analysis of the kind referred to in this paragraph is appropriate for inclusion in its connection-stage assessment process.

The omissions

- 5.22 The Engineering Report sets out the physical relationship by which voltage angle at a given busbar is determined by load, generation, and impedance, and confirms that this relationship can be evaluated by load-flow study (section 3.2 of that Report). The Authority understands the voltage angle that existed across CB662 at the moment of closure was a direct consequence of the network impedance condition that the outage of TAB-WRK-1 had created together with the generation pattern at the time. It is the Authority's view that this was the kind of voltage angle that a load-flow study of the conditions for the return-to-service would have identified.

- 5.23 The relationship between voltage angle and power flow is fundamental to AC power system analysis. The active power transferred between two points in an AC network is approximately proportional to the sine of the voltage angle between them.³ This means that a voltage angle across an open circuit breaker is a direct indicator of the magnitude of the power that will flow through that breaker when it is closed. A formal load-flow study confirms the estimate, but even a first-order calculation using the published circuit parameters would have indicated a voltage angle well in excess of normal switching limits. No additional modelling capability was required to identify this condition.
- 5.24 The Engineering Report also records in respect of the 23 October 2025 closure of TAB-WRK-1 that:
- (a) the grid owner did not complete any studies, nor receive any connection studies from the asset owner, that considered the voltage angle difference between TAB and WRK when TAB-WRK-1 was out of service (section 4.2)
 - (b) assessment of step changes in voltage angle is not part of routine analysis carried out in system studies, either in system design or in system operation (section 6.3.1); and
 - (c) the focus of the System Operator's routine load-flow studies is thermal loading of equipment and voltage stability, that is, the matters bearing on the System Operator's principal performance obligations as the System Operator has historically understood them (section 6.3.3).
- 5.25 These documents show that no assessment of the voltage angle and loop-flow conditions that would arise on closure of CB662 was carried out as part of the System Operator's assessment of the planned outage of TAB-WRK-1 and its return-to-service.
- 5.26 Consequently, the Authority's view is that the System Operator made two omissions:
- (a) at the time of the planned outage of TAB-WRK-1 in October 2025 and its return to service, the System Operator did not assess the outage in the manner required by clause 3 of Technical Code D of Schedule 8.3 of the Code, against its principal performance obligation under clause 7.2A(1)(a); and
 - (b) at the time of the connection of TAB G1 to the grid in 2024, the System Operator's formation of the reasonable opinion contemplated by clause 8.25(1) of the Code, and its identification of reasonable requirements under clause 2(1)(c) of Technical Code A of Schedule 8.3, did not include consideration of voltage angle conditions during routine switching of the TAB-WRK-1 circuit.
- 5.27 The outage assessment omission allowed the specific switching event of 23 October 2025 to proceed without the load-flow analysis that would have identified the voltage angle in advance.
- 5.28 The connection-stage omission left a configuration in which the failure mode was latent and foreseeable on routine switching.
- 5.29 Either omission, on its own, would have been sufficient to cause the event. The two omissions arise from the same gap in the System Operator's processes: voltage angle conditions of the kind that arose on 23 October 2025 are not examined, either when a new connection is approved or when a planned outage is assessed.
- 5.30 The omissions caused the trip of TAB G1 and TAC G1 in the sense contemplated by the definition of "causer" in clause 1.1 of the Code. Had the System Operator included voltage-

³ Expressed in power systems engineering as $P \approx V_1 V_2 \sin(\delta) / X$, where V_1 and V_2 are the voltages at each end, δ is the voltage angle difference, and X is the reactance of the connecting path. The voltage angle difference is also referred to in power systems literature as the phase shift or phase difference.

angle analysis in its connection-stage assessment of the TAB G1 generator in 2024, or in its assessment of the planned outage of TAB-WRK-1 in October 2025, a load-flow study would have identified the risk of high voltage angles across CB662 under certain power system conditions. The Authority considers this assessment would most likely have occurred at the connection stage, resulting in a standing operating policy for the switching of TAB-WRK-1 – requiring, for example, the generators to be de-loaded before manual closure, or specifying a maximum voltage angle for closure. This is materially the same as the temporary measures that Contact, the grid owner, and the System Operator agreed after the event, ie reducing the synchrocheck setting to 10 degrees and requiring TAB generation to be ramped to 0MW before manual closure. If a policy were in place, the closure of CB662 at 5.42pm on 23 October 2025 would not have proceeded in the manner that it did. The generators would not have tripped, and the UFE would not have occurred.

The System Operator's own recommendations confirm the gap

- 5.31 The Engineering Report recommends that the System Operator:
- (a) consider updating its guidelines for generator connection studies to include consideration of potential voltage angle differences at points of network switching; and
 - (b) consider whether useful analysis on this issue could be included as part of the System Security Forecast (section 7.2.1 of the Engineering Report).
- 5.32 The Authority treats recommendation (a) as the System Operator's own identification of the connection-stage gap described above, and recommendation (b) as supporting identification of the outage-assessment gap described above. The Authority records, without making a separate determination on the point, that the Engineering Report identifies a parallel gap in the grid owner's planning practice (section 6.3.2 of that Report). The grid owner's practice in this area may warrant separate Authority attention but does not affect the Authority's draft determination that the System Operator was the causer of this UFE. The Authority will follow up with the grid owner separately to this event.

The Authority does not agree with the System Operator's causer finding

- 5.33 The Authority does not agree with the System Operator's finding that Contact was the causer of the UFE.
- 5.34 The Authority disagrees with the System Operator's view the operation of Contact's protection settings was unexpected. The System Operator's own Engineering Report (section 3.2) identifies that sudden voltage angle changes "create a sudden change in electrical torque at a generator's terminals" and "can cause significant mechanical stress." Contact's response to the System Operator of 16 December 2025 records a "significant torsional stress" on its unit, and states that the event "can be likened to a poor generator-synchronising." Both the grid owner and Contact agreed, after the event, that the voltage angle required management, which is why they agreed to change its protection settings.
- 5.35 The Authority considers a generator's protection system should disconnect the machine from a transient which could damage it, as this is an example of the protection system performing its intended function.
- 5.36 The Authority does not accept the System Operator's technical characterisation that the protection operations were not expected from the system conditions. The voltage angle of approximately 23 degrees across CB662 at the instant of closure, combined with the approximately 39-fold step change in impedance (78 ohms to 2 ohms), produced a transient current approximately twice nominal current.

- 5.37 Contact's letter of 16 December 2025 records that TAB output increased from net 163 MVA to 334 MVA on closure. When a circuit breaker closes, the resulting current contains a DC offset component that decays with the circuit's X/R time constant. This DC component drives the current transformer core's magnetic flux in one direction. If the offset persists long enough, the core saturates and the relay sees a spurious differential current. At 220 kV, a three-phase fault would typically be cleared by protection in 80 to ~120 milliseconds, limiting the CT's exposure to the DC offset to that interval. The 270-millisecond duration of the switching surge (as noted in Contact's letter of 16 December 2025) is approximately three times that interval – the transient persisted because there was no fault to clear. These are the conditions known to produce CT saturation even at modest current magnitudes. The trip of TAB G1 on differential protection was a foreseeable response to the conditions created by the closure.
- 5.38 The trip of TAC G1 on the rate of change of frequency was a direct consequence of the voltage-angle step produced by the closure of CB662. The relay interpreted the sudden angle change as a high rate of change of frequency. The Authority notes that TAC G1 tripped before TAB G1 in the event sequence (at 5:42:50pm and 5:42:51pm respectively), confirming that the TAC trip was caused by the closure transient directly and not by the subsequent loss of TAB G1.
- 5.39 Lastly, the Authority does not accept the System Operator's contention that identifying the risk of generator tripping in this instance required detailed knowledge of the generators' CT models and relay algorithms (Causation Report, section 4.2). Regardless of whether the System Operator modelled Contact's specific CTs or relay algorithms, had it undertaken appropriate load flow analysis identifying the 23-degree voltage angle across CB662, the 23 October 2025 switching event would not have proceeded as it did.

Q1. Do you agree with the draft determination that the System Operator was the causer of the UFE event on 23 October 2025 at 5.42pm? If not, please advise your view on the causer and give reasons.

6 The System Operator has calculated the MW lost during the event based on its investigation

- 6.1 Clause 8.64 of 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 the UFE under clause 8.65.
- 6.2 Central to the event charge calculation is determining the MW of injection lost at one or more grid injection points because of the UFE. The System Operator determines the MW lost as part of its investigation into a UFE.
- 6.3 The System Operator has determined that the electric power lost as a result of the UFE was 222.744 MW resulting in an event charge of \$203,425.00.
- 6.4 The System Operator's calculation of the MW lost for this event is included in the report (Appendix A). 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 UFE charge payable by the causer, and therefore also to the rebate (calculated by the clearing manager) paid for a UFE. The Authority invites comment on the System Operator's calculation of the MW lost.
- 6.5 Any comments received will be passed to the System Operator.

Q2. Do you agree with the System Operator's assessment that 222.744 MW was lost from the power system in the 23 October 2025 5.42pm UFE? If not, please advise your view on the MW lost and give reasons.

7 Submissions are invited from affected parties

- 7.1 Under clause 8.61 of the Code, the Authority must consult with every participant substantially affected by a UFE on its draft determination before making its final determination. We invite affected participants to make a submission on our draft determination by **5.00pm, 31 August 2026** to compliance@ea.govt.nz.
- 7.2 After reviewing all submissions, the Authority will then make a final determination on the causer of the UFE.

Appendix A Format for submissions

Draft determination consultation – UFE 5.42pm 23 October 2025

Please email your submission to compliance@ea.govt.nz by 5pm, Monday 31 August 2026

Name	
Organisation	

Questions	Comments
Q1. Do you agree with the Authority's draft determination that Transpower as System Operator was the causer of the UFE at approximately 5.42pm on 23 October 2025? If not, please advise your view on the causer and give reasons.	
Q.2 Q2. Do you agree with the System Operator's assessment that 222.744MW was lost from the power system in the 23 October 2025 UFE? If not, please advise your view on the MW lost and give reasons.	

Appendix B Causer report and engineering report

[System Operator causation and engineering report - 23 October 2025 17:42:53](#)

[Under-Frequency Event](#)