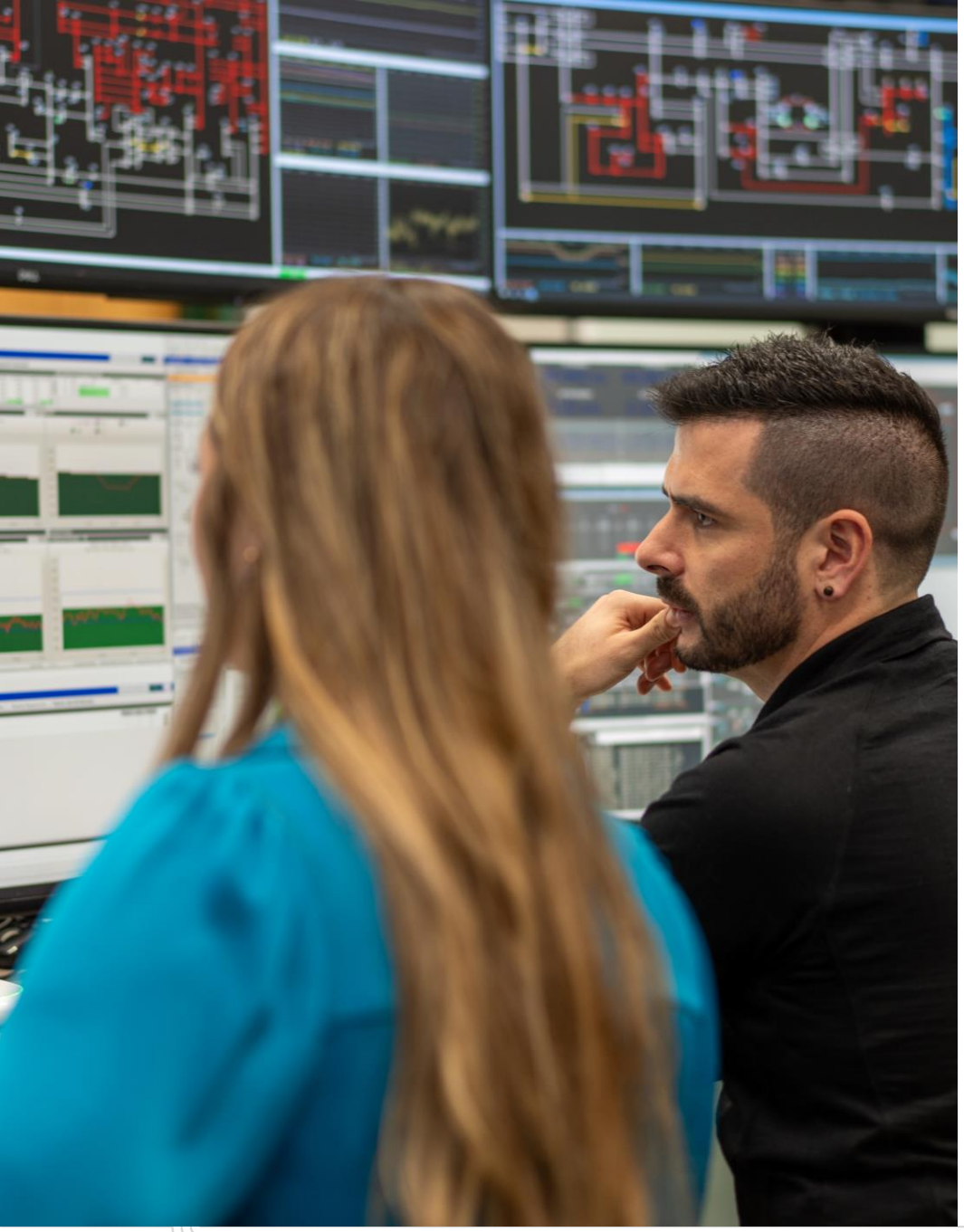
TRANSPOWER

System Operator Industry Forum

28 October 2025

Today's agenda

- Key messages
- Market update
- NZGB update
- Outage update – next 4 weeks
- Operational update
- Tokaanu Black Start
- GridEx overview
- Consultations, publications and events
- Questions / Patai



Key Messages

- Nationally hydro storage is above the historic mean for this time of year due to increased inflows.
- Continued focus on fuel (both hydro and thermal) and asset availability is needed to reduce energy and capacity risks going into 2026.
- Moving into spring we have seen demand soften due to warmer weather, more planned outages and less firm thermal generation offered.
- Spring weather events are challenging the power system. Participants are asked to be responsive when needed and keep offers up-to-date especially when there are cold snaps.

Market update

Energy: National hydro storage

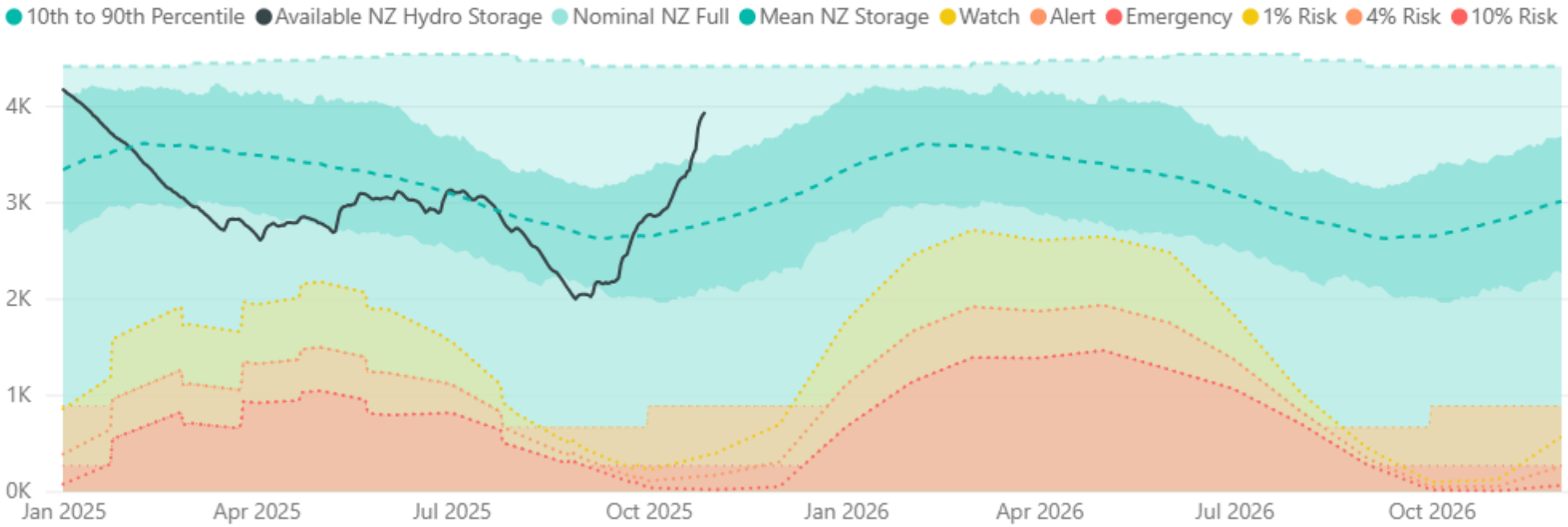
	Hydro storage level (% of mean ▲/▼)		
	New Zealand	South Island	North Island
Last forum	115%	112%	135%
Now	143% ▲	142% ▲	134% ▼

Note: these numbers include contingent storage, so they differ from those reported by NZX

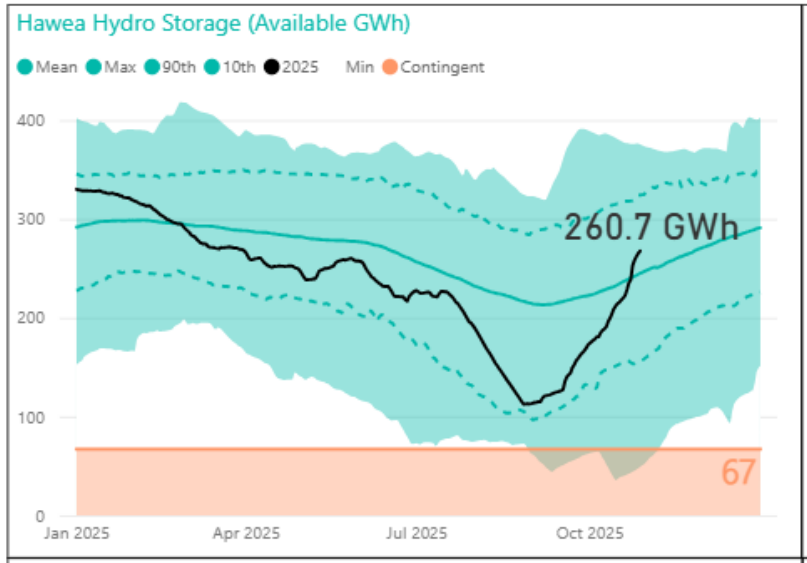
New Zealand Energy Risk

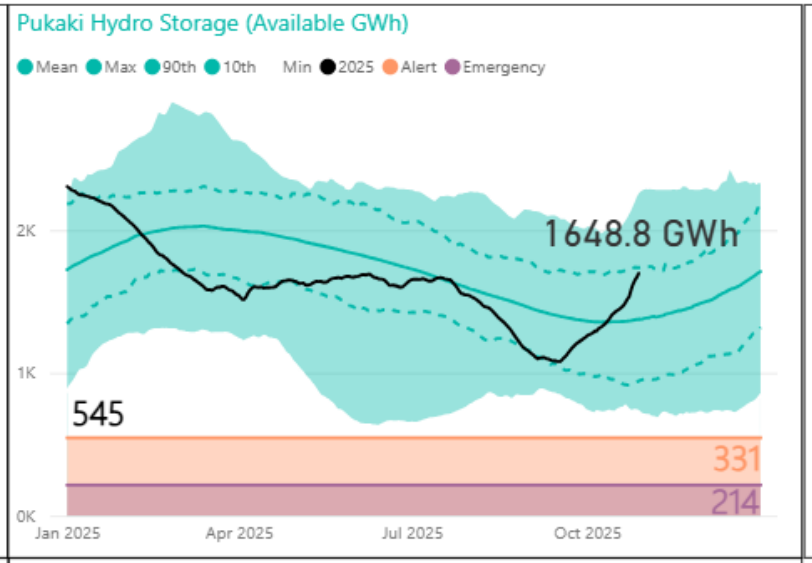
South Island Energy Risk

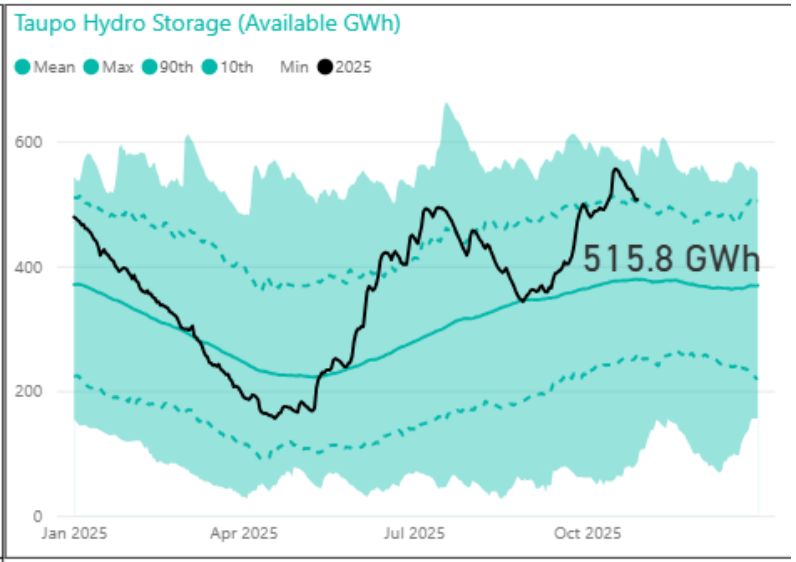
New Zealand Electricity Risk Status Curves (Available GWh)

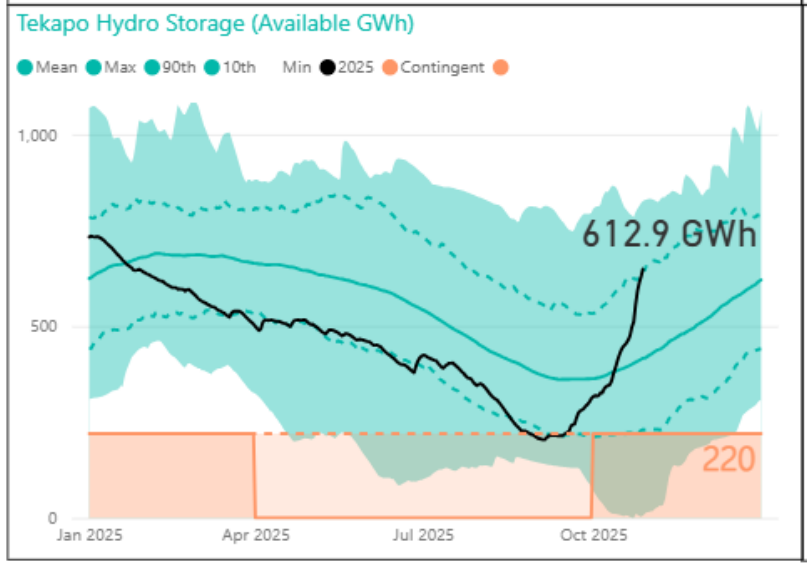


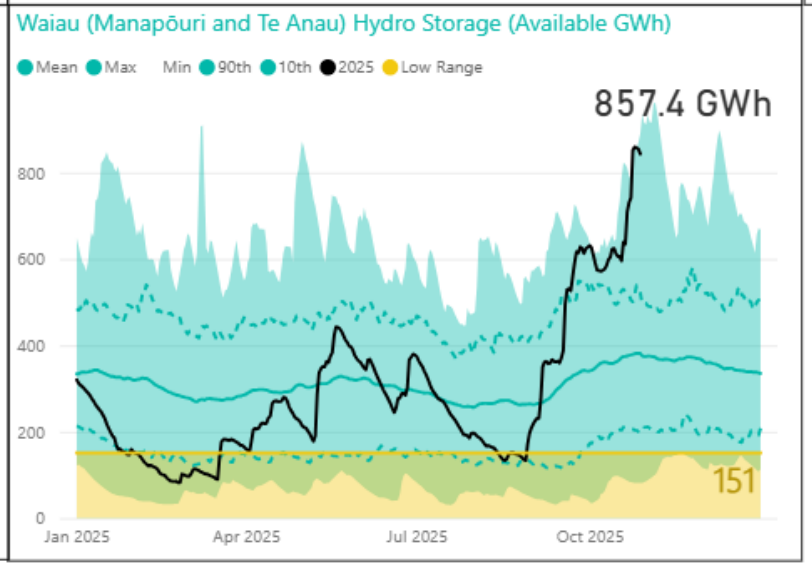
Hydro storage by catchment







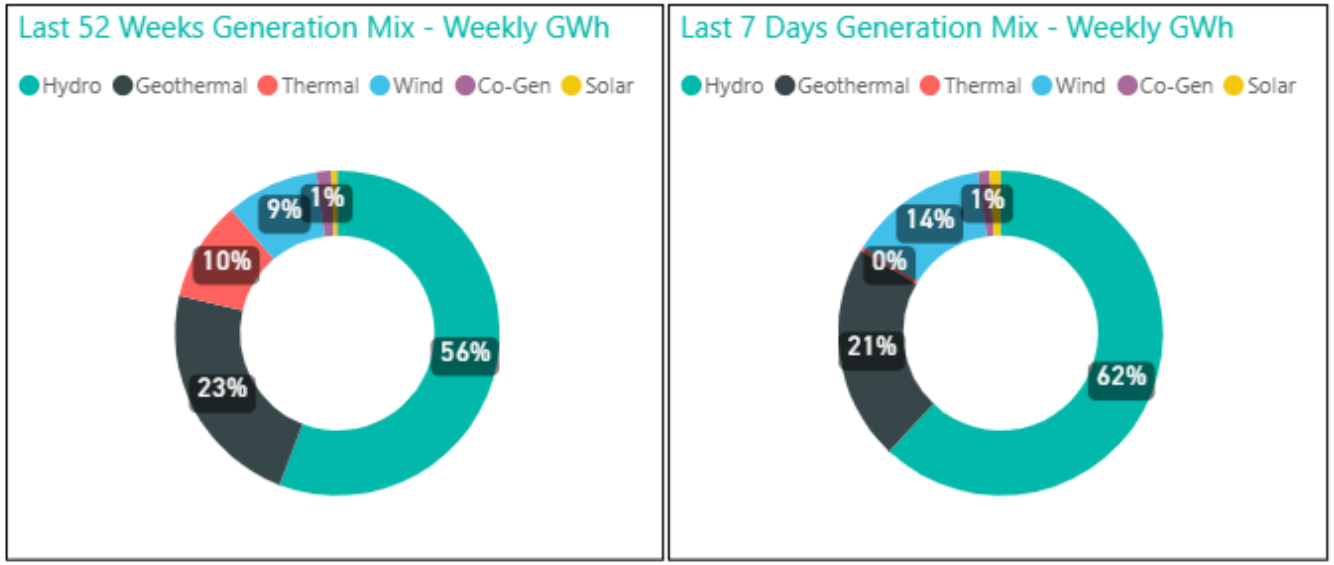


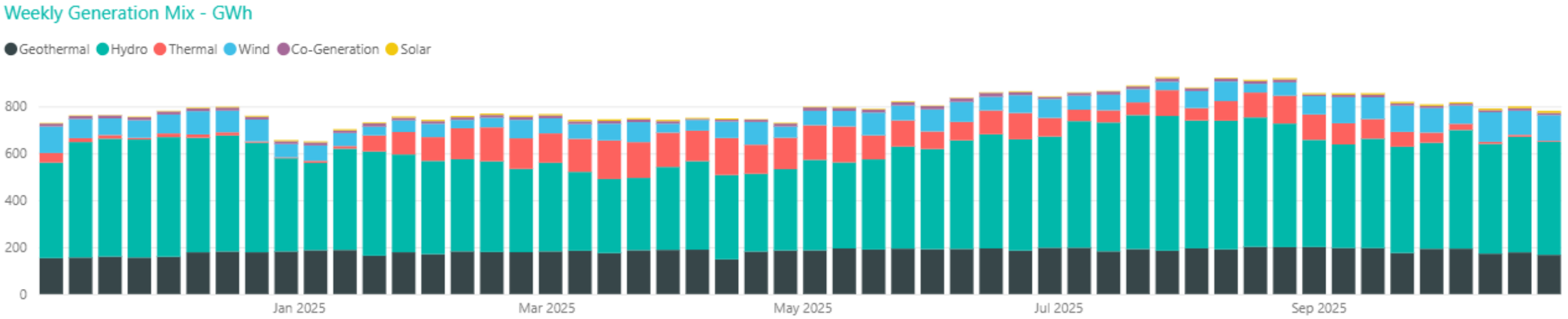


Lake	Current (%) avg
nz_controlled	142
si_controlled	143
hawea	109
pukaki	123
manapouri	217
te_anau	224
tekapo	156
taupo	134

Generation mix

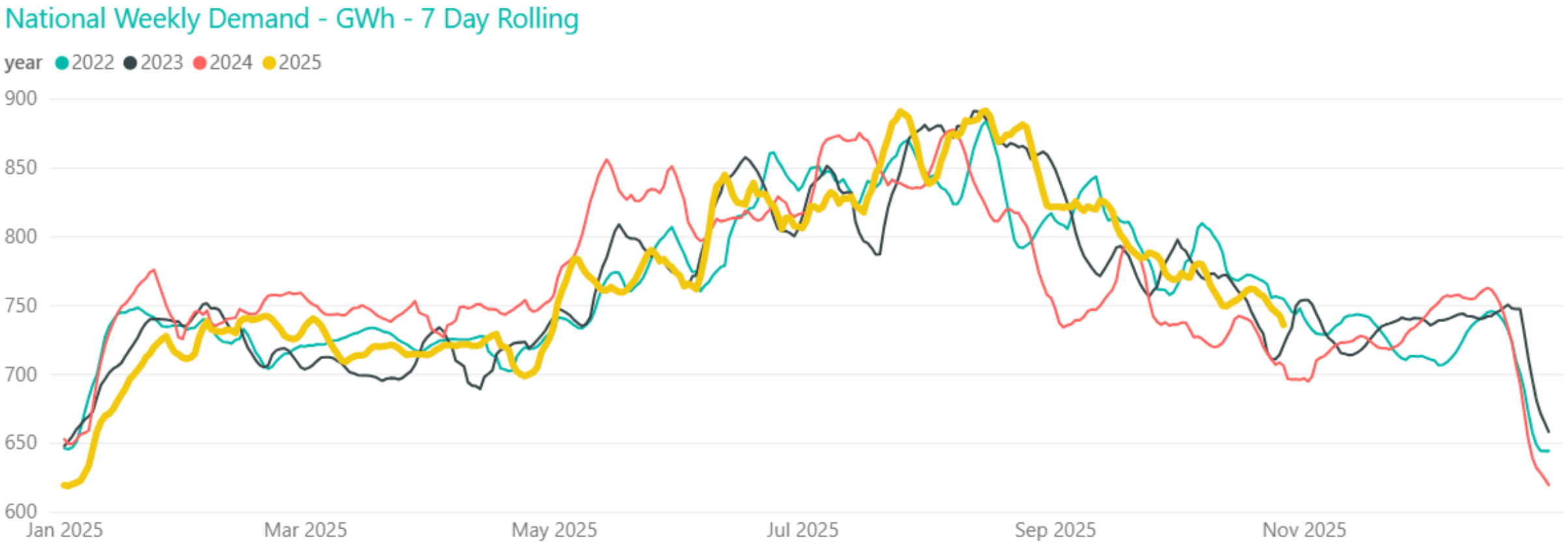
- Hydro generation share above average at 62%.
- Wind generation continued to be above average at 14%
- Thermal declined further from 1% to just 0.5%
- Geothermal slightly below average at 21%





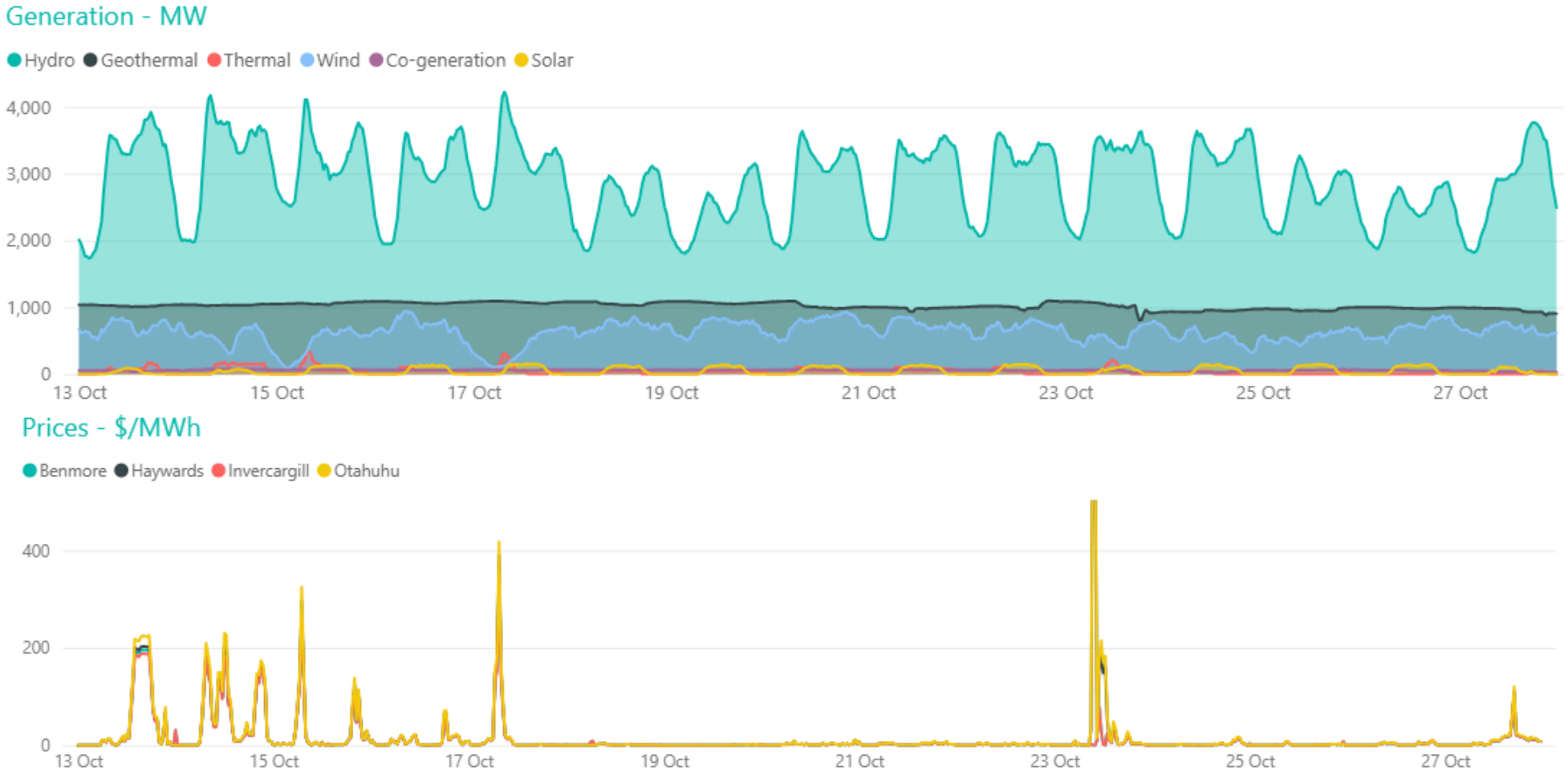
Demand

- Continued declining demand as we move into spring with warmer weather
- 736 GWh last week, and 761 GWh the week before



Pricing

- Average Ōtāhuhu price was $11/MWh last week, and $19/MWh the week prior
- Low prices in line with high hydrology and high wind
- Peak of $842/MWh at Ōtāhuhu, 9:30am on Thursday 23 October during the unplanned HVDC pole 2 outage

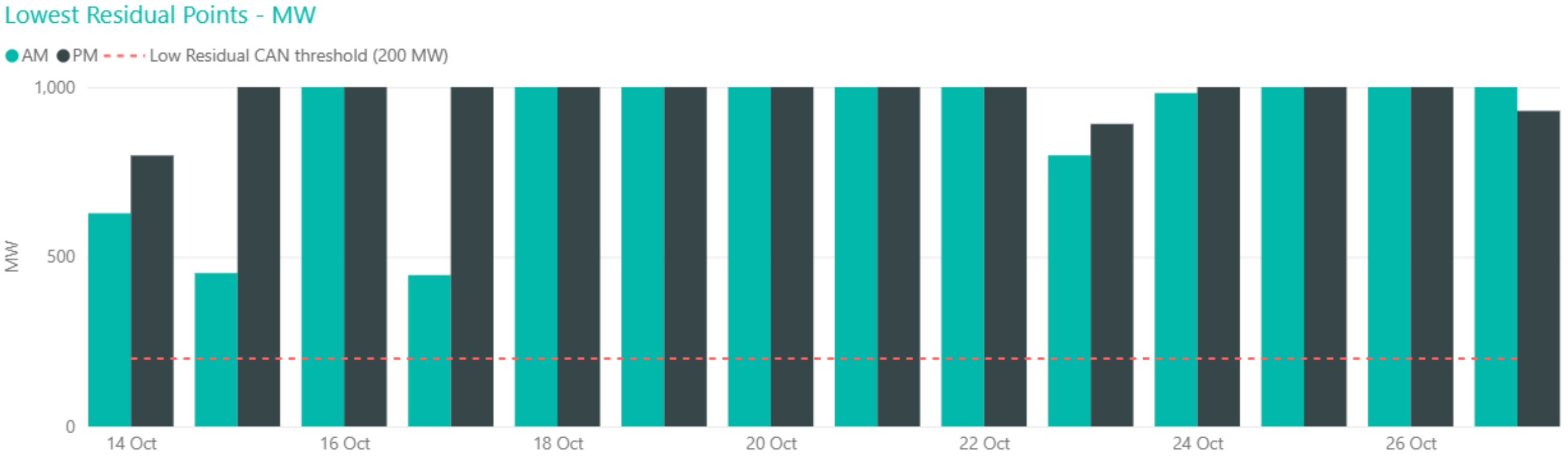


HVDC transfer

- Last week, 48 GWh sent north and 1 GWh south.

Capacity residual margins

- Healthy residual margins in line with decreasing demand
- Lowest residual 446 MW during 17 October morning peak

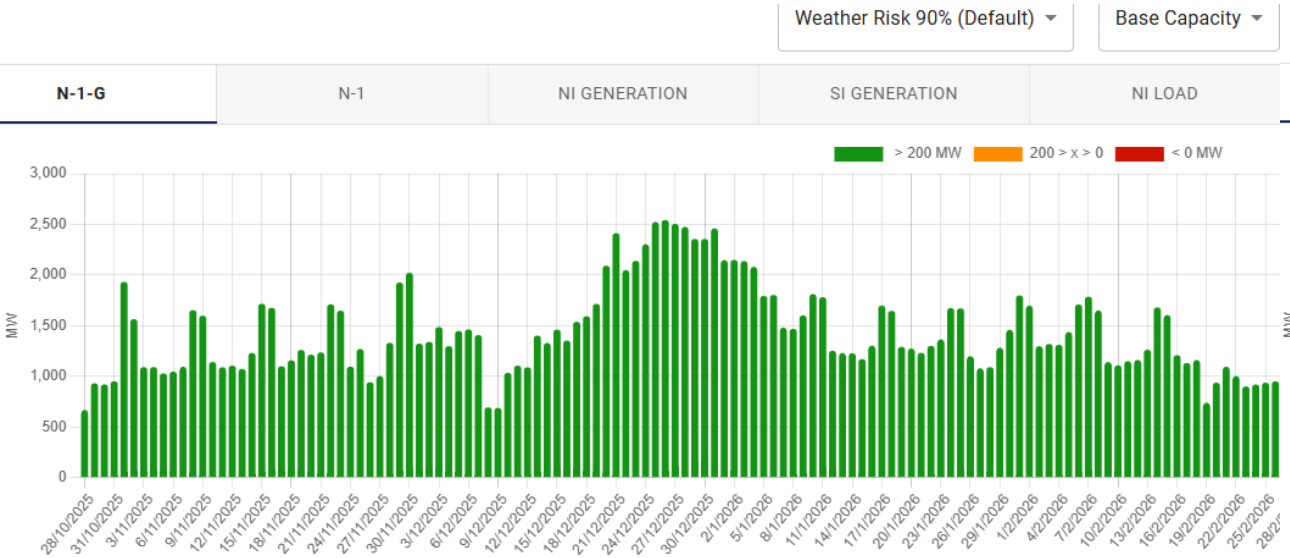


NZGB update

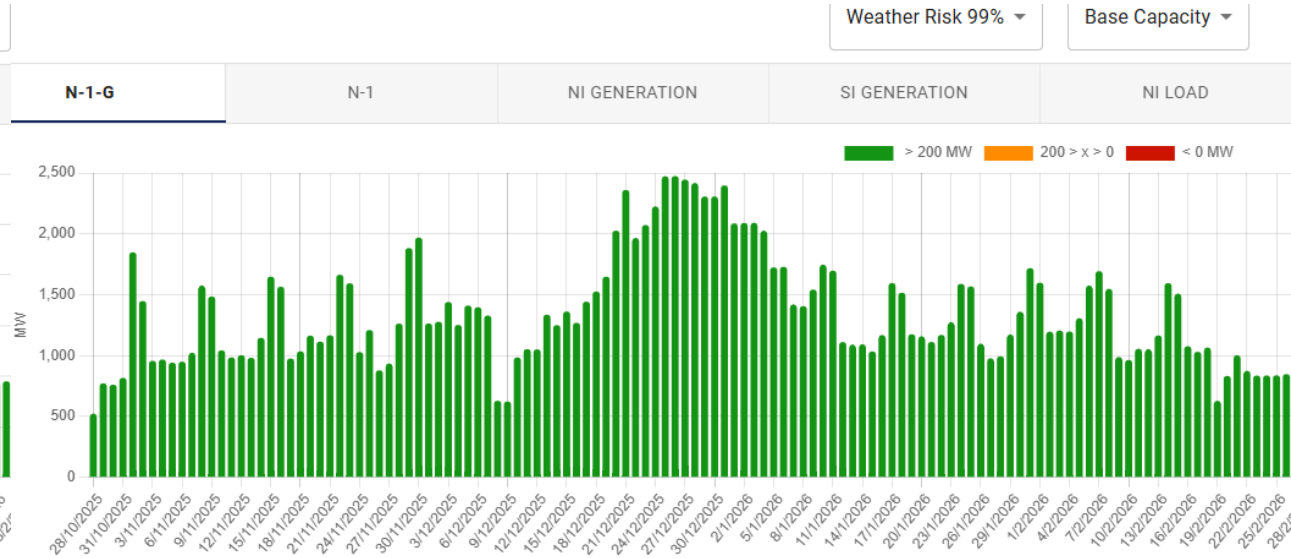
NZGB update: base capacity N-1-G

- N-1-G margins are currently showing healthy values
- Under the 99th percentile load, which we would expect under a cold snap, the margins drop but are still healthy

Base case capacity at 90%
- ***This triggers the CAN process***
- Assumes all generation available in POCP is offered
- It uses 20% of total wind capacity



90th percentile load



99th percentile load

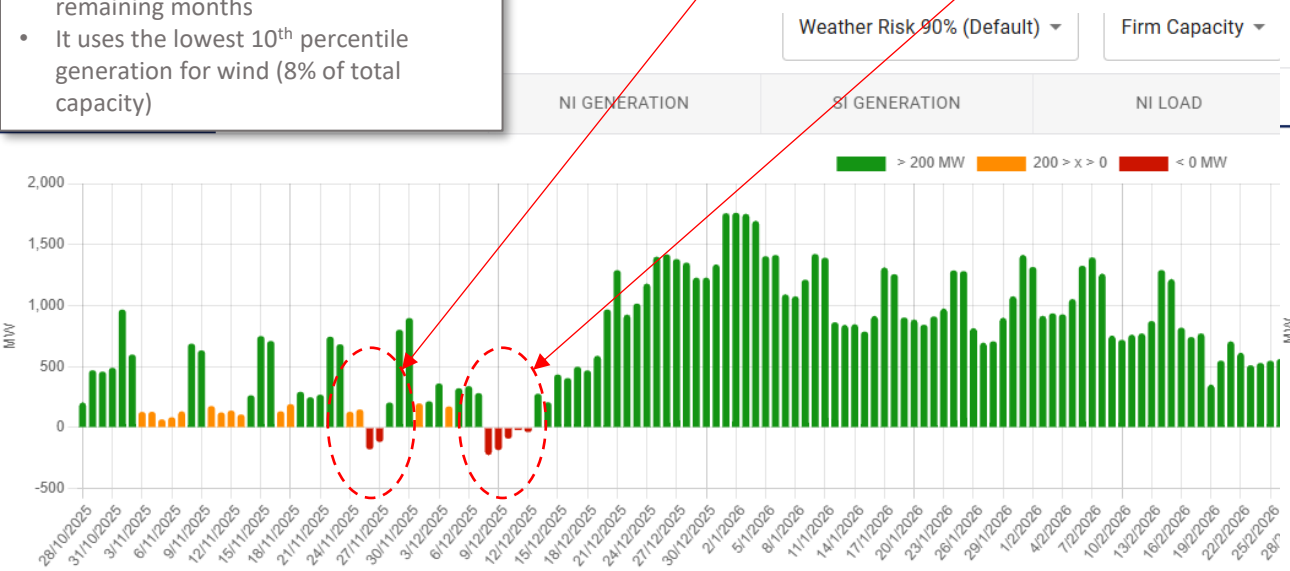
NZGB update: firm capacity only N-1-G

- Firm capacity scenario reflects units that historically operate for at least 90% of AM & PM peaks.
- Any shortfall or low margin periods highlight the potential reliance on these units to be available to cover N-1-G
- This means we are relying on the market to coordinate especially slow starting thermal units, to get through high peak load periods

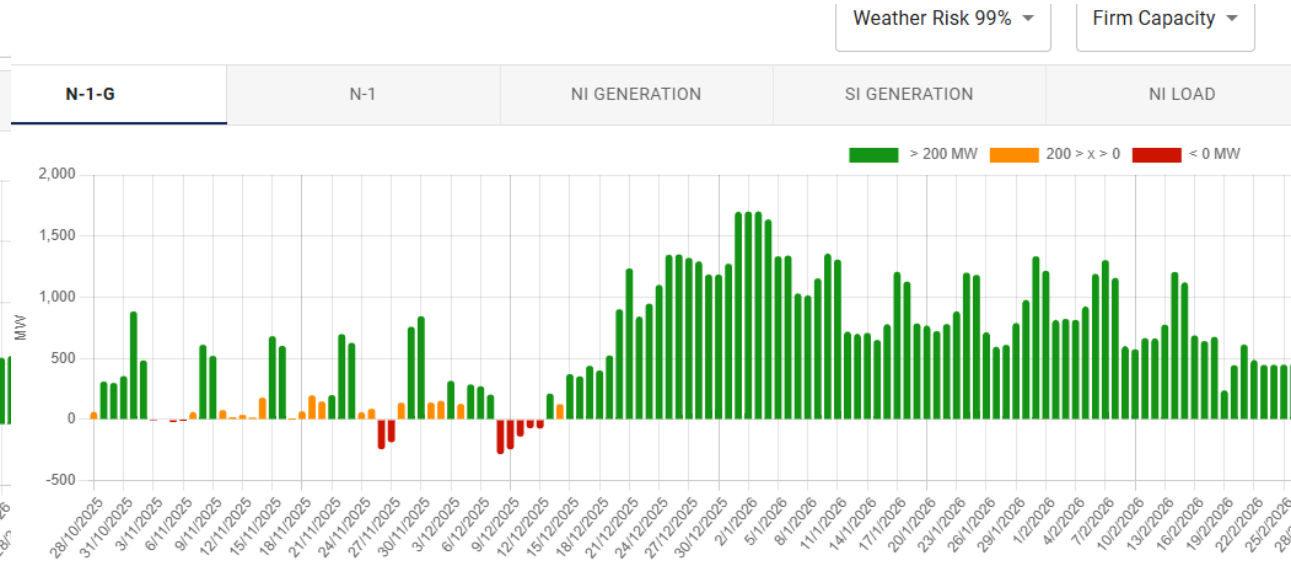
Firm capacity removes
- TCC (-360MW) all months
- HLY 5 (-405MW)
- 2 HLY Rankines from 1st Oct to 31 Dec 2025, and 2 Rankines over the remaining months
- It uses the lowest 10th percentile generation for wind (8% of total capacity)

THI-WKM-1 outage

WKM-WRK-1 outage



90th percentile load



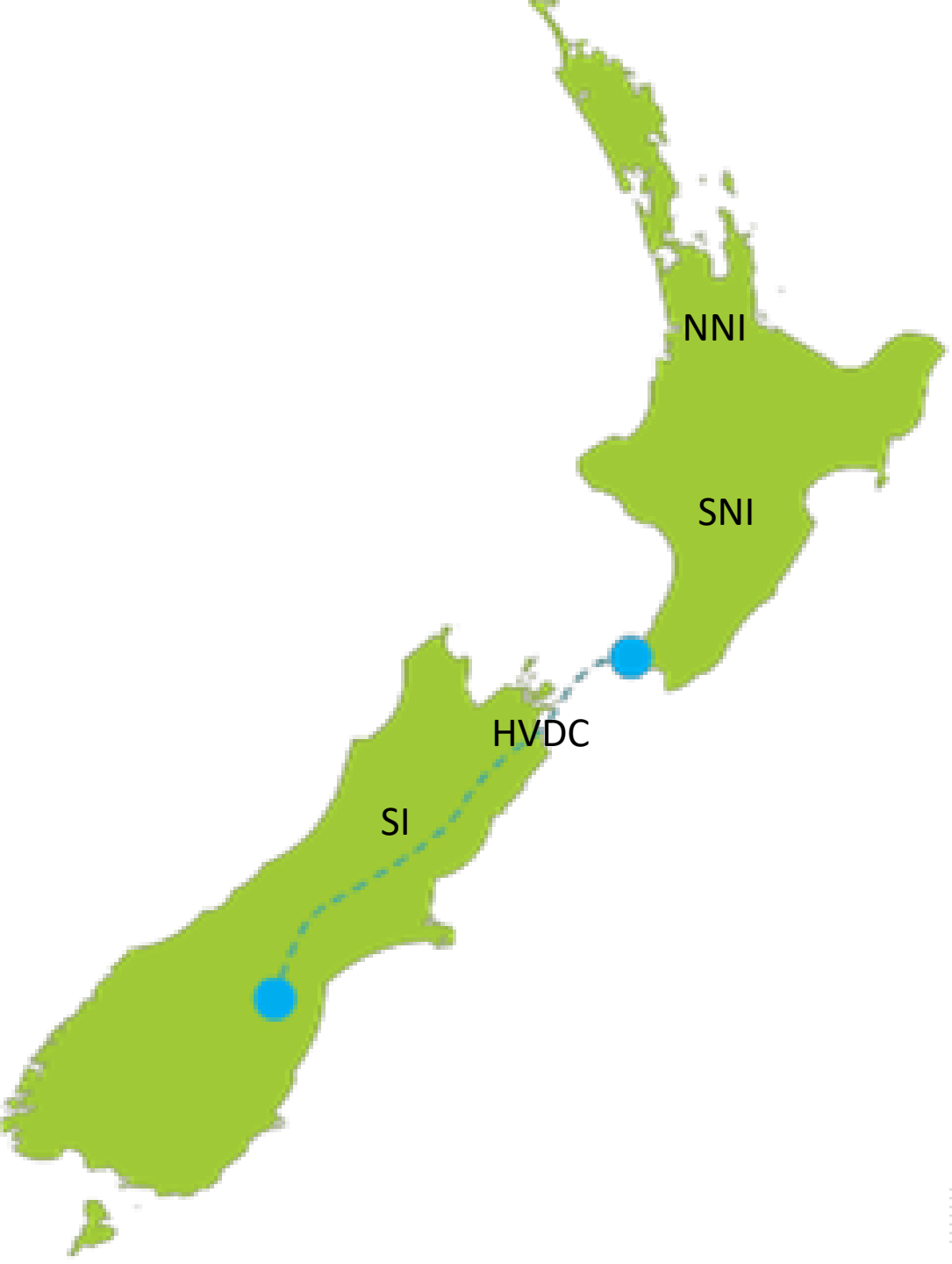
99th percentile load

NZGB update: Information

Recommendations from SO:

- Avoid further outages during periods with low margins
- Market coordination is required from industry to ensure available generation capacity remains high to cover potential cold snaps
- Keep POCP updated with scheduled or tentative outages
- Keep the WDS up to date with the latest offers
- Any other information on plant availability, please contact the SO

Outages next 4 weeks



Outages

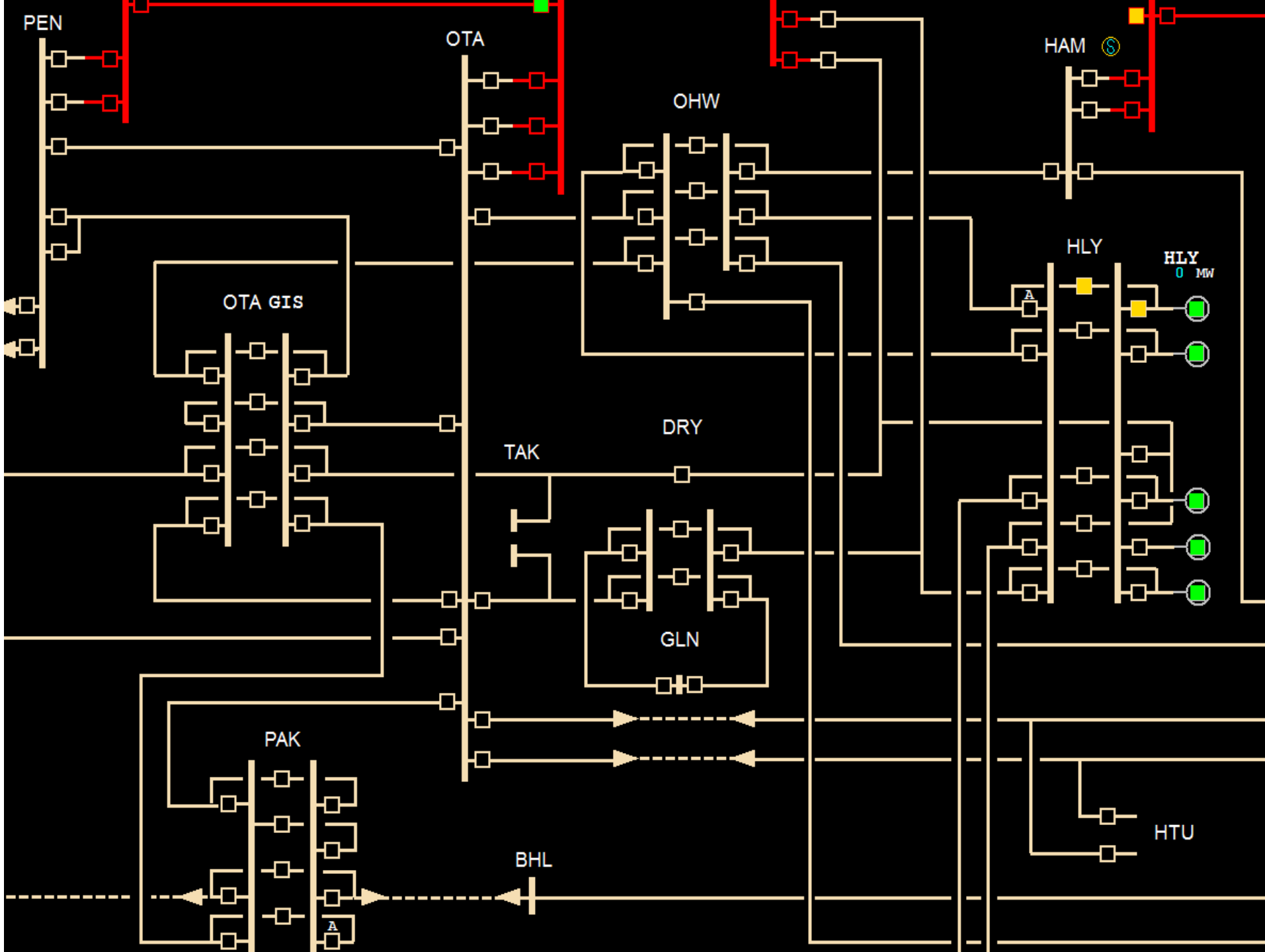
- NNI outages
- SNI outages
- SI outages

Asset owners

- Check in POCP for detailed dates
- Consider the impact on your own outages

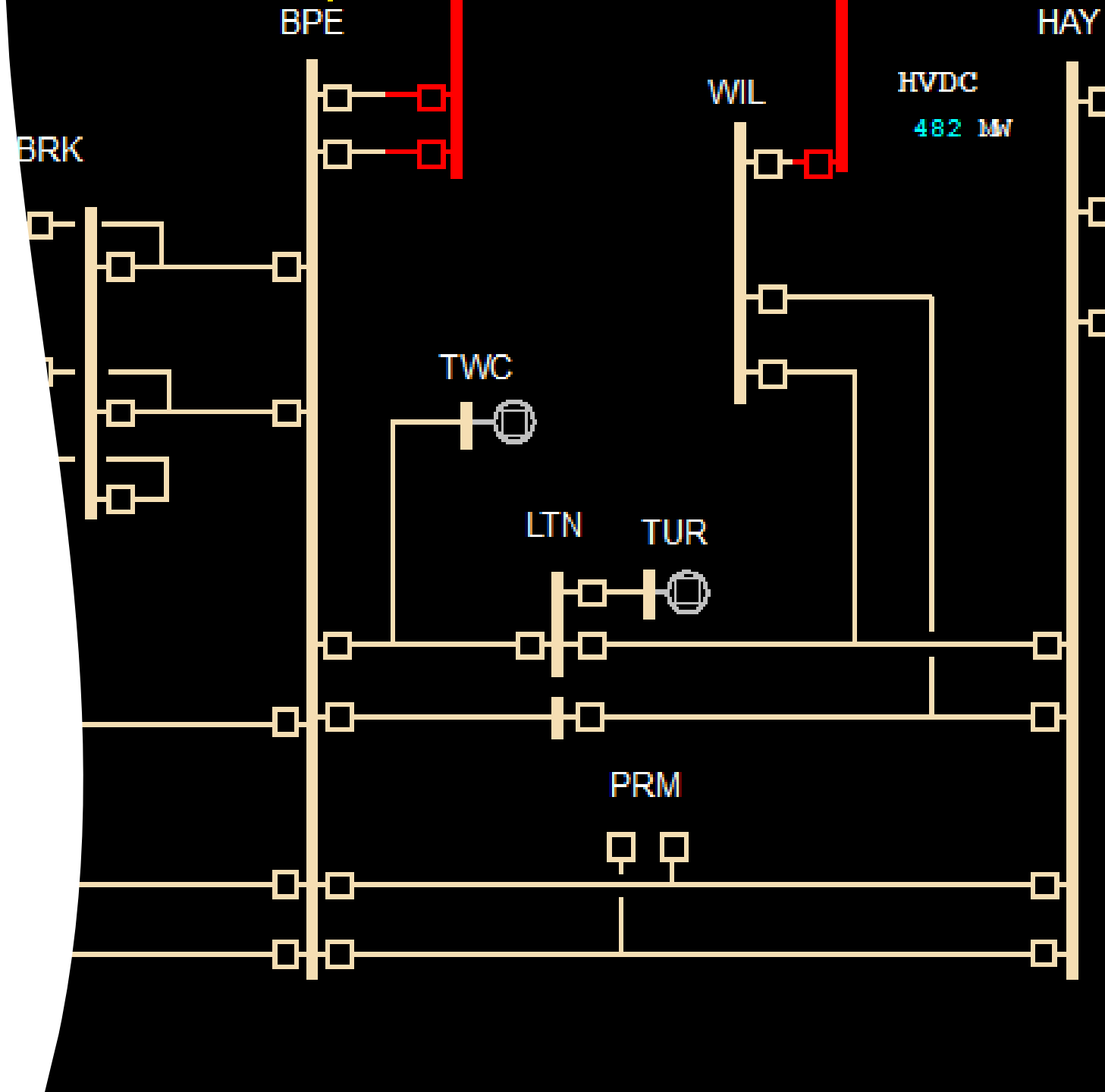
NNI Outages

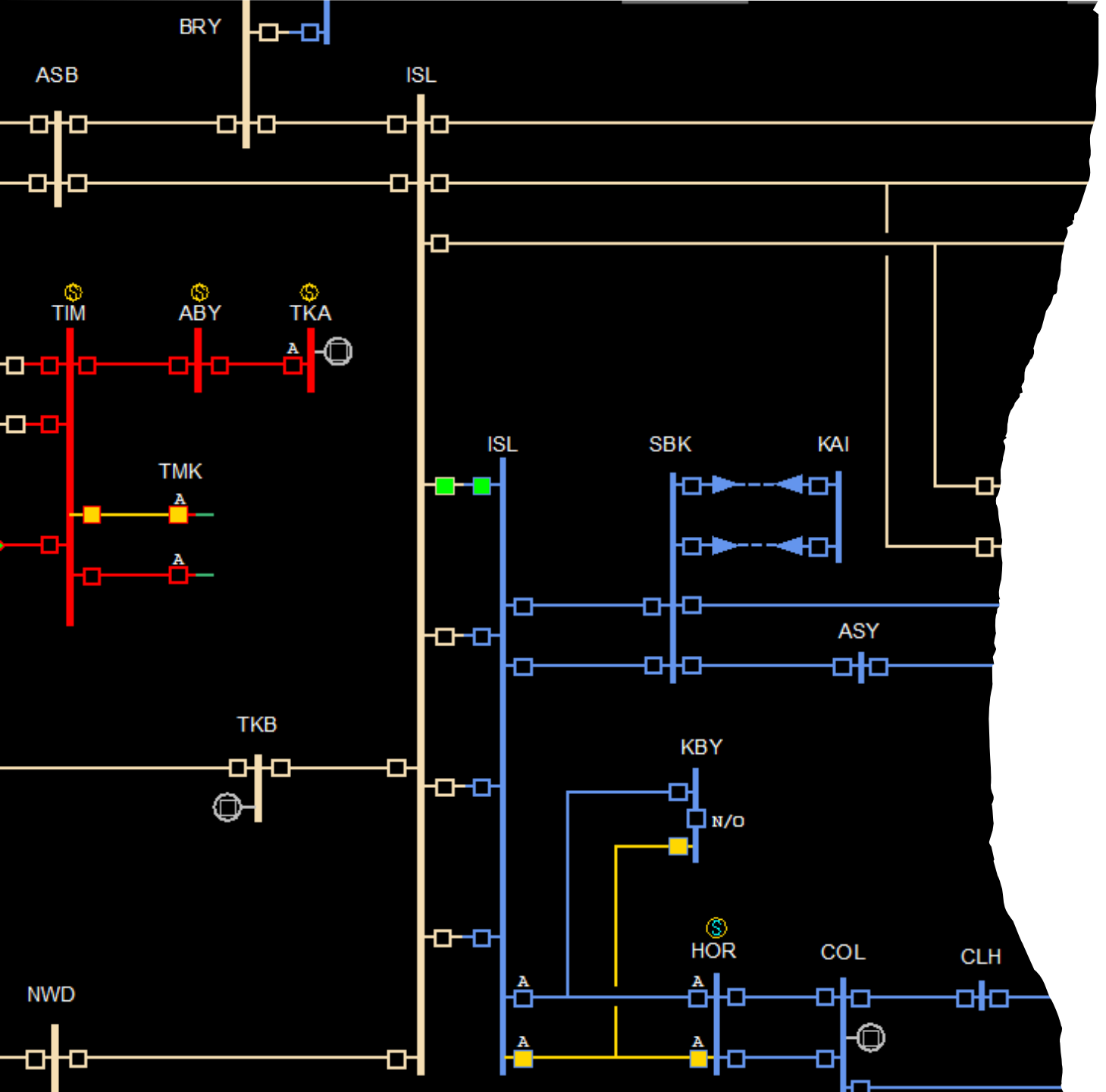
- Week of 3 Nov
  - OTA_PAK_4
  - OTA_TIE_5
  - DRY_BOB_HLY_1
- Week of 10 Nov
  - DRY_BOB_HLY_2
  - OTA_HTU_WKM_2
  - HAM_T6
- Week of 17 Nov
  - OTA_PEN_5
  - OHW_OTA_2
  - OTA_HTU_WKM_1
- Week of 24 Nov
  - OTA_HTU_WKM_1
  - DRY_TAK_OTA_2
  - KAW_OHK_1



SNI Outages

- Week of 3 Nov
  - ATI_WKM_1
  - RPO_TNG_1
  - BPE_PRM_HAY_1
- Week of 10 Nov
  - RPO_WRK_1
  - BPE_PRM_HAY_1
- Week of 17 Nov
  - BPE_PRM_HAY_2
  - BPE_TNG_1
- Week of 24 Nov
  - HLY_SFD_1
  - THI_WKM_1
  - BPE_PRM_HAY_2
  - BPE_TNG_1

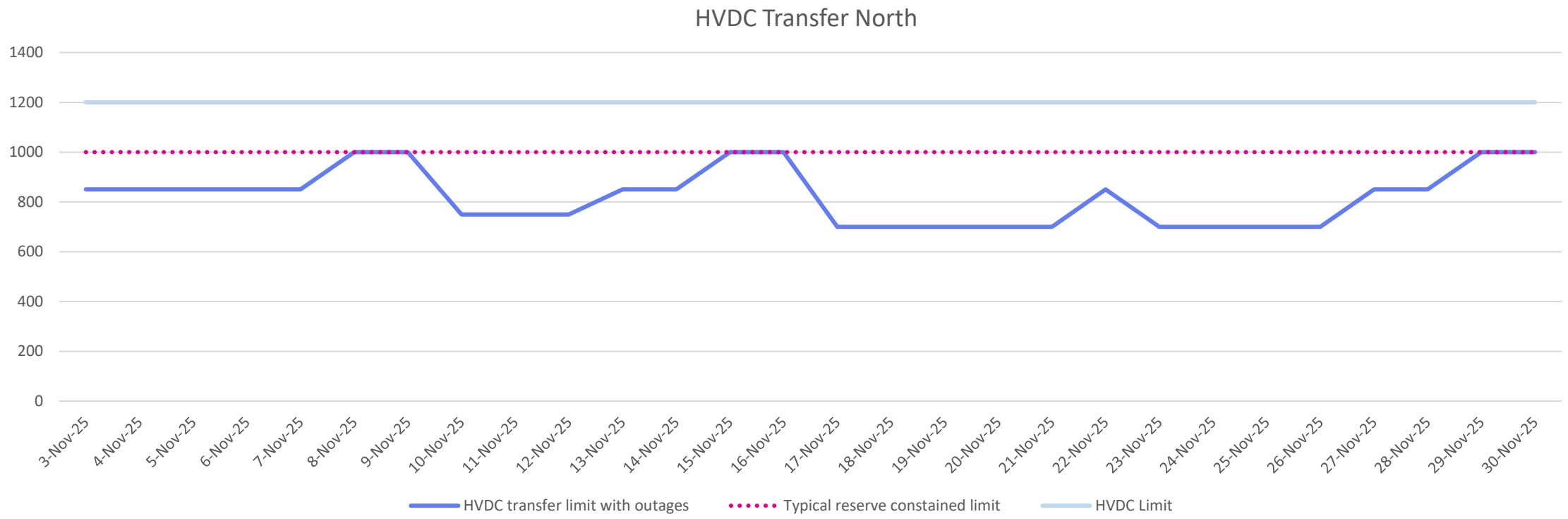




SI Outages

- Week of 3 Nov
  - ISL_KIK_1
  - INV_ROX_2
  - MAN_NMA_3
- Week of 10 Nov
  - BRY_ISL_1
  - NMA_GOR_TMH_1
  - INV_ MAN_2
- Week of 17 Nov
  - ISL_WPR_CUL_KIK_3
  - MAN_NMA_1
- Week of 24 Nov
  - CUL_KIK_2
  - MAN_NMA_2

HVDC North transfer limit



Operational update

Loss of the Upper South Island – 23 October 2025

- The ISL WPR CUL KIK 2 circuit tripped along with CUL T22 at 05:02. It was returned to service at 05:58 but tripped again at 06:14.
- A manual reclose failed so the circuit was officially removed from service at 06:30.
- At 06:56 the ISL WPR CUL KIK 3 tripped and auto reclosed at the ISL end. KIK 322 was manually closed at 07:01
- 07:24 ISL WPR CUL KIK 3 tripped and remained out of service
- This left just ISL KIK 1 and the 66kV system connecting Upper South Island to the grid

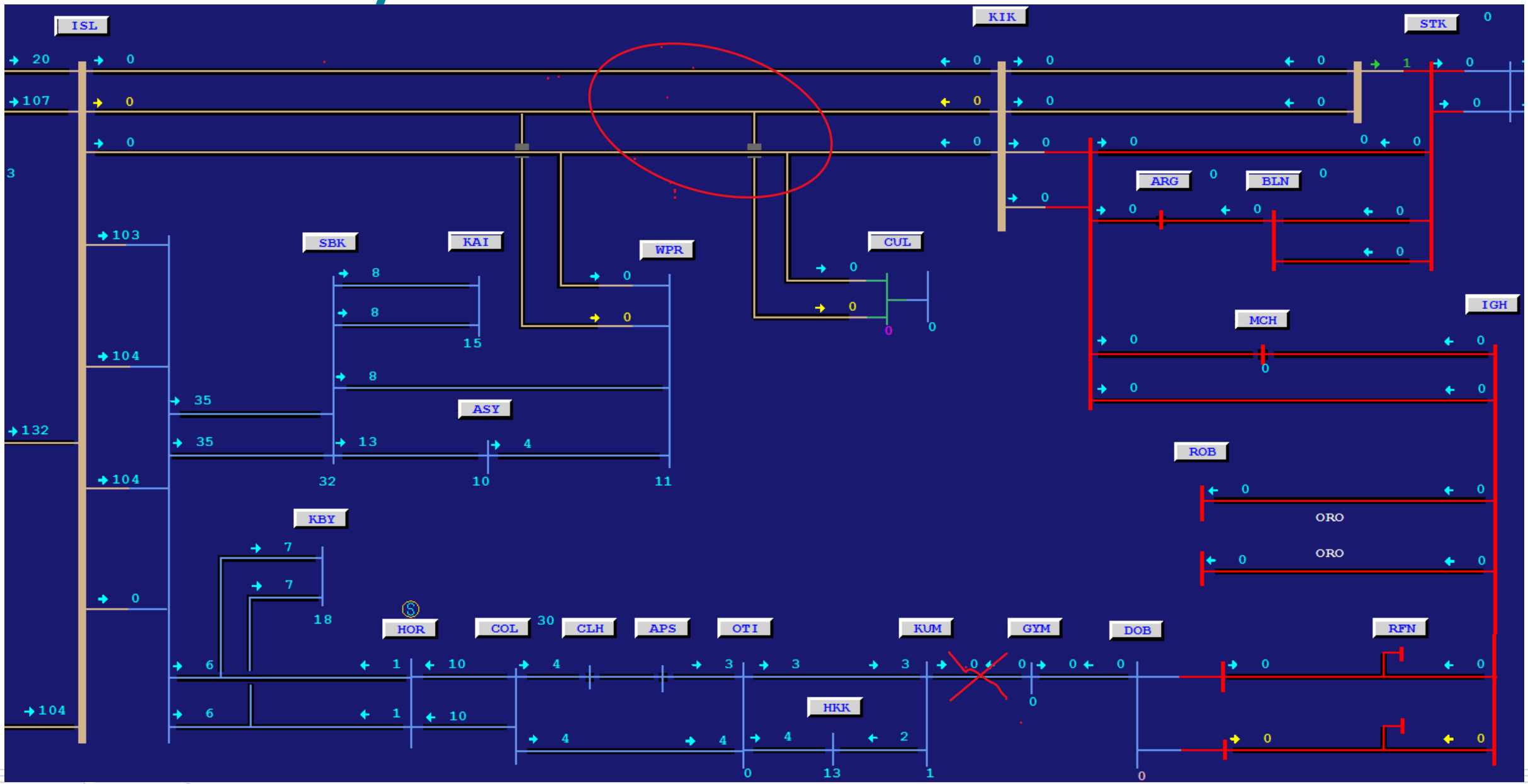
Loss of the Upper South Island – 23 October 2025

- 07:27 The North Canterbury 66kV circuit overload protection scheme was enabled
- 07:29 A verbal GEN was declared to implement a West Coast split on the GYM KUM circuit. This was implemented at 07:41.
- 07:45 ISL KIK 1 tripped. Loss to the upper South Island of approximately 150 MW
- 07:51 the GEN was revised to include load management and grid reconfiguration for restoration of the upper South Island
- The Nelson Marlborough Buller contingency plan was systematically worked through until final restoration occurred around 11:01

Other Events – 23 October 2025

- 09:24 Pole 2 tripped. This reduced the transfer by approx. 200 MW due to Pole 3 now being the risk setter
- 09:34 ISL WPR CUL KIK 3 tripped. Loss to CUL and WPR. ISL KIK 1 still in service connecting approx. 42 MW at STK
- 10:15 Pole 3 tripped causing an underfrequency event (49.02Hz). There was approx. 325 MW on Pole 3 at the time
- 17:42 Tauhara and Te Huka generation tripped causing an underfrequency event (49.2Hz).

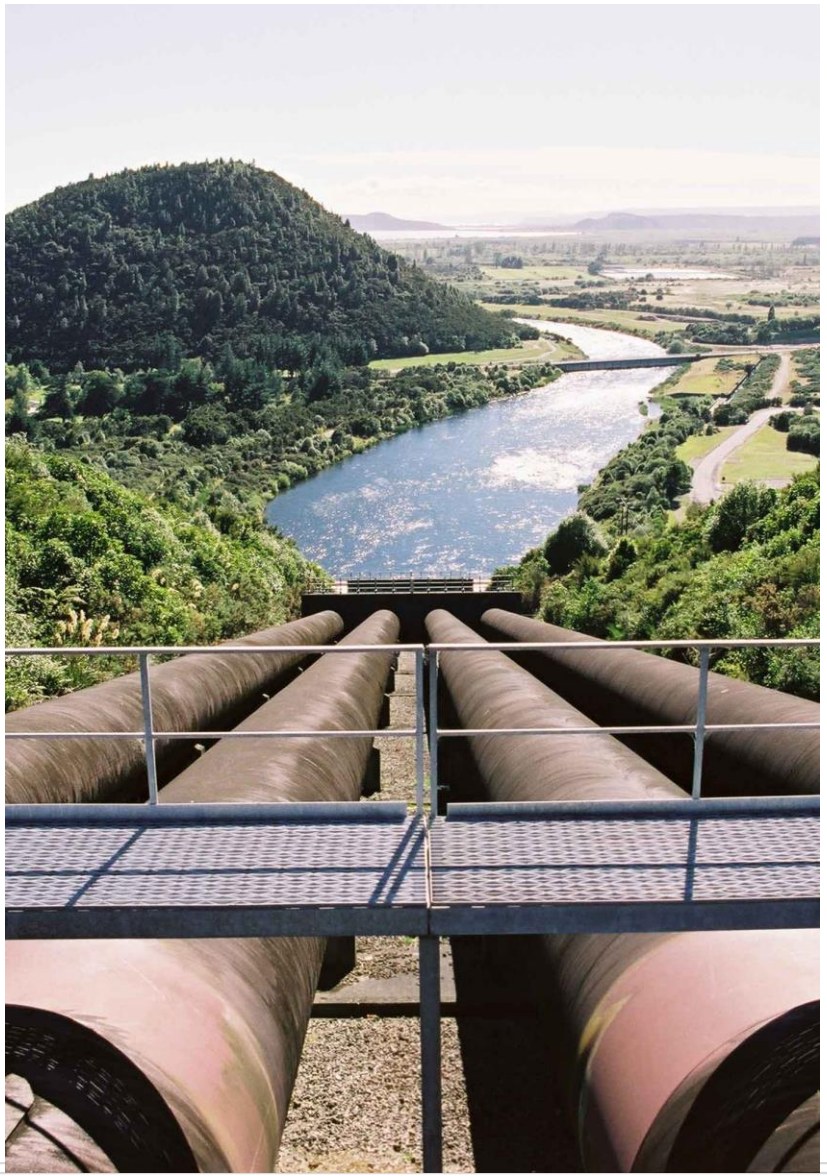
System Events – 23 October 2025



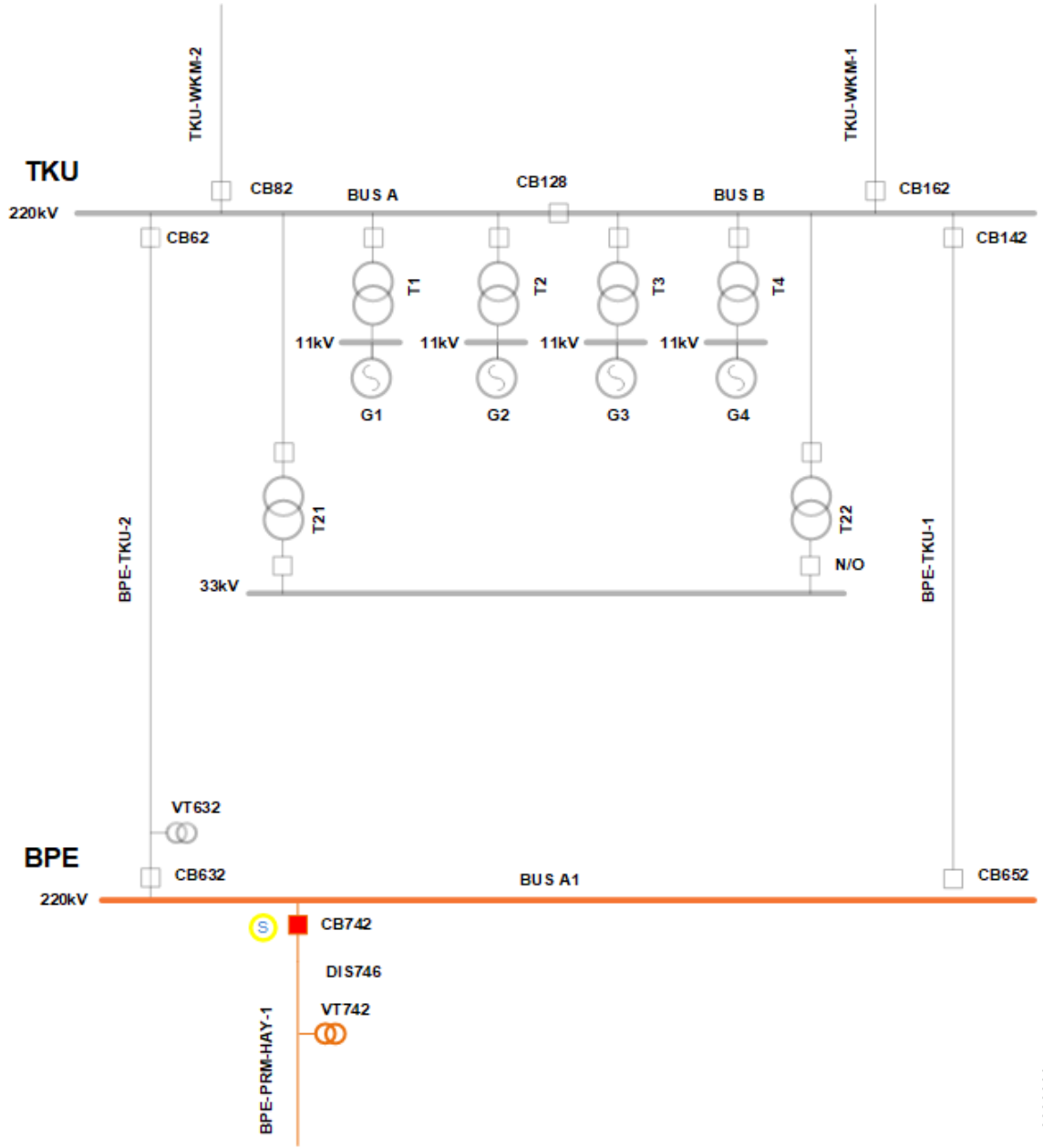
Power Systems Group Update – Tokaanu Black Start Test

TOKAANU BLACK START - FUN FACTS

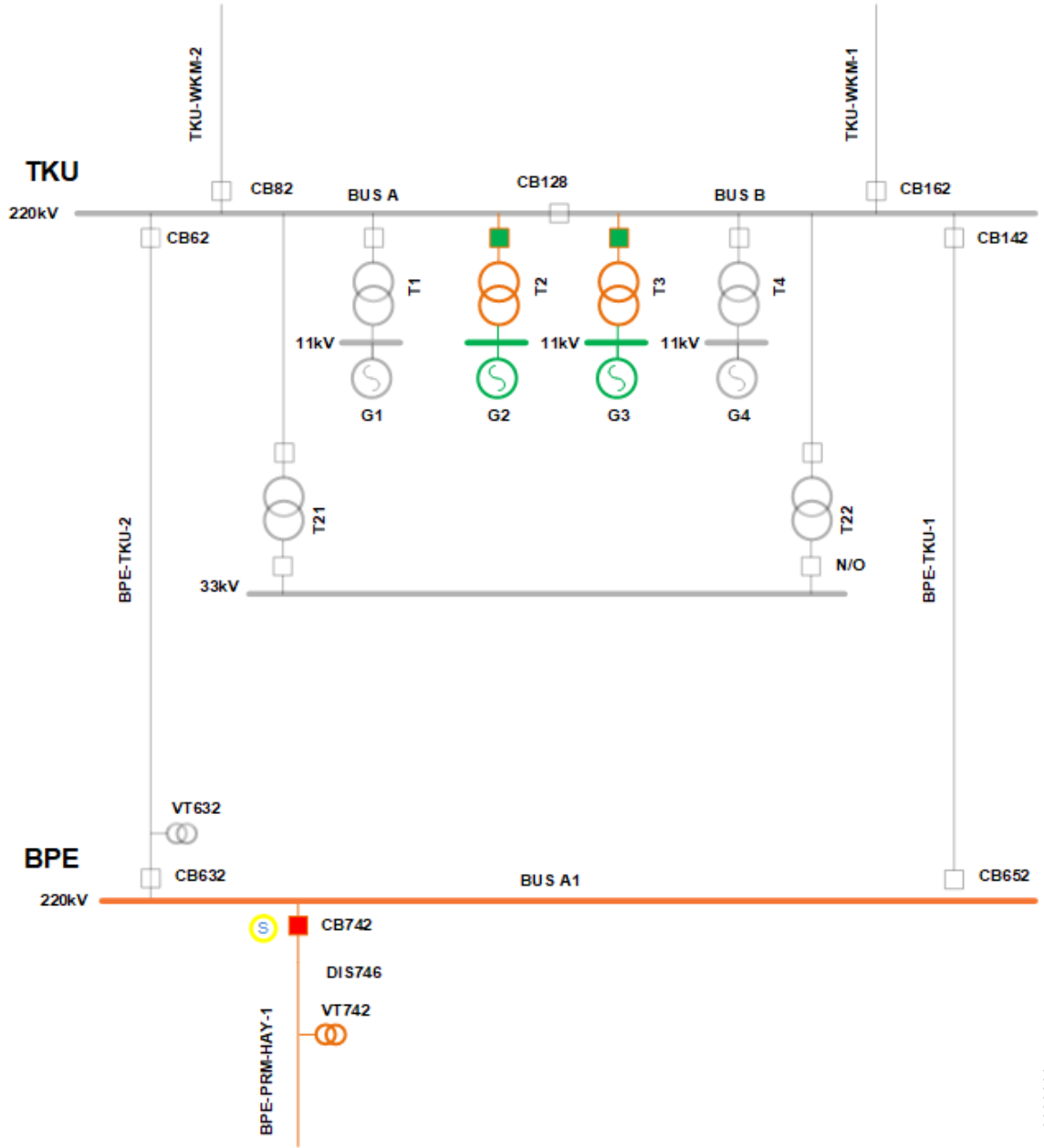
- Tongariro Power Scheme:
  - Drains a 2,600 km^2 area
  - Fed by four rivers, multiple streams incl. tunnels
- Tokaanu Power Station:
  - Commissioned in 1973
  - Max Continuous Output: 240 MW (4 x 60 MW)
- Black Start History/Status:
  - Four providers contracted via Ancillary Services
  - NZ never experienced a blackout



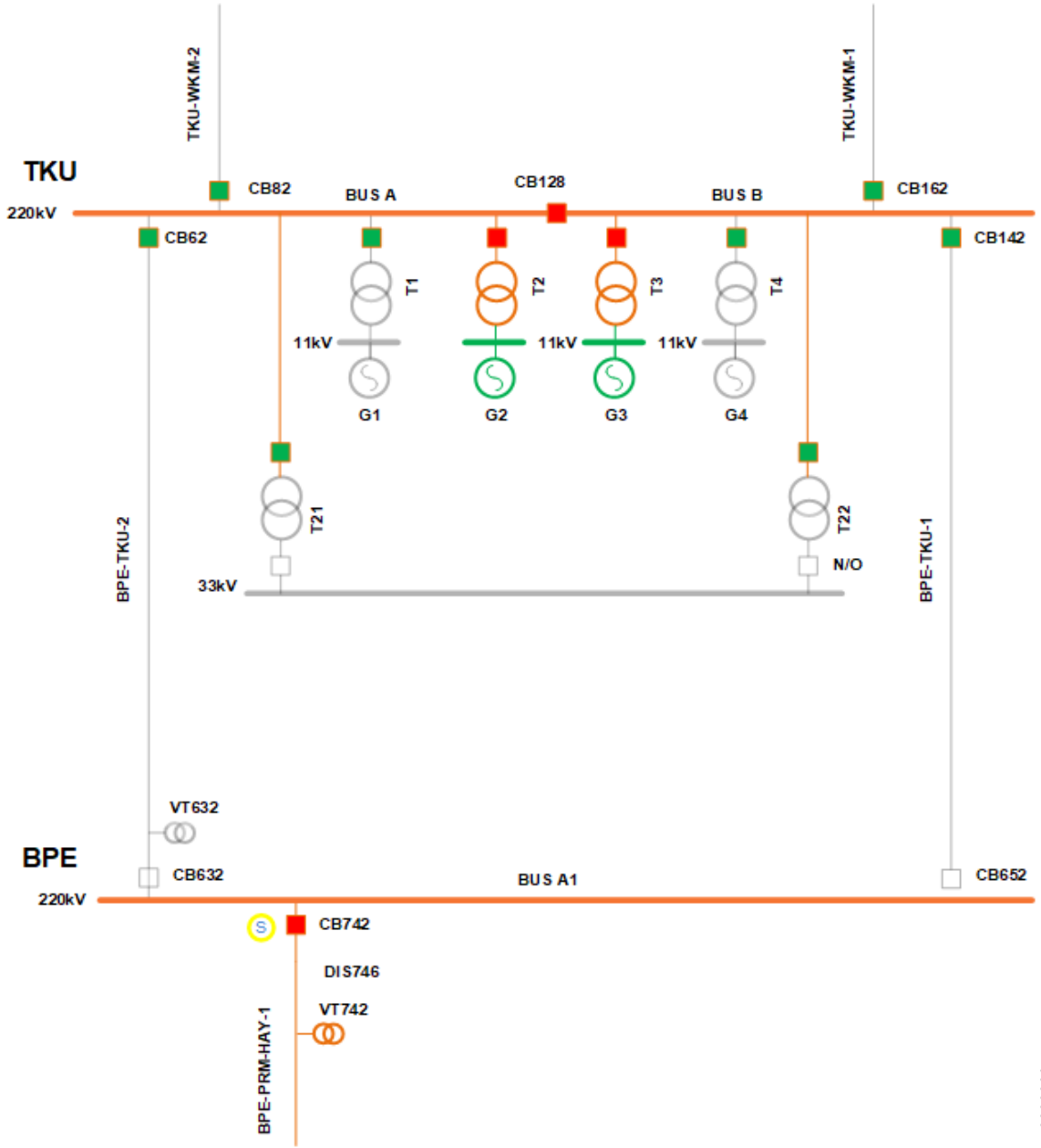
2025 TKU BS - BLACK ISLAND



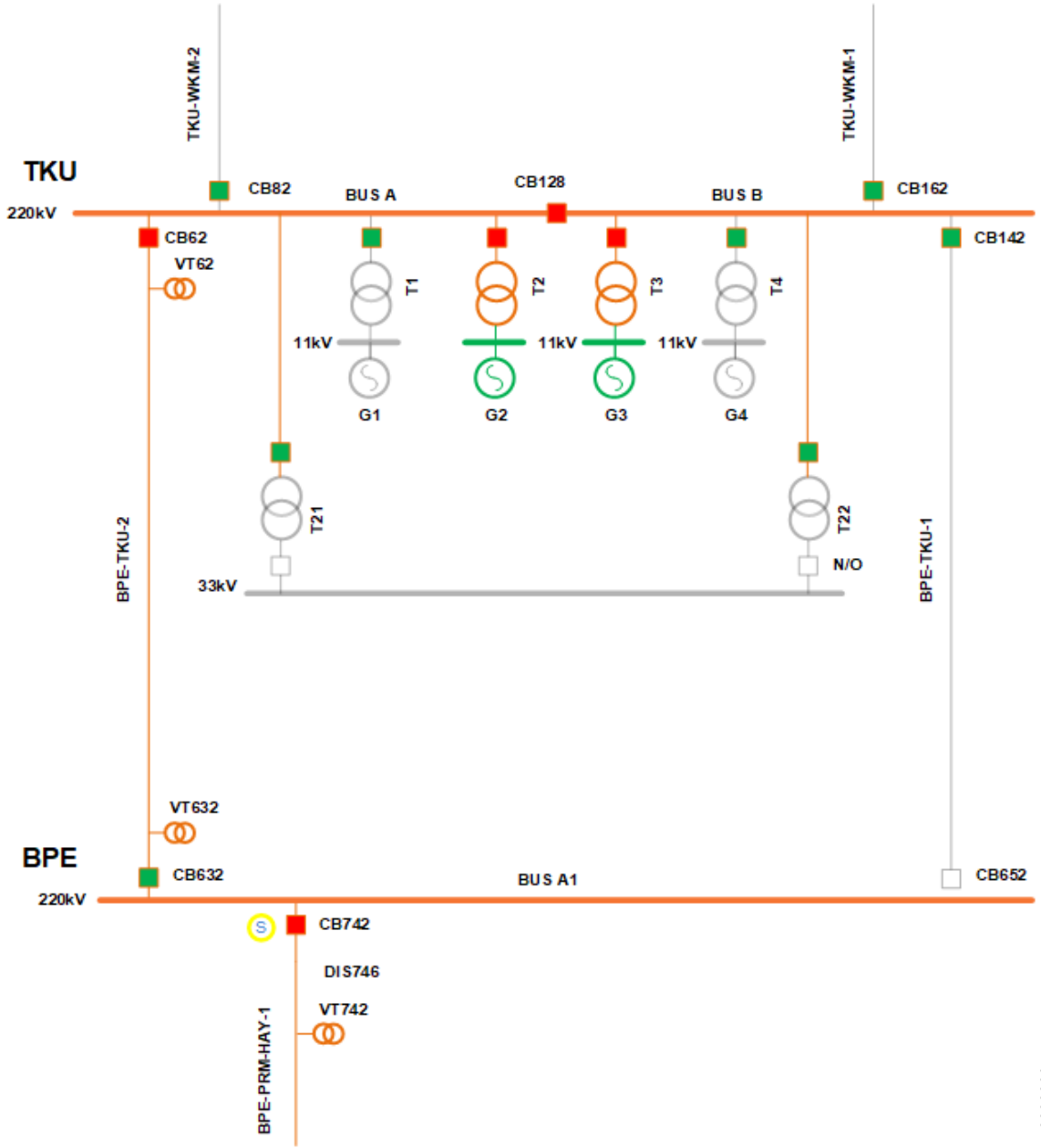
2025 TKU BS - SYNCHRONISE GENERATION



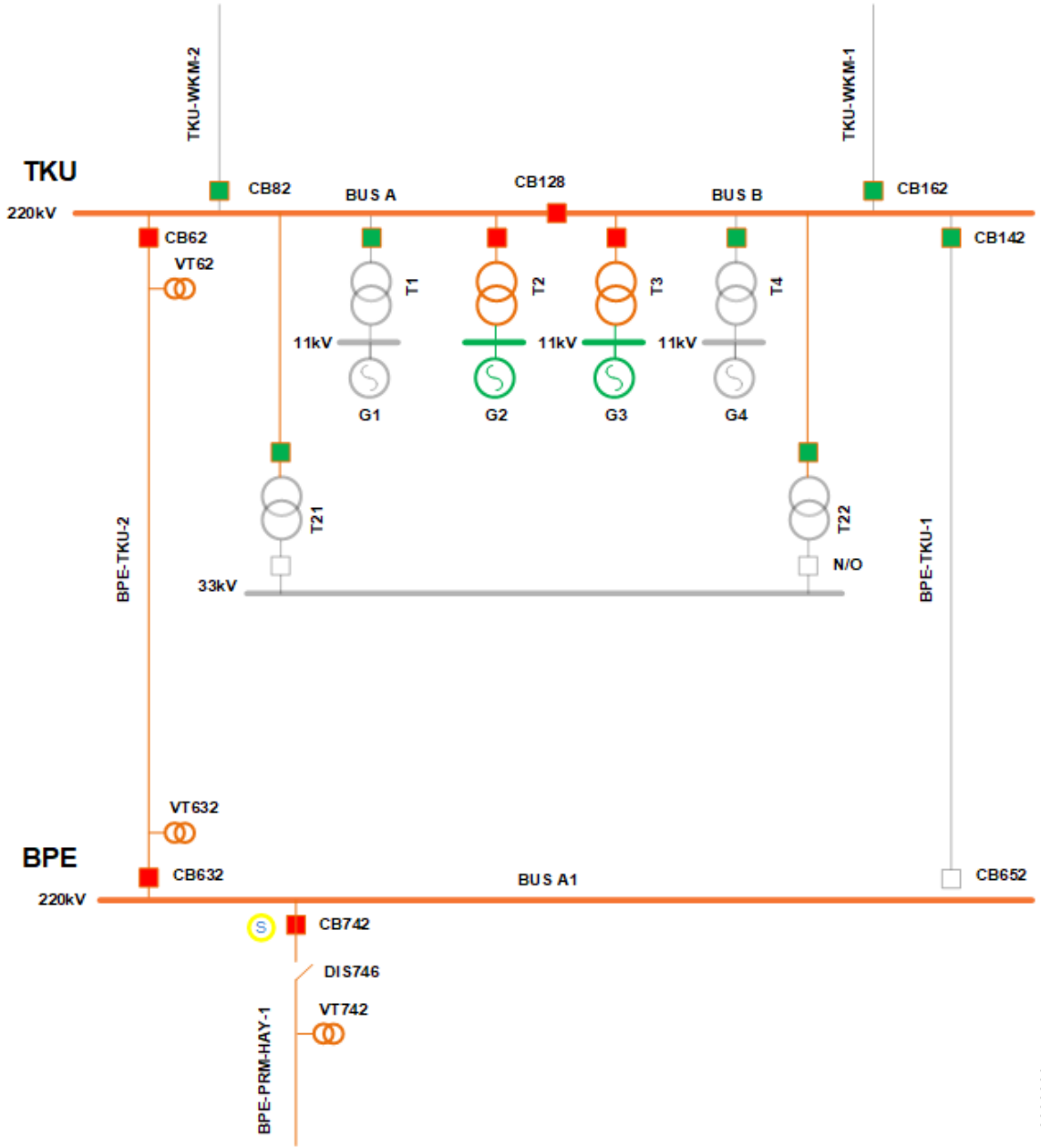
2025 TKU BS - ENERGISE 220 kV BUS



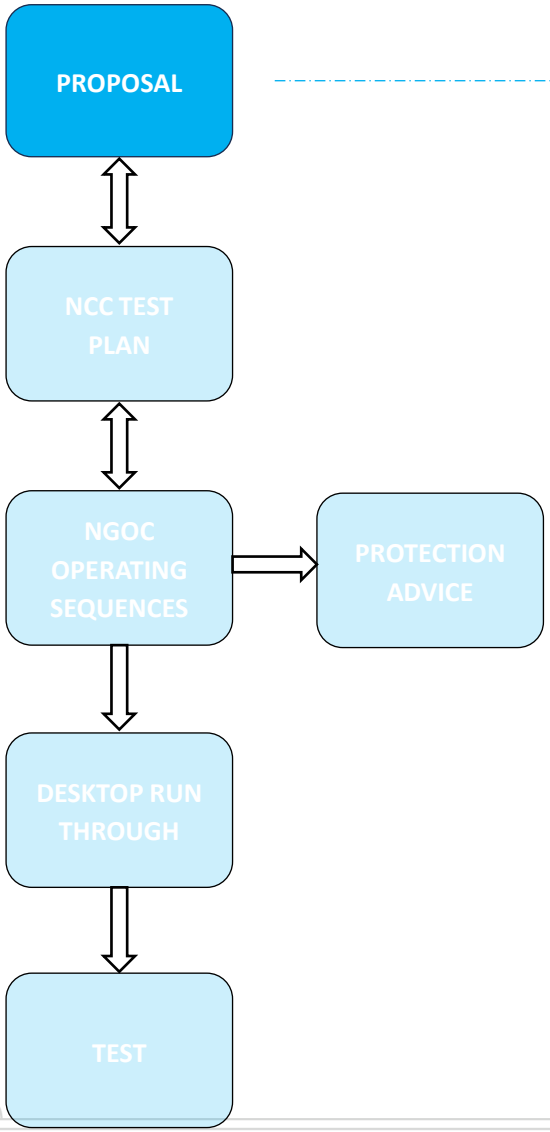
2025 TKU BS - ENERGISE A DEADLINE

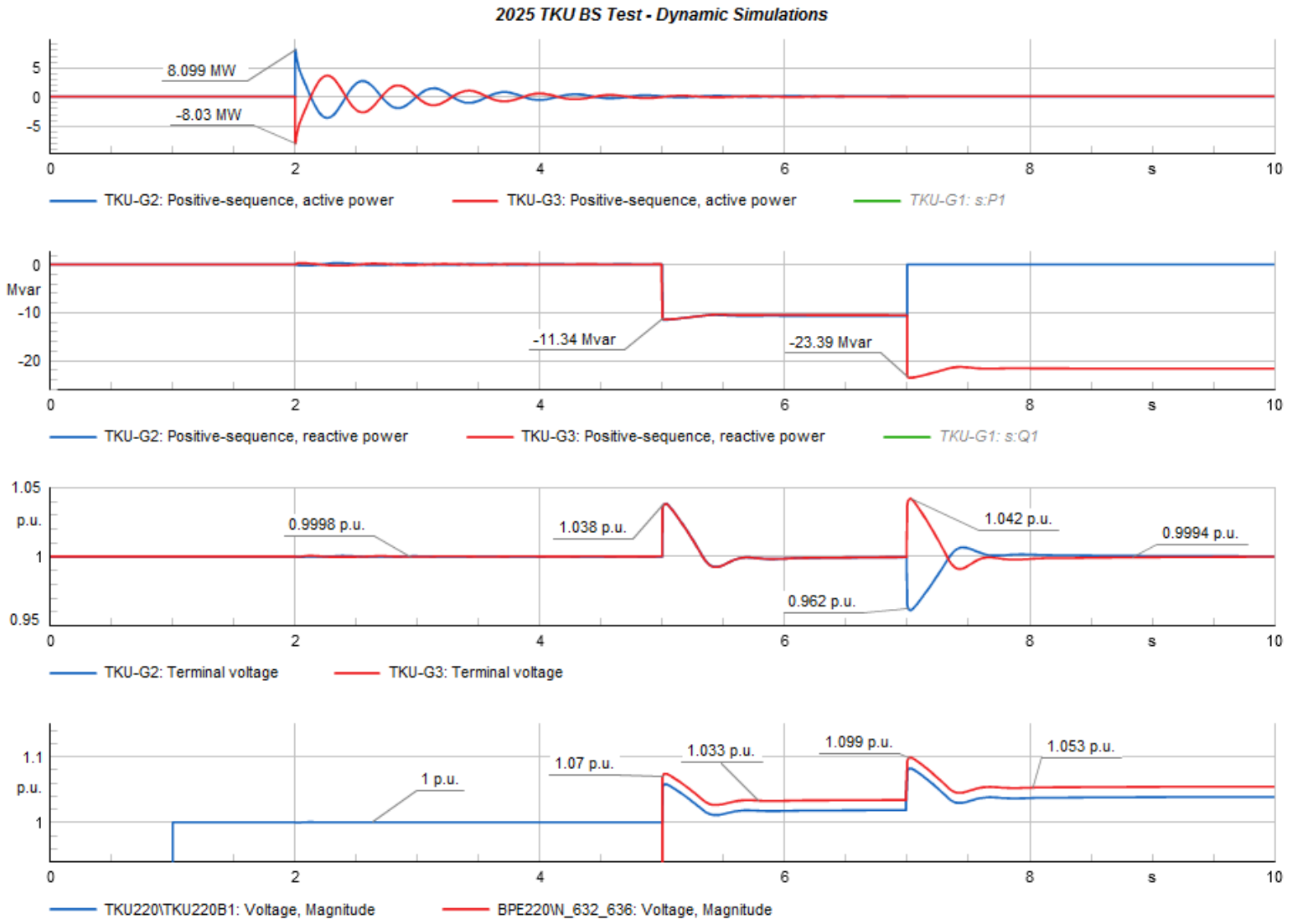


2025 TKU BS - REMOTE AUTO DUMMY SYNC



BLACK START - ACTIVITIES





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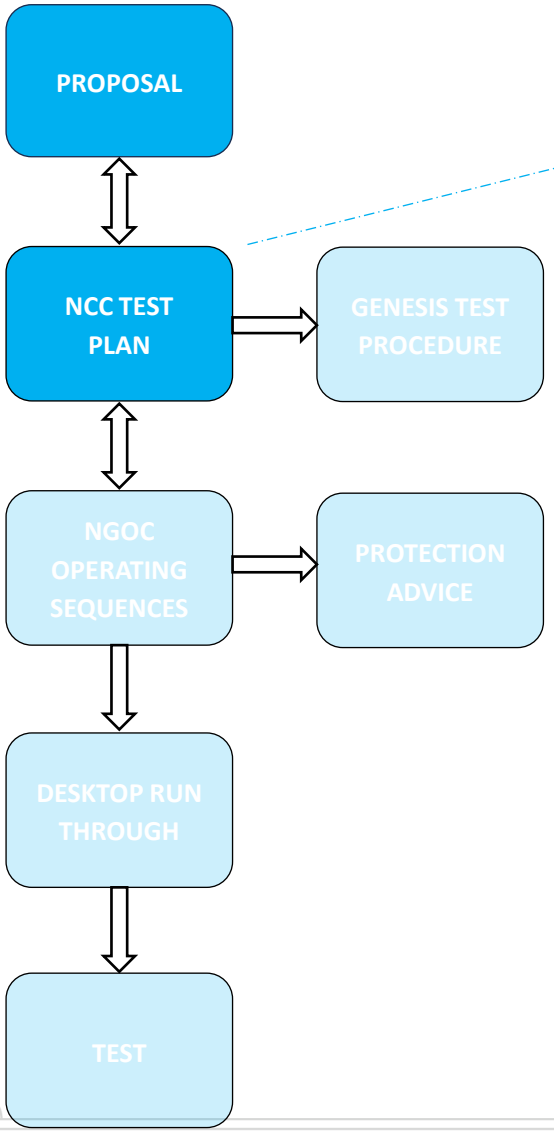
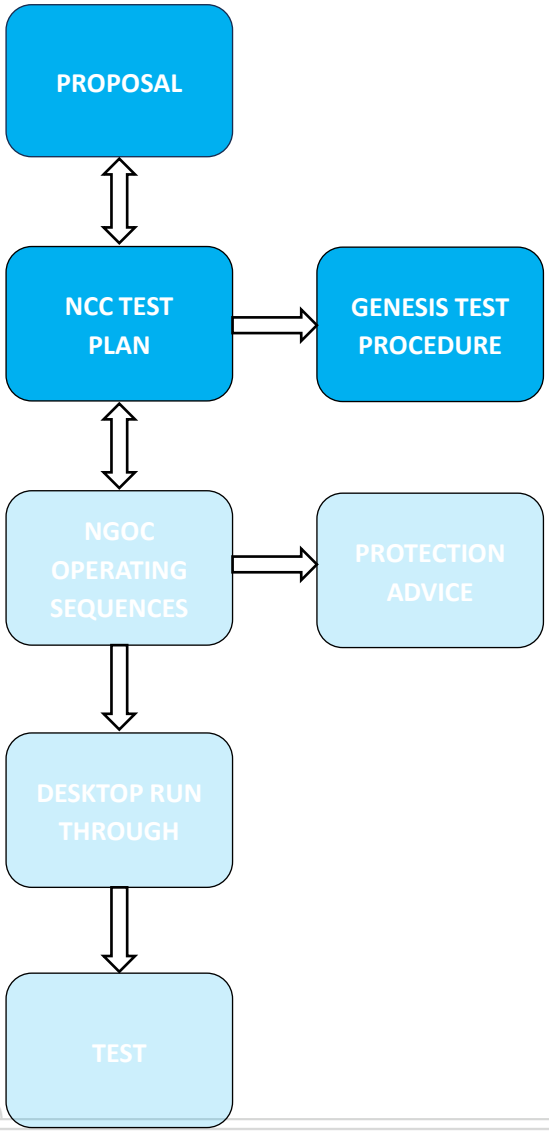


NCC TKU Black Start Test Plan 2025

Black Start Test

Item	Initiator	What/To Whom	Details	Time
1.2.1	NCC Test Coordinator	Advise Duty Security Coordinator, TKU Test Controller and NGOC Test Controller Black Start Test is about to commence.	Prior to giving an instruction to carry out the test, NCC Test Coordinator will confirm that the NGOC and TKU Test Controllers are ready for that step. This is to ensure any concerns with plant performance are addressed and that any measurements needing to be recorded have been started and/or completed before actioning the next step.	
1.2.2	NCC Test Coordinator	Advise NGOC Test Controller that TKU is Black Starting two machines and energising the 220 kV Bus A & B.	TKU 220 kV Bus will be energised.	
1.2.3	NCC Test Coordinator	To TKU Test Controller: Start TKU **G2** and connect to TKU 220 kV Bus. TKU **G2** to be in **voltage** mode with terminal voltage at 1.0 p.u. (11 kV). Hold for 5 minutes	TKU Generator synchronising tap is position 4. This gives (as per SO modelling) 231 kV. TKU generator transformer T2 tap positions to be set to achieve 223 kV at TKU (indicative tap position 6).	
1.2.4	NCC Test Coordinator	To TKU Test Controller: Start TKU **G3** and connect to TKU 220 kV Bus. TKU **G3** to be in **voltage** mode with terminal voltage at 1.0 p.u. (11 kV). Hold for 5 minutes	TKU Generator synchronising tap is position 4. This gives (as per SO modelling) 231 kV. TKU generator transformer T3 tap positions to be set to achieve 223 kV at TKU (indicative tap position 6).	

BLACK START - ACTIVITIES

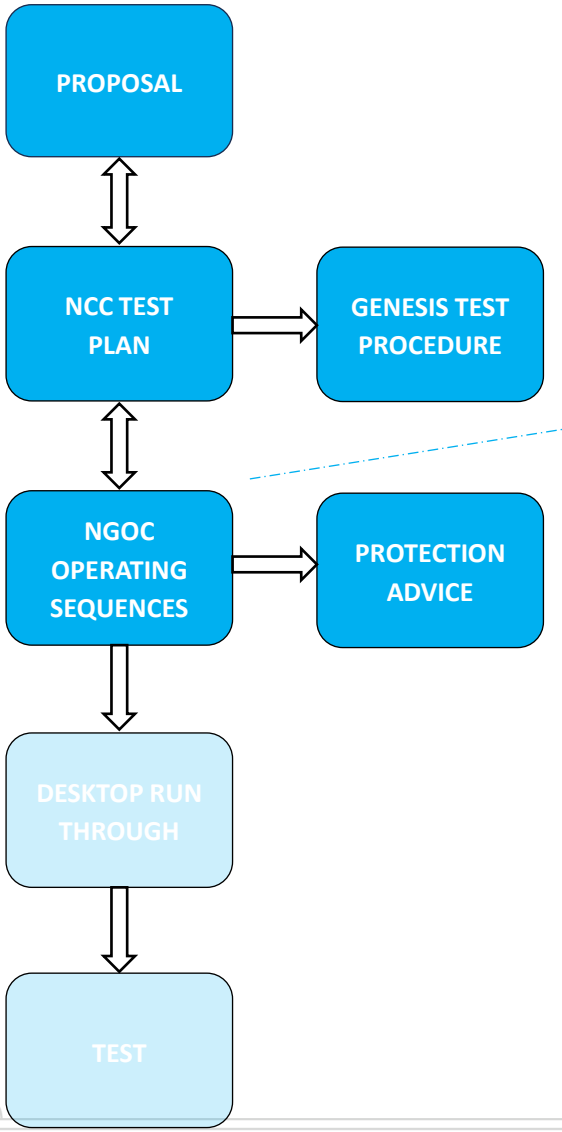


Manual	**Tongariro Operations Manual**		
Title	**Tokaanu Black Start Procedure**		
Document ID	**TGO-OPS-INS-228**	Revision No:	5

Personnel Requirements:	Generation Controller x 2 Operator Maintainer
Supervision:	Nil
Document Requirements:	Procedure

The Tokaanu Power Station has the capability to carry out a 'Black Start' of the 'Grid' should the Grid fail. In such an event Transpower will still be dispatching either in the usual way or via phone.

BLACK START - ACTIVITIES



Operating Sequence #: **128691** Planned Date/Time: **18/10/2025 08:00 NZDT**

Objective: **Prepare for TKU 220kV Black Start Test**

PTP

Actioned Date

Compiled By: Veta Broomhall 01 **Approved By:** Stephen Wakelin **Checked (by Actioner):**

Pre-Condition(s):
NCC test coordinator to confirm Black Start switching to proceed
TGC to confirm TKU Auxillary generator running and supplying the entire LS Bus & TKU_T23 RFS
TGC to confirm TKU G1, G2, G3 and G4 shutdown
Confirm ONG_TKU_GXP_TIE in place
TKU 1062 & 1102 UV3 UNDER VOLTAGE PROTECTION DISABLED
Confirm BPE 742 Protection 1 relay permanent settings are applied

Item No	Time Start	At	Action	Time Finish
1		SNI	Disable TKU 128_COPS_SPS1 TRIPPING SCHEME	
2		SNI	Disable TKU 128_COPS_SPS2 TRIPPING SCHEME	
3		SNI	Check TKU 1092 OPEN	
4		SNI	Check TKU 134 OPEN	
5		SNI	Open TKU 1072 (TLC)	
6		SNI	Open TKU 72 TKU_T21 RFS	
7		SNI	Disable TKU 142 AUTO RECLOSE	
8		SNI	Disable BPE 652 AUTO RECLOSE	
9		SNI	Disable TKU 62 AUTO RECLOSE	
10		SNI	Disable BPE 632 AUTO RECLOSE	
11		SNI	Open TKU 142	

TRANSPOWER

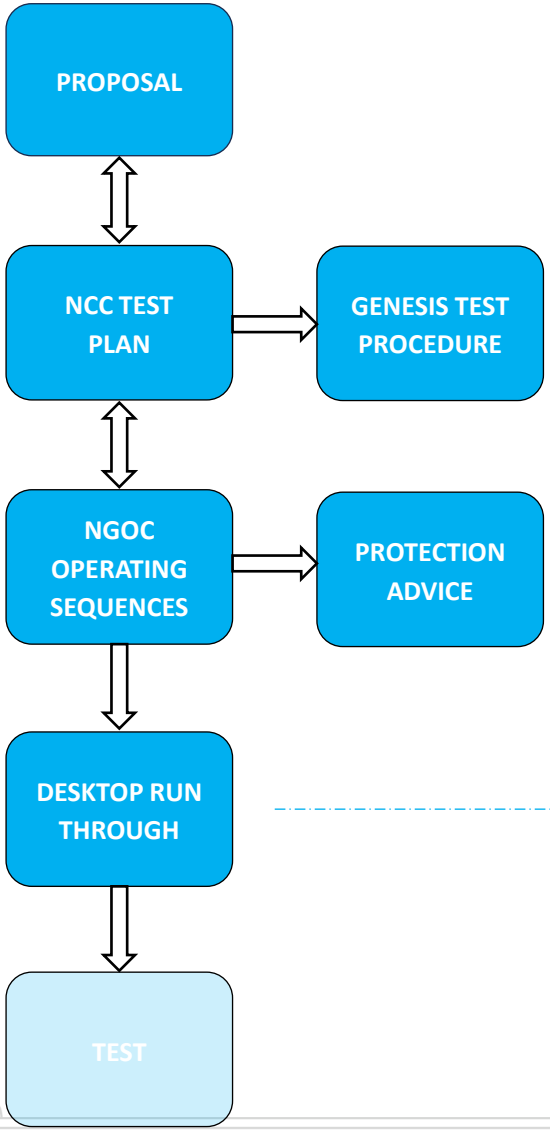
Protection Advice for TKU Black Start on 2025/10/18.

Prepared By	Parsa Zakeri
Document Last Saved	7/10/2025 12:46 pm
Revision	First Revision

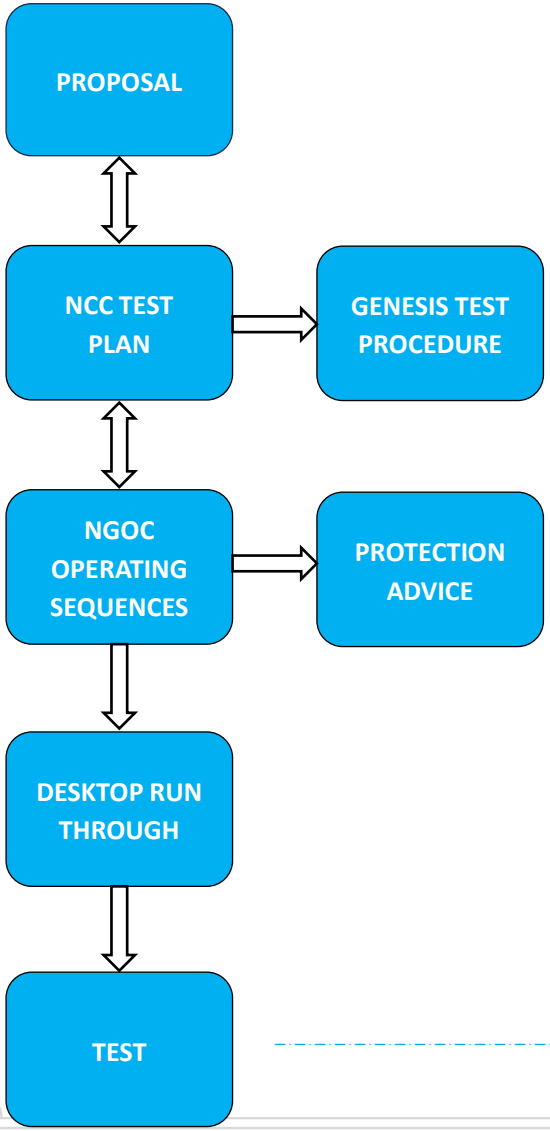
Protection Advice for black start test:

1. BPE-TKU-1&2 protection 1 and protection 2, along with associated signalling must be in-service.
2. BPE-TKU-1&2 auto-reclose must be disabled.
3. Ensure that the permanent settings are applied on BPE742 Protection 1 relay before the black start test. StationWare Settings location:
   Region: SNI > Substation: BPE > Line: BPE-PRM-HAY-1 (CB: 742) > Relay: LDif1 (SEL411L-SCL-Numerical) > Settings: Transpower-PZ-20251001

BLACK START - ACTIVITIES



BLACK START - ACTIVITIES



TOKAANU BLACK START – NEXT STEPS

- Review test recordings
- Review relay waveforms recordings
- Compile Black Start Engineering Test Report

GridEx VIII

What is GridEx?

- **Industry-wide exercise simulating cyber and physical attacks on electricity grid infrastructure.**
- U.S. based, organized by North American Electric Reliability Corporation's Electricity Information Sharing and Analysis Center.
- Customised to New Zealand by Transpower, scenario and objectives maintained.
- Designed to:
    - Test utilities' approach for incident response, coordination, and recovery in a crisis.
    - Move past targeted tabletop exercises to think "whole of system" and crisis scenarios.
    - Include real-time scenarios, communications drills, and executive-level decision-making.

- In 2025, will be held on **17/18 November** (N.Z. time – a day ahead of U.S).

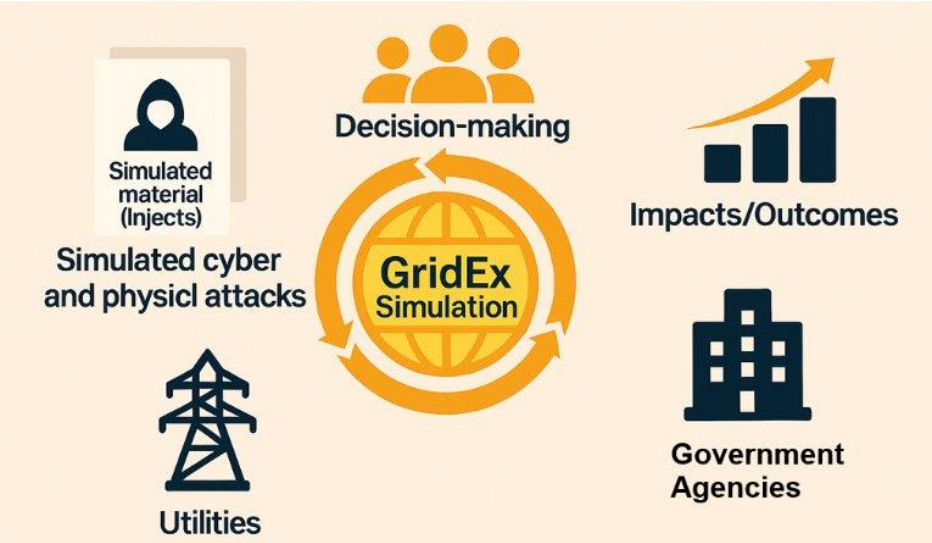
Join us for GridEx in 2025

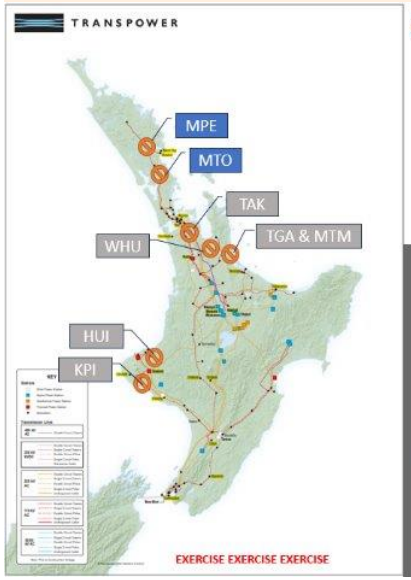
- **As a participant -** run an exercise in parallel and have an immersive whole of industry exercise yourself
- **As an observer -** be taken on a journey and gather learnings from NZ energy industry emergency for takeaways or use in your organization.

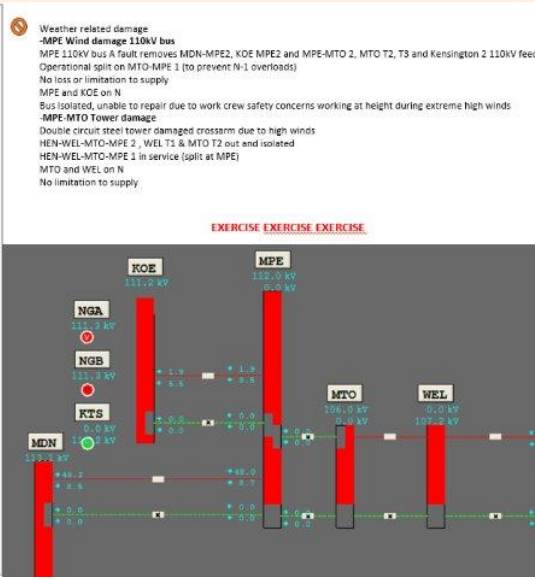
You'll experience:

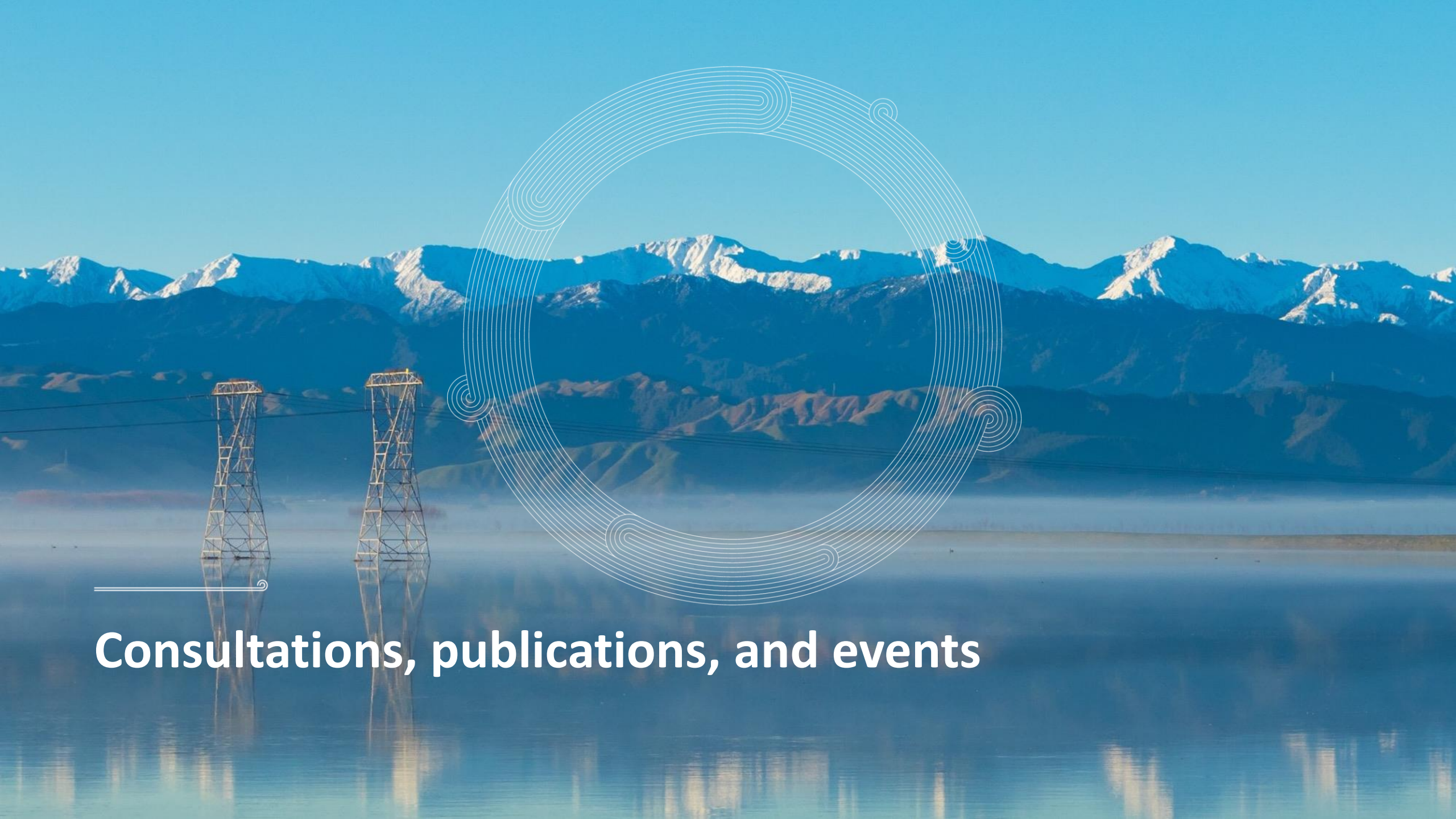
- Simulated cyber and physical attacks on grid operations and infrastructure through realistic simulated material (Injects).
- A crisis "hub" sharing the material, decisions made, impacts/outcomes and interactions across utilities, regulators, and government agencies.

Contact GridEX@Transpower.co.nz to observe or participate









Consultations, publications, and events

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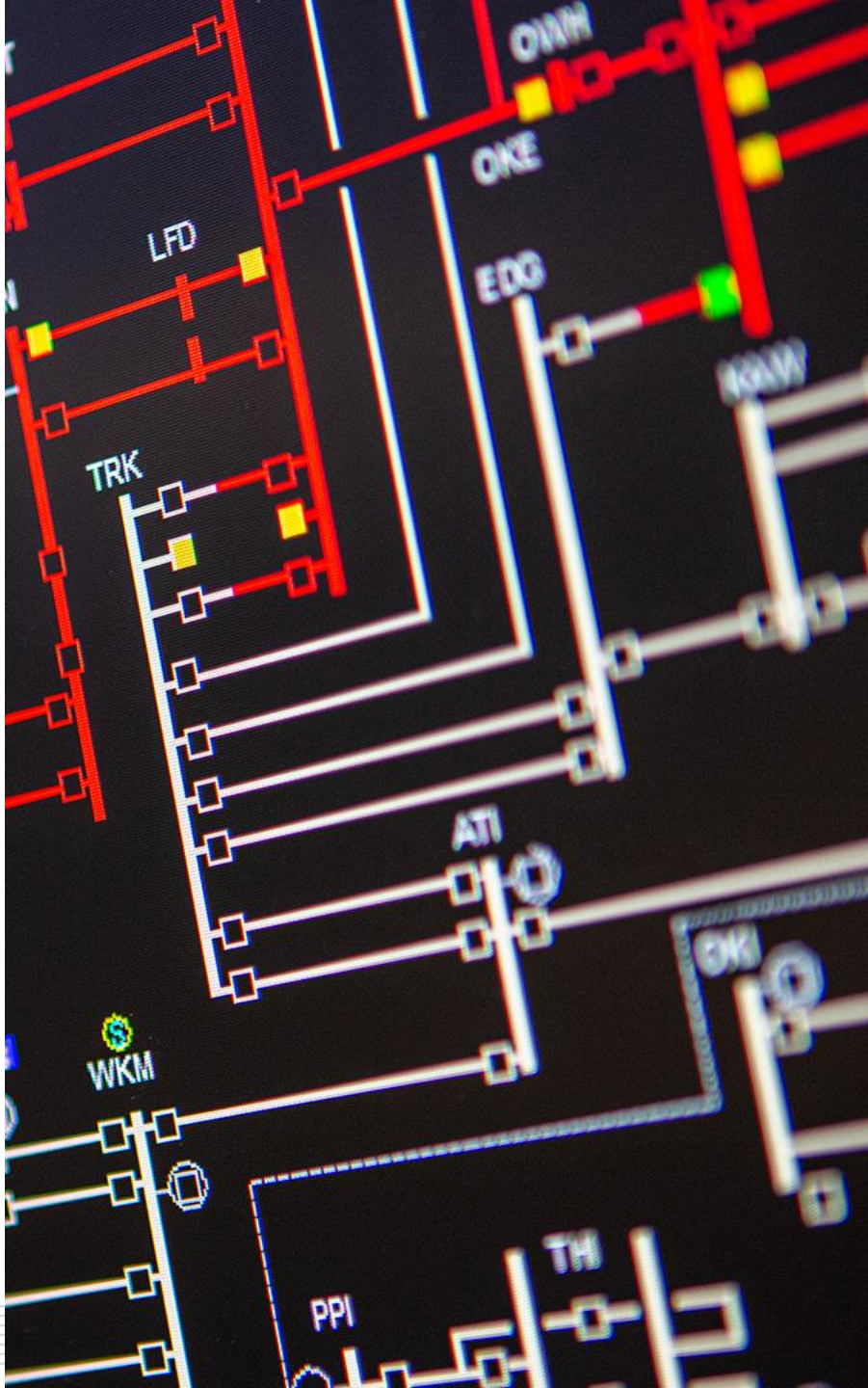
Last week we published our latest **Quarterly Security of Supply Outlook** which is available on our website.

Our **draft SOSFIP amendment proposal consultation** is open. Submissions are due by 5pm Tuesday 4 November, followed by a week for cross-submissions.

Our **2025 Ancillary Services tender** closes at 5pm Wednesday, 5 November. We are contracting for Instantaneous Reserves, Frequency Keeping (Multiple FK, and Back-up Single FK), and North Island Black Start services.

We will publish our October **Energy Security Outlook** this week.

We are hosting this years **System Operator Asset Owner Engineering Forum** tomorrow (29 October). This year the forum is focused on the proposed draft Connected Asset Commissioning and Testing Information Standard (CACTIS).



Questions / Patai

Please raise your hand

If you have feedback let us know via our **Feedback Form**

TRANSPOWER.CO.NZ