TRANSPOWER

Transpower Customer Webinar

10 December 2025

Opening **Karakia**

Kia tau te rangimarie
O te Rangi e tū iho nei
O Papatūānuku e takoto nei
O te taiao e awhi nei
Ki runga i a tātou
Tihei Mauri ora

Translation

Let the peace
of the sky above us
of the earth laid out here
and of the all-embracing universe
settle upon us
Breathe the breath of life

Topic	Presenter	Time
Welcome, agenda and karakia	Tim Duguid, Head of Customer & Commercial Graham McMurtry, Customer Solutions Advisor	13:30 – 13:35
Space weather	Andrew Renton, Senior Principal Engineer - Grid Development (10 mins)	13:35 – 13:45
em6 data platform updates	Nick Warren, Product Owner (10 mins)	13:45 – 13:55
Pricing and TPM review	Victoria Parker, Head of Grid Pricing Will Hancock, Regulatory Advisor - Grid Pricing (15 mins)	13:50 – 14:05
Connections update – end of year wrap	Rupert Holbrook, Customer Connections Project Director (10 mins)	14:05 – 14:15
Q & A	Tim Duguid	14:15 – 14:30
Ngā mihi e karakia	Tim Duguid & Graham McMurtry	14:30

Space weather

Andrew Renton, Senior Principal Engineer - Grid Development

CME GIC National Exercise May 2026

Last time we saw an extreme event

- 1859 Carrington
- 1886/8 Bullendale and Reefton
- 1902 Buffalo – Niagara repair crew for 42km 11 kV line built 1896

Refresher - why we need to practice

A planet sized generator using Faradays law.

Magnitude GIC governed by CME speed, density, polarity, system resistance, ground resistance.

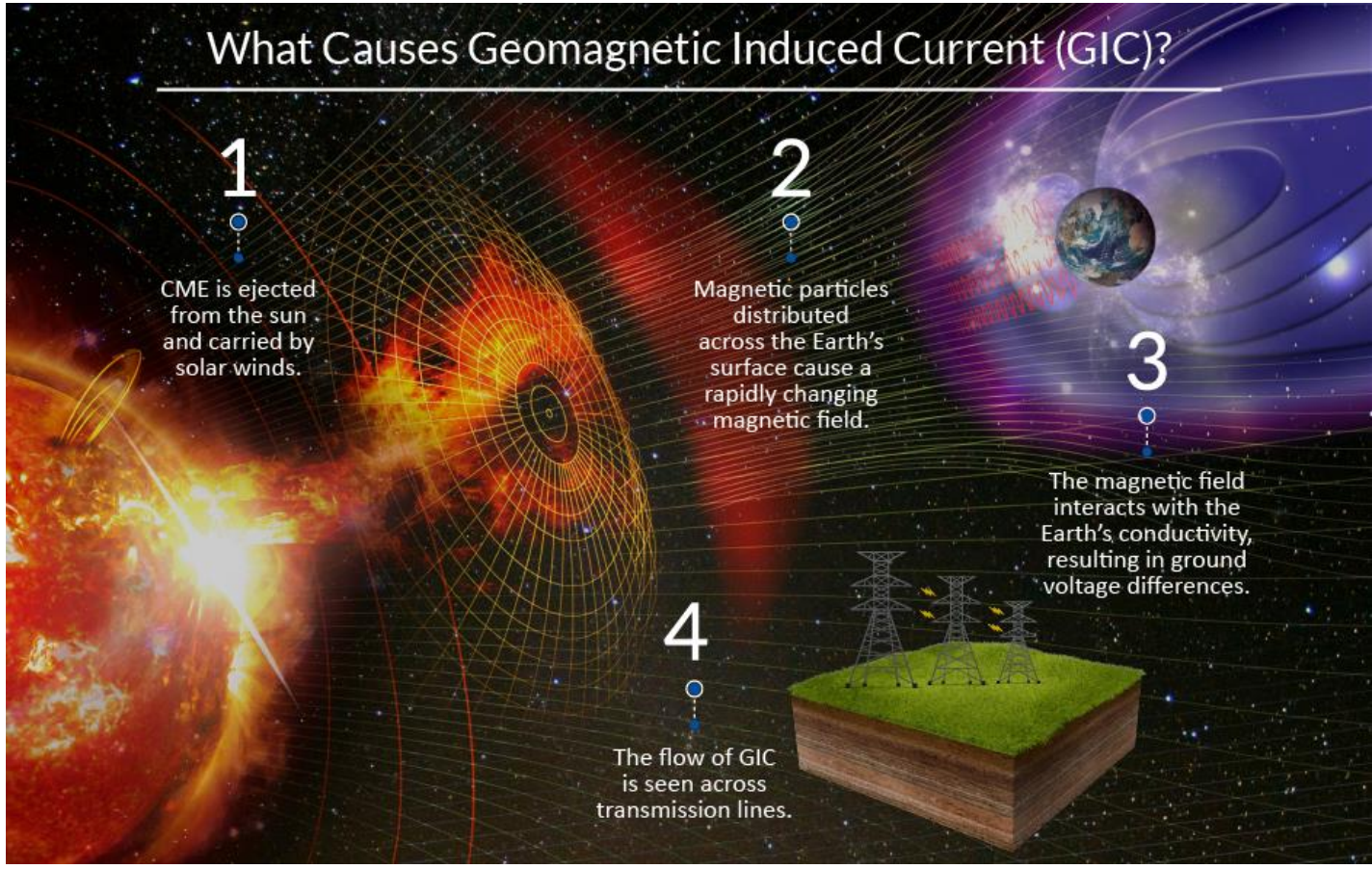
An electric current produces a magnetic field

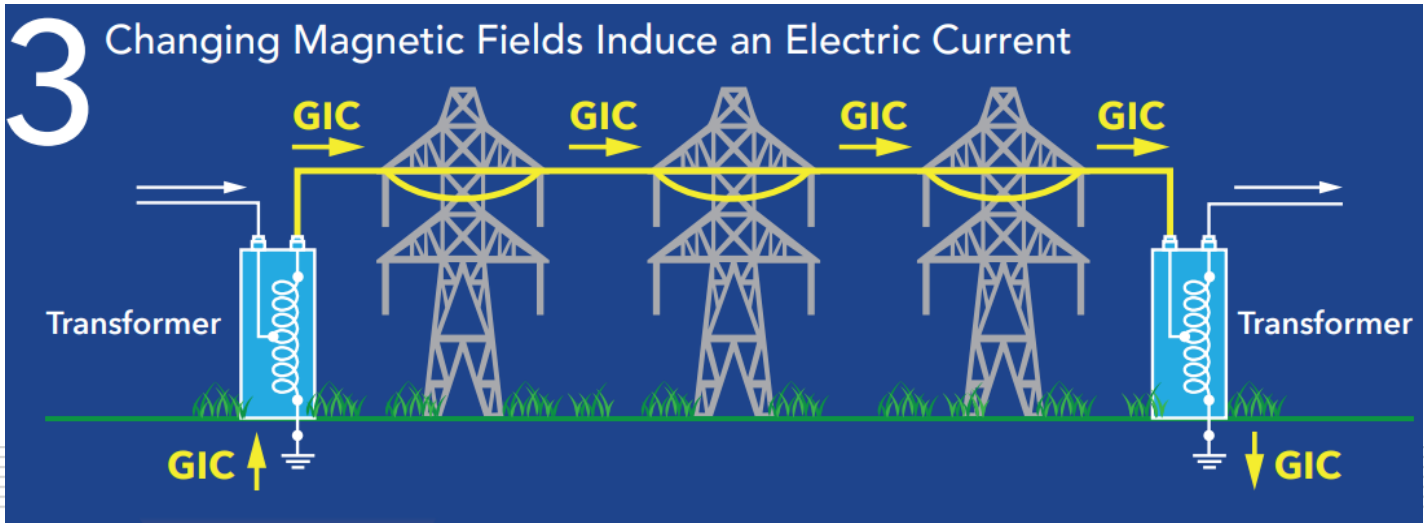
The magnetic field produces a voltage in the ground.

Voltage differences (10-30V/km) between the ground points drives a current between them.

Current takes the path of least resistance either the ground or long metal connection like our transmission lines. Why a transmission issue not distribution.

Saturates transformers, heating, reactive power draw, equipment damage and voltage collapse.





Expected event consequence by magnitude and island

Expected CME GIC System Impacts							
Event Category		Event Probability (yrs)	Expected Field Change (nT/min)	South Island		North Island	
				Likely Impact	Mitigations	Likely Impact	Mitigations
Extreme G5 (NOAA SWPC)	Extreme (Transpower)	1:10 - 15	<500	**Minor** Isolated tripping and alarms	PR-DP-1077 Implement monitoring PR-DP-252 Implement Lower SI only Await L1 confirmation	**Insignificant** Isolated tripping and alarms	PR-DP-1077 Implement monitoring Await L1 confirmation
		1:30	>500 <1,000	**Moderate** Isolated tripping and alarms	PR-DP-1077 Implement monitoring PR-DP-252 Implement Lower SI only Await L1 confirmation Additional 100MVAR reactive plant made available	**Minor** Isolated tripping and alarms	PR-DP-1077 Implement monitoring Await L1 confirmation
	Catastrophic (Transpower)	1:30-50	>1,000 <2,500	**Significant** Generation and demand loss expected	PR-DP-1077 Full implementation PR-DP-252 Implement SI only Call before L1 MAN-TWI islanding, 1200MW SI generation removed Recall all outages Additional 200MVAR reactive plant made available	**Moderate** Some trippings and alarms Likely loss of HVDC 15-20% demand reductions	PR-DP-1077 Implement monitoring PR-DP-252 Prepare for NI implementation Await L1 confirmation Possible demand management if SI generation lost
		1:100	>2,500 <4000	**Extensive** Significant loss of generation and demand INV, NMA, All Canterbury & South Canterbury, Nelson & Marlbough loss of supply WestCoast islanded 30% self supply	PR-DP-1077 Full implementation PR-DP-252 Implement nationally Call before L1 MAN-TWI islanding Recall all outages Additional 200MVAR reactive plant made available	**Significant** Some trippings and alarms 20-30% demand reduction Loss of HVDC Isolated supply loss HEN, HEP, BPE	PR-DP-1077 Full Implementation PR-DP-252 Implement nationally Call before L1 Recall all outages Additional 100MVAR reactive plant made available

Event timeline

CME detected magnitude unknown

T-12 **Trigger event (WATA99) / Scientific community signal its big**

T-11 Industry conference held (Possible extreme event)

IMTs stood up

Customer Advice Notice (CAN) sent

T-10 IMT coordination meetings (every 2 hours)

Industry conference held (outline response plan)

T-9 CAN requesting assets made available, return outages

CME magnitude G5++ unknown

T-4 Advise NEMA of likely impacts

Recall assets from outage

Mobilise service providers / emergency generators / Tx cooling (fans/pumps)

T-3 **Commence ramp down of at-risk geothermal generation**

Demand management if required (GE)

T-2 **IMT coordination meeting (Go/No Go for Grid Emergency)**

T-2 Declare Grid Emergency

Switch out GIC circuits

CME magnitude confirmed

Determine / communicate demand management

Single frequency keepers selected

Protect black start generation units

T-1 **Shut down remaining at-risk generation**

Demand management as required

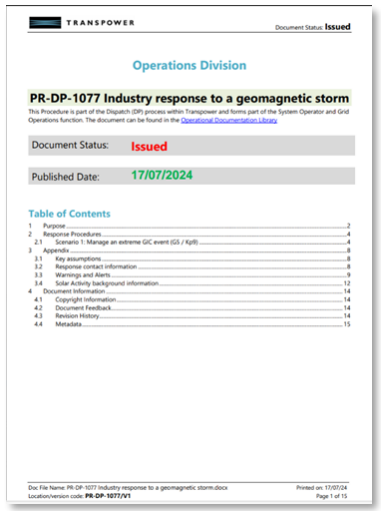
T-0.5 **Storm passes L1 satellite / confirm how extreme storm will be**

T=0 Storm hits – ongoing management of system, including demand management, responding to faults, until all clear given

Operational switching plan – predicted result

Used actual data to:

- Validated and published plan PR-DP-252 & PR-DP-1077
- Extrapolate to compare to historical record
- Compare to NERC & Carrington events
- Scenario scaled 1989 event, winter peak demand, full security, objective minimise total system GIC and peak GIC in most at threat assets, by switching assets out of service.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Document Status: Issued

Operations Division

PR-DP-1077 Industry response to a geomagnetic storm

This Procedure is part of the Dispatch (DP) process within Transpower and forms part of the System Operator and Grid Operations function. The document can be found in the Operational Documentation Library

Document Status: Issued

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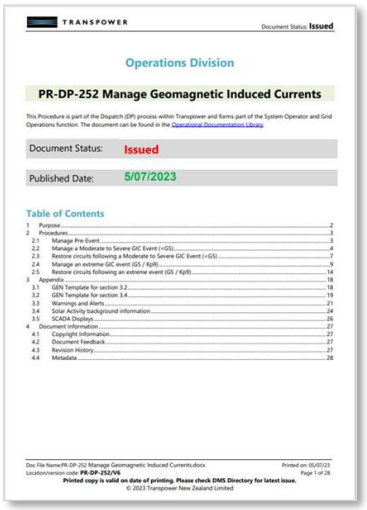
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Document Status: Issued

Operations Division

PR-DP-252 Manage Geomagnetic Induced Currents

This Procedure is part of the Dispatch (DP) process within Transpower and forms part of the System Operator and Grid Operations function. The document can be found in the Operational Documentation Library

Document Status: Issued

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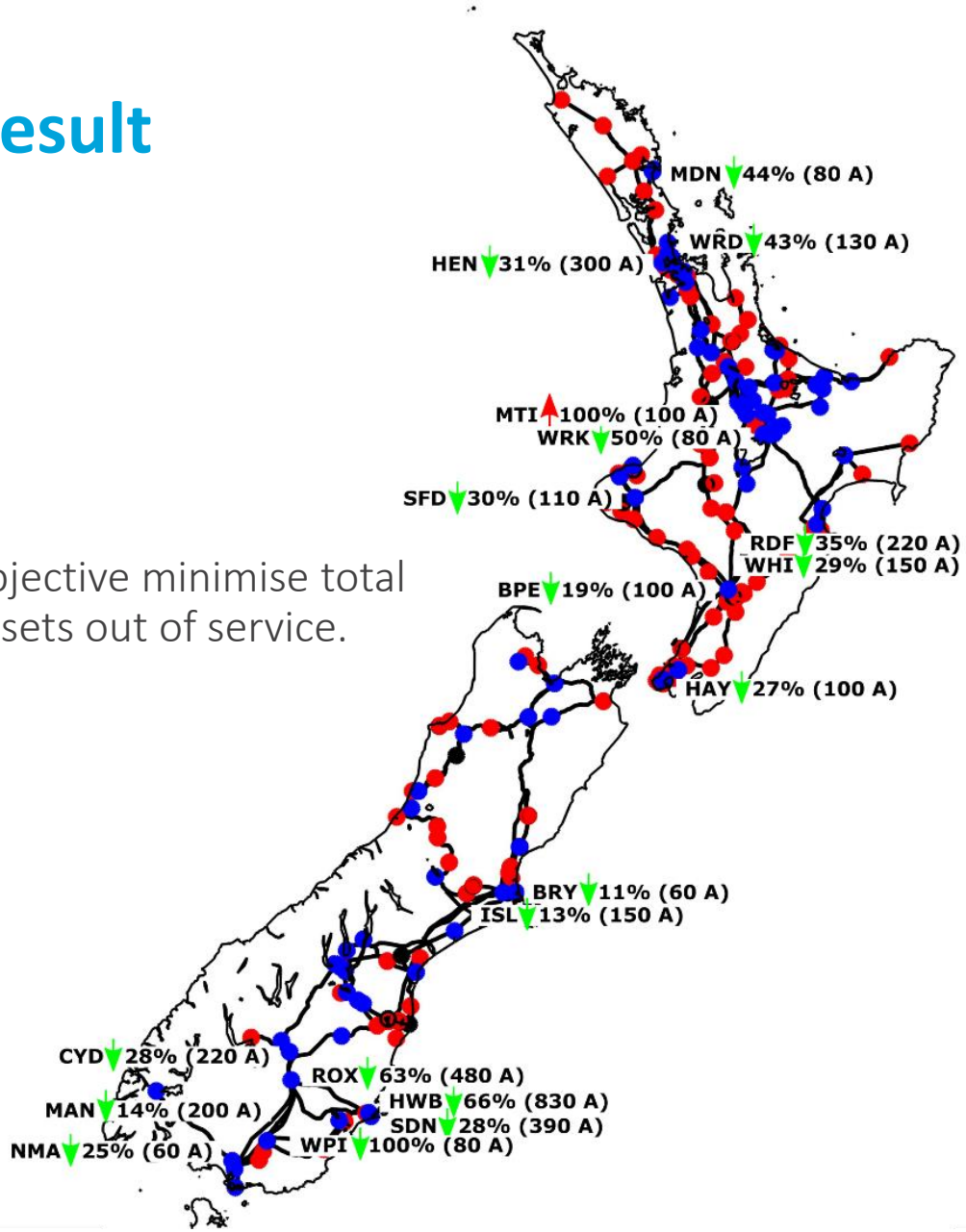


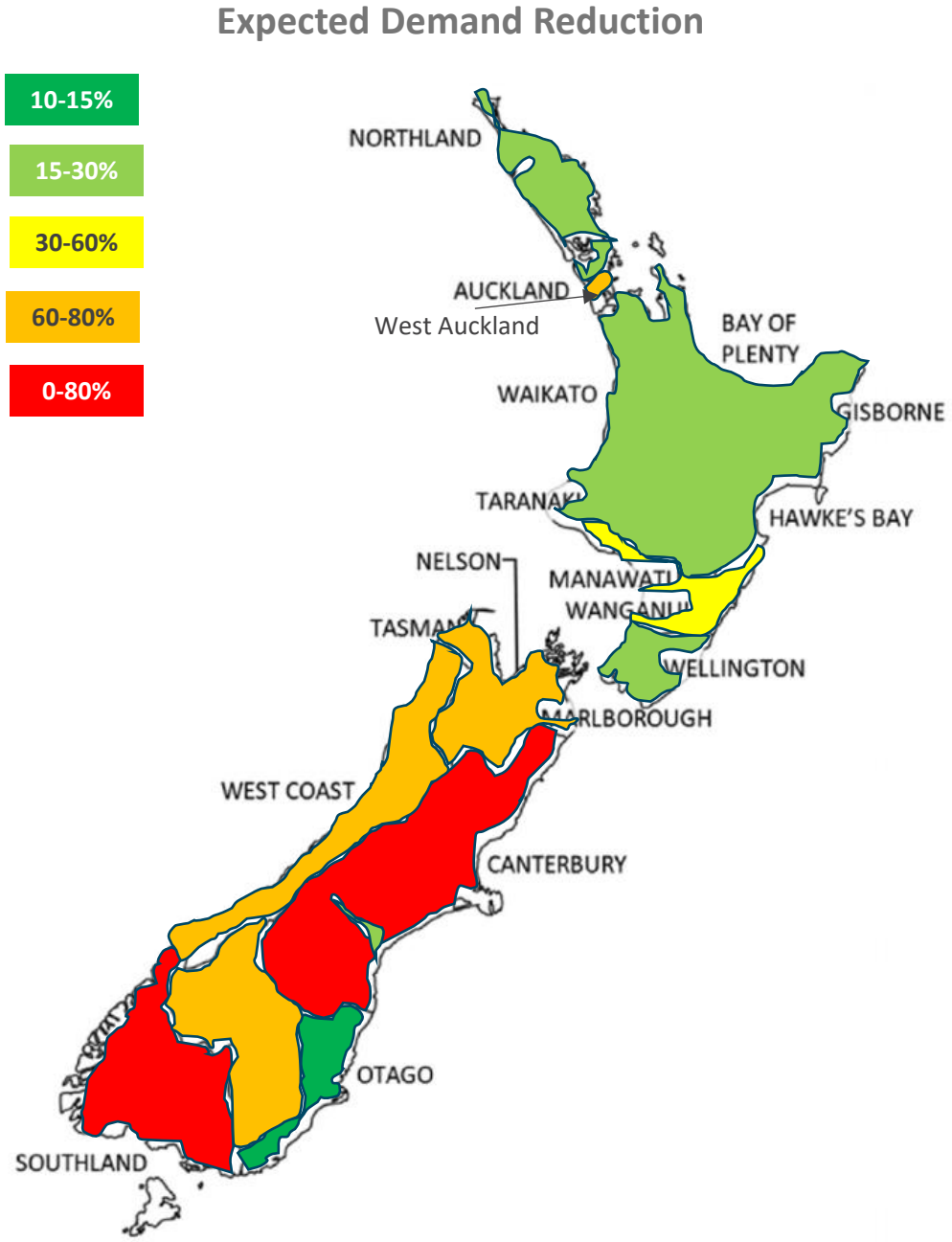
How an event would play out today

If a design level event happened today before additional hardware mitigations installed-

- MAN, OHA, OHB, OHC, TKB approximately 1600MW generation at risk of going offline
- Only OAM, STU, SDN, HWB, EDN, GOR, BAL substations with supply at N security
- TWI likely offline
- SI substations likely offline including INV, NMA, TIM, ASB, ISL, BRY, STK and West Coast
- NI substations likely offline HEN & GLN
- NI substations HEP, GLN, BPE **with up to 50% load reduction**
- NI energy shortfall likely to require 20% demand management due to limited SI generation.

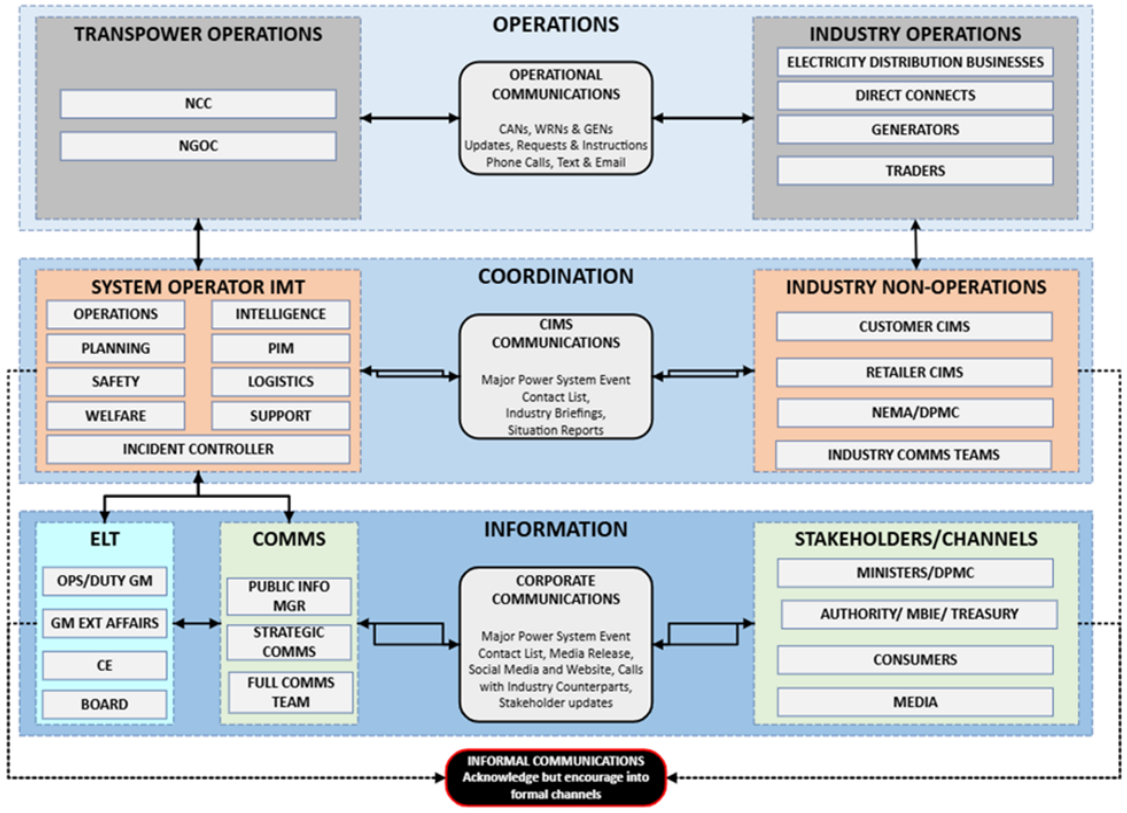
We are working on mitigations to reduce the impacts but this will take time to implement.

For now we need to practice existing demand management procedures and processes.



Upcoming work

- We will hold an online refresher webinar on space weather in **February 2026**.
- A follow-up Q&A will be held to answer questions in **March 2026**.
- We will utilise standard reporting and management procedures and documentation like other significant power system events:
  - Demand Management and supply shortfall
  - System disruption
  - NatCat e.g. significant snow, wind, fire and flooding, earthquake, tsunami, volcanic eruption
- Currently considering with the Electricity Authority whether space weather could be the focus topic of the 2026 Industry Exercise. More details will be provided closer to the time.



em6 data platform updates

Nick Warren, Product Owner

https://app.em6.co.nz/

Grid Pricing Update

Victoria Parker, Head of Grid Pricing

Will Hancock, Regulatory Advisor - Grid Pricing

Transmission Prices

- On Friday last week we notified our customers of their charges for the pricing year starting 1 April 2026 (PY2026/27)
- Please refer to your customer ECHO pages for company-specific and general pricing information
- We'll be publishing information about PY2026/27 prices on our website later this week
- Any queries email us at pricingteam@transpower.co.nz

Operational review

We are seeking members for an industry working group to support a targeted review of the TPM.

The TPM working group's purpose is to inform, test and help validate:

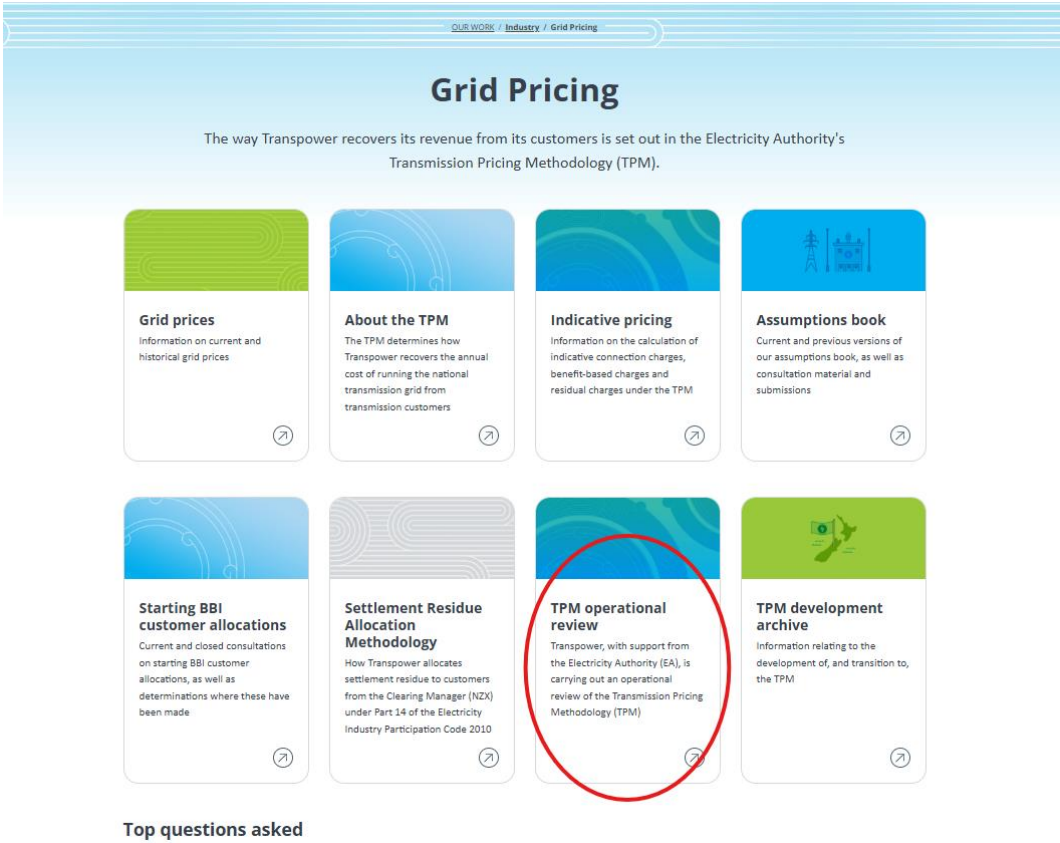
- Transpower's analysis of problems identified with the TPM and its implementation.
- potential changes Transpower may propose to the TPM (which would be submitted for consideration by the Authority).

The key objectives of the operational review are:

- Refinement of adjustment mechanisms.
- Reconsidering the delineation between the simple and standard methods for calculating Benefit-Based Charges (BBCs).
- Refinement of BBC charge calculations and their inputs to reduce the need for Transpower to exercise judgement, and to reduce complexity, volatility and uncertainty. Overall, to enhance and support stakeholders' ability to understand, replicate and reliably forecast BBCs and, by extension, transmission charges.
- Ensuring First Mover Disadvantage and Prudent Discount provisions are appropriate for evolving electrification scenarios.

Operational review

- More information on the operational review is available on our website https://www.transpower.co.nz/tpm-operational-review
- Any questions – get in touch with us
- Email: tpmreview@transpower.co.nz
- Sign up for newsletters



What's coming up

- Mid January – Re-consultation on NZGP1 BBI allocations
- Mid January – Launch of our targeted customer journey learning pages
- Early February – Kick off TPM working group
- February/March – Consultation on first tranche of issues and options under the operational review
- Late February – Consultation on updates to Assumption Book

Connections Update – end of year wrap

Rupert Holbrook, Customer Connections Project Director

Generation 2025

- Volumes remain healthy
- Wait times down
- Expecting delivery pickup

Connection Pipeline – December 2025

(Generation and energy storage)

Total pipeline = 92 projects (23,706 MW)

	Application stage	Investigation stage	Delivery stage
	2	3	0
	25 projects (8695 MW)	50 projects (12439 MW)	17 projects (2572 MW)
	6 / 1739	15 / 3206	2 / 248
	16 / 3800	17 / 3227	5 / 491
	12 / 3100	36 / 5956	11 / 1796
	1 / 16	1 / 0	0 / 0
	2 / 40	1 / 50	1 / 37

Dec 2024	Application stage	Investigation stage	Delivery stage
	35 projects (7693 MW)	37 projects (5393 MW)	14 projects (1948 MW)

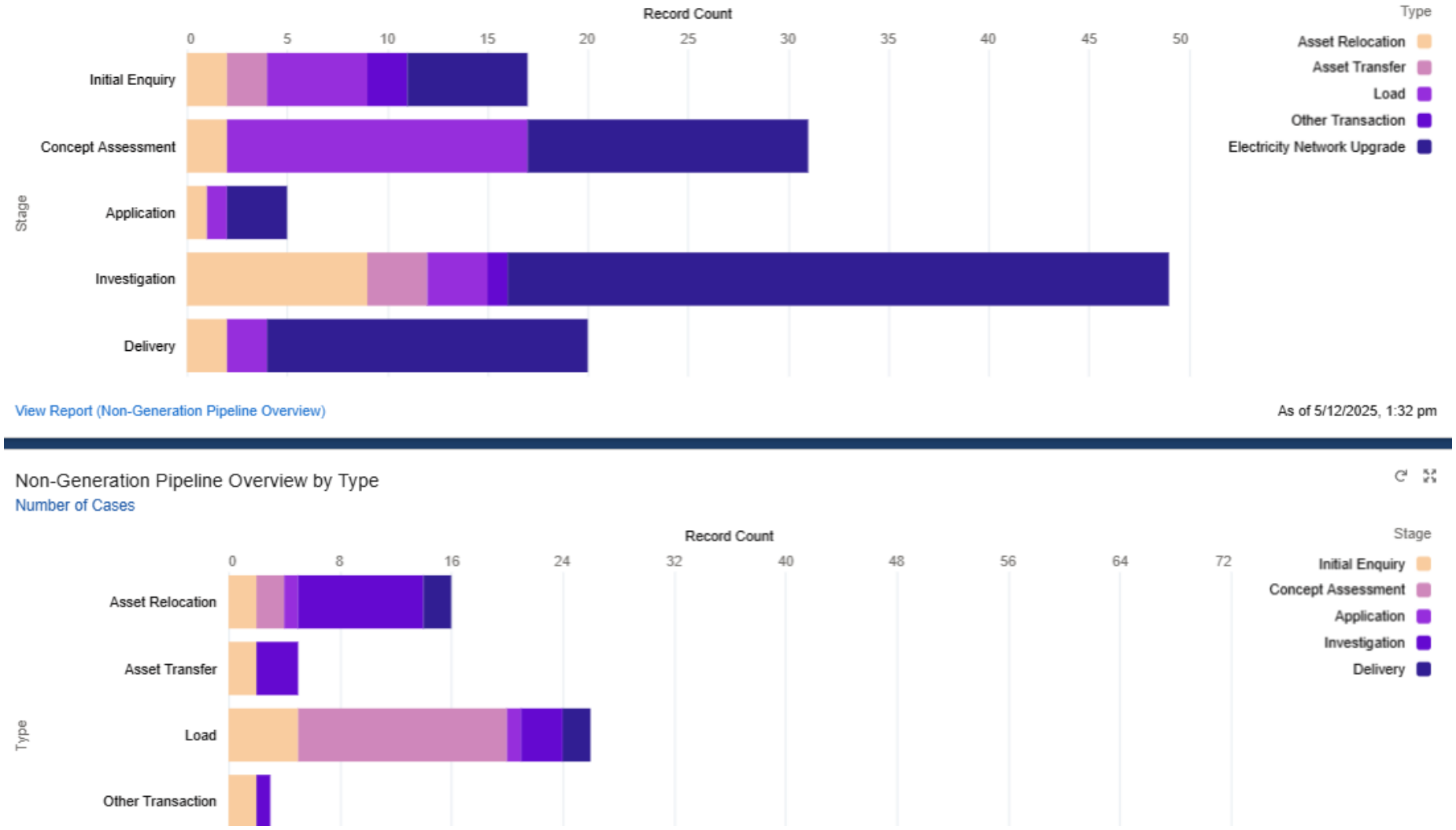
Notes

Following an update to Transpower's customer management tools during October 2025, stage counts still show the number of Transpower connections, while generation and storage technologies are now tracked individually, so technology counts represent the number of technologies connecting. Each connection may have more than one technology, e.g. Solar + BESS.

Number of projects includes those currently on hold at the customer's request (10 in investigation, three in delivery).

Load 2025

- Wait times down
- Increasing process heat electrification
- Significant ongoing data centre interest



Concept Solution Proposals

- First trials complete
- Now embedding as BAU for most new investigations
- Commits customer and TP
- Covers design, schedule and resourcing
- Interaction with ‘Area grid planning’
- Potential for some projects to then go straight to TWA

Harmonic reports

- First set of annual reports now available through our Echo document sharing hub

Questions

Thank you

Next webinar: 2026

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Closing **Karakia**

Unuhia, unuhia,
Unuhia ki te uru tapu nui
Kia wātea, kia māmā, te ngākau,
Te tinana, te wairua, i te ara tangata
Koia rā e Rongo, whakairia ake ki runga
Kia tina! Tina! Hui e! Tāiki e!

Translation

Draw on, draw on
draw on the supreme sacredness
to clear, to free the heart,
the body and spirit of humankind
That is Rongo suspended high above us
Draw together! Affirm!