TRANSPOWER

On the grid

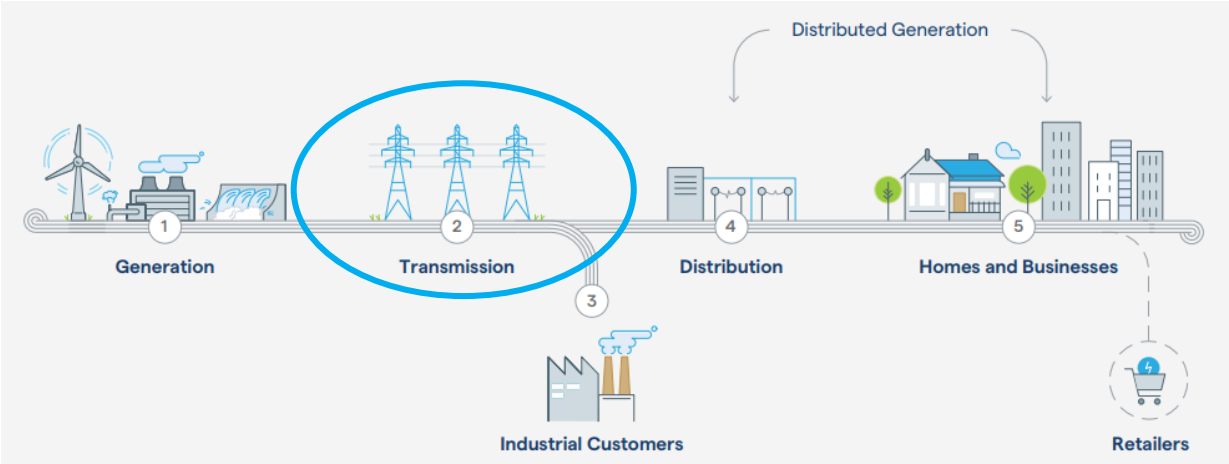
How the electricity grid is enabling decarbonisation

Matt Webb – EGM Grid Development

CEP2025 Conference - Auckland

Who is Transpower?

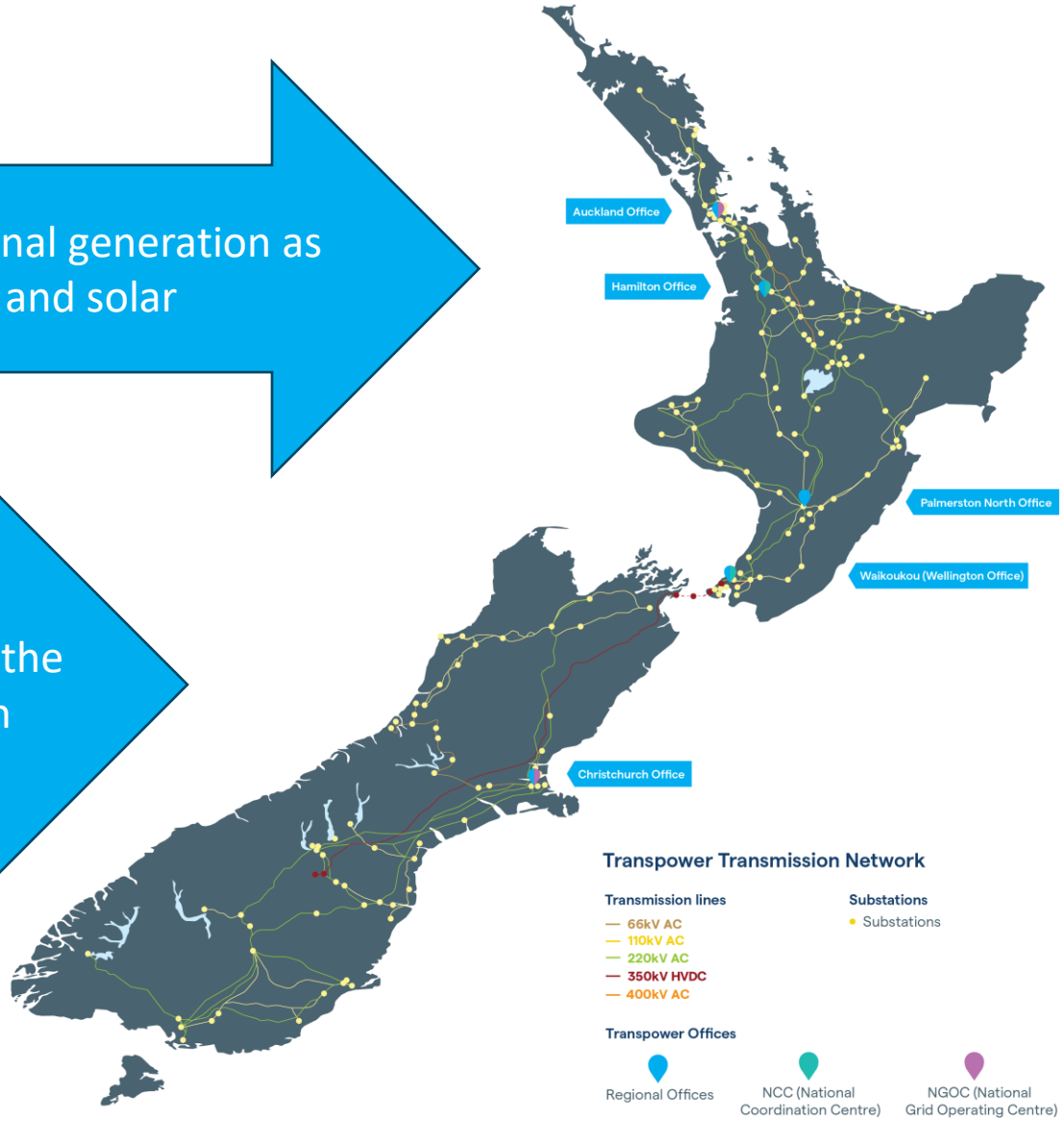
- Owner and operator of New Zealand's national electricity transmission system
- We provide the infrastructure and market system that connects electricity generators to major electricity users and the distribution network
- Over $5 billion in assets positioned across around 30,000 properties
- 174 substations, 25,000 transmission towers and more than 11,000 kilometres of lines
- Operates the electricity market system in real time
- Offices in Wellington, Auckland, Hamilton, Palmerston North and Christchurch
- Around 1,000 staff



The role of the grid

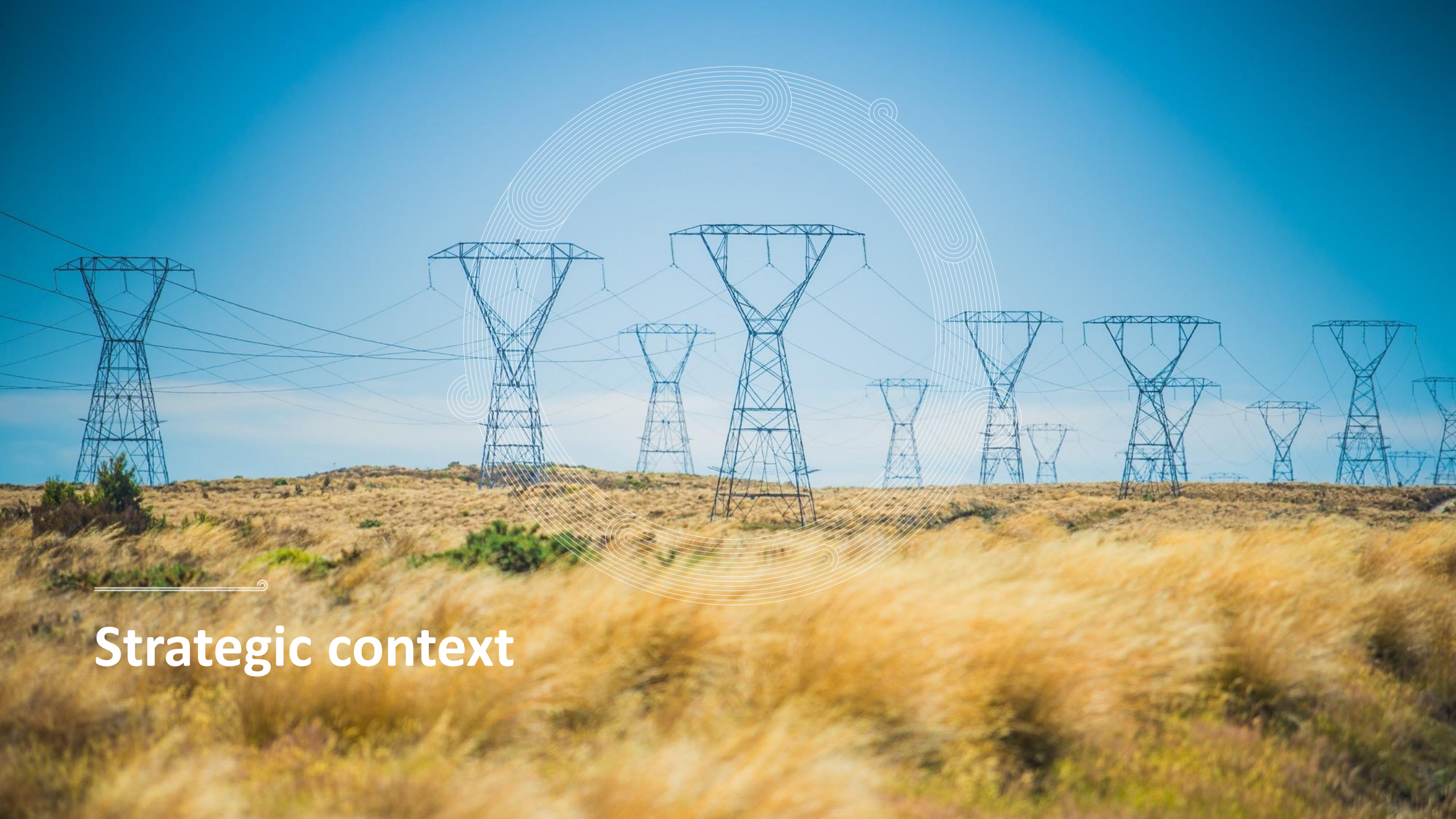
North Island has the majority of the load and the traditional generation as well as potential for additional geothermal, wind and solar

South Island has significantly less load, but the majority of the hydro generation and high potential for wind generation



Enabling Aotearoa's energy future

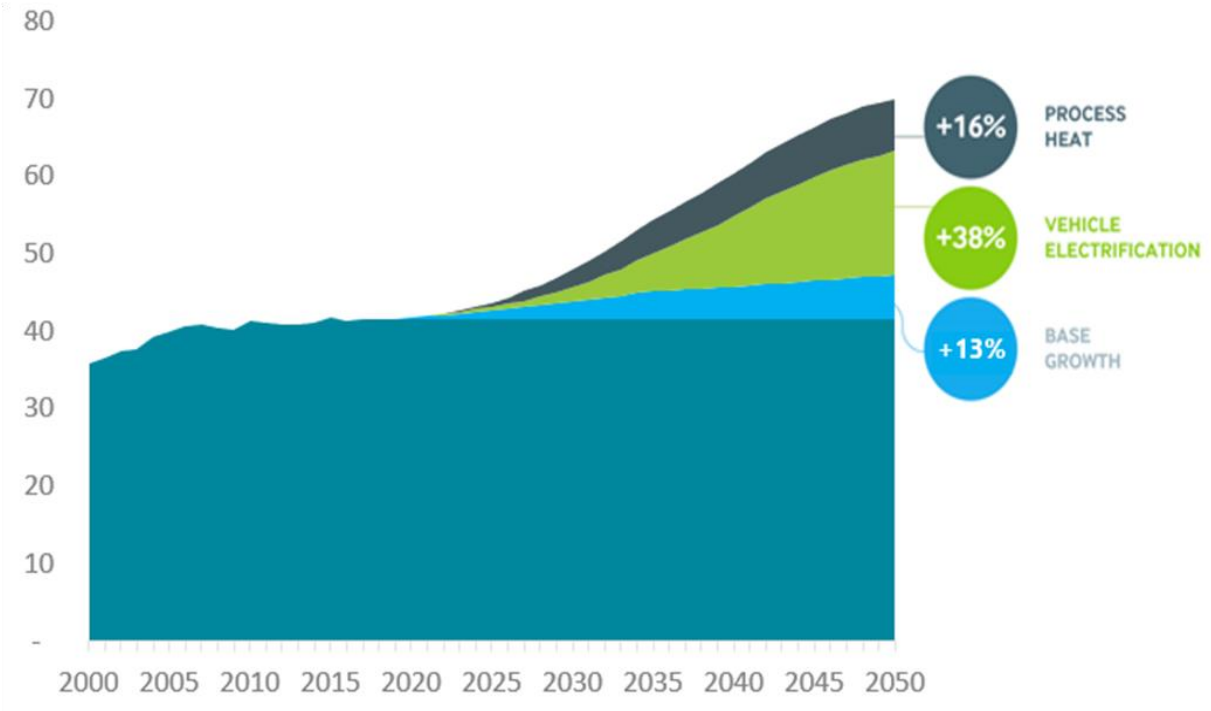
Drivers	New energy future		Transpower's enabling role
 **Economic Growth** Maximising our strategic advantage so New Zealand thrives	Increasing demand for electricity	Electrification of transport	Developing, maintaining, and delivering the transmission grid
		Electrification of heat	Operating the electricity system in real time
Sustainable prosperity		New Industries	Connecting new generation and load
 **Decarbonisation** Policy, technology, and consumer behaviours	Increasing supply of electricity	New power plants	Taking a whole-of-system view in planning our infrastructure
		More distributed	
		Secure and affordable	Advocating for appropriate regulatory & market settings



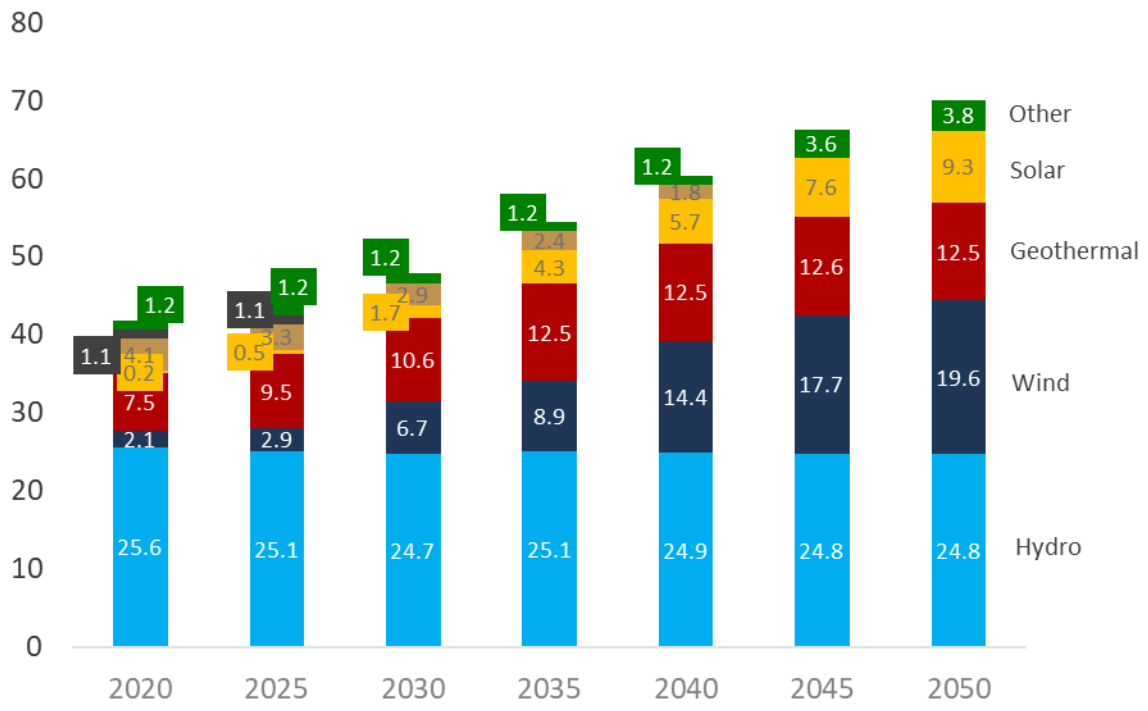
Strategic context

Electricity demand is expected to grow 68% by 2050, supported by renewable energy supply expansion

Electricity demand
(TWh, Accelerated Electrification)



Electricity supply by generation type
(TWh, Accelerated Electrification)

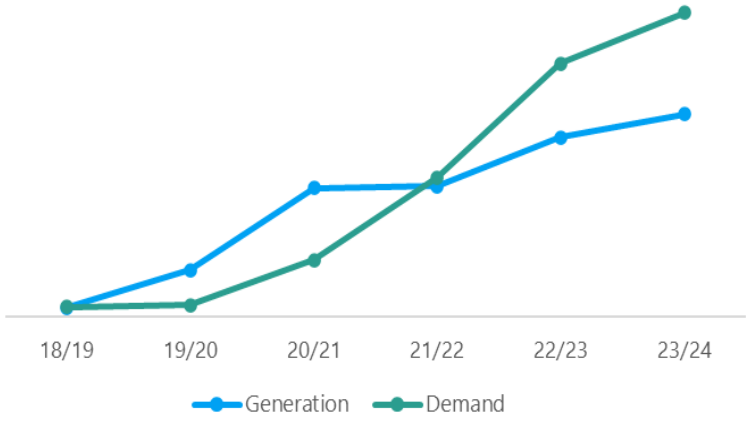


Source: Transpower – 'Accelerated Electrification' scenario.

Continuing trends which influence electricity supply and demand

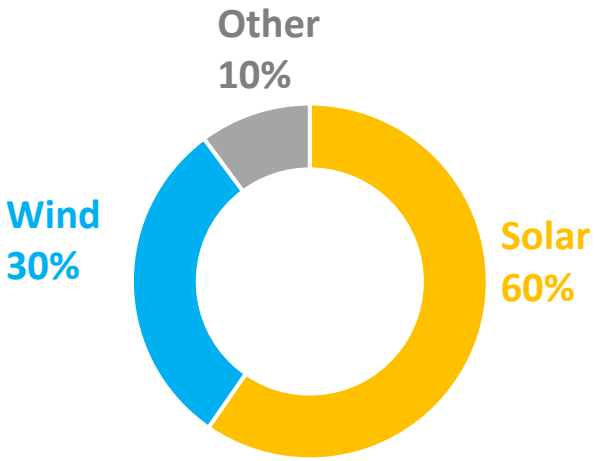
Customer investment in transmission connections

Dollars by financial year



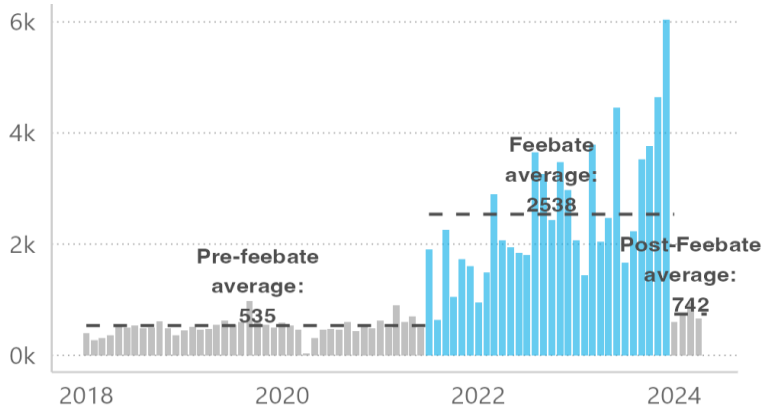
Generation connection by type

At application, investigation or delivery phase



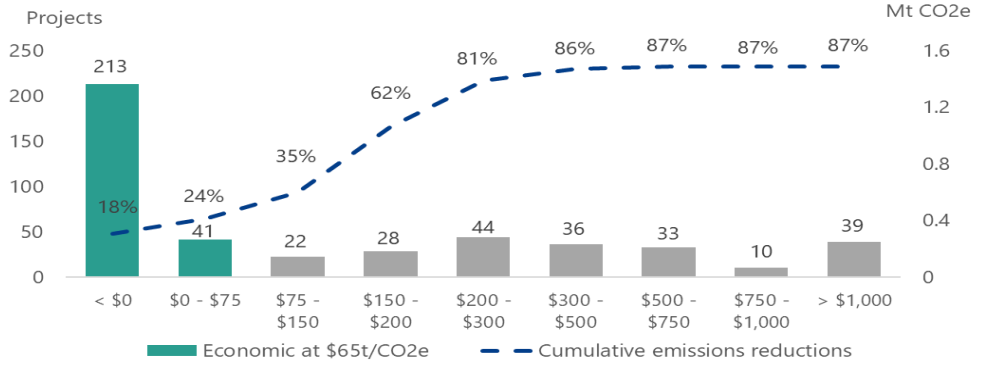
Monthly Electric Vehicle Registrations

Number of vehicles includes EVs and PHEVs

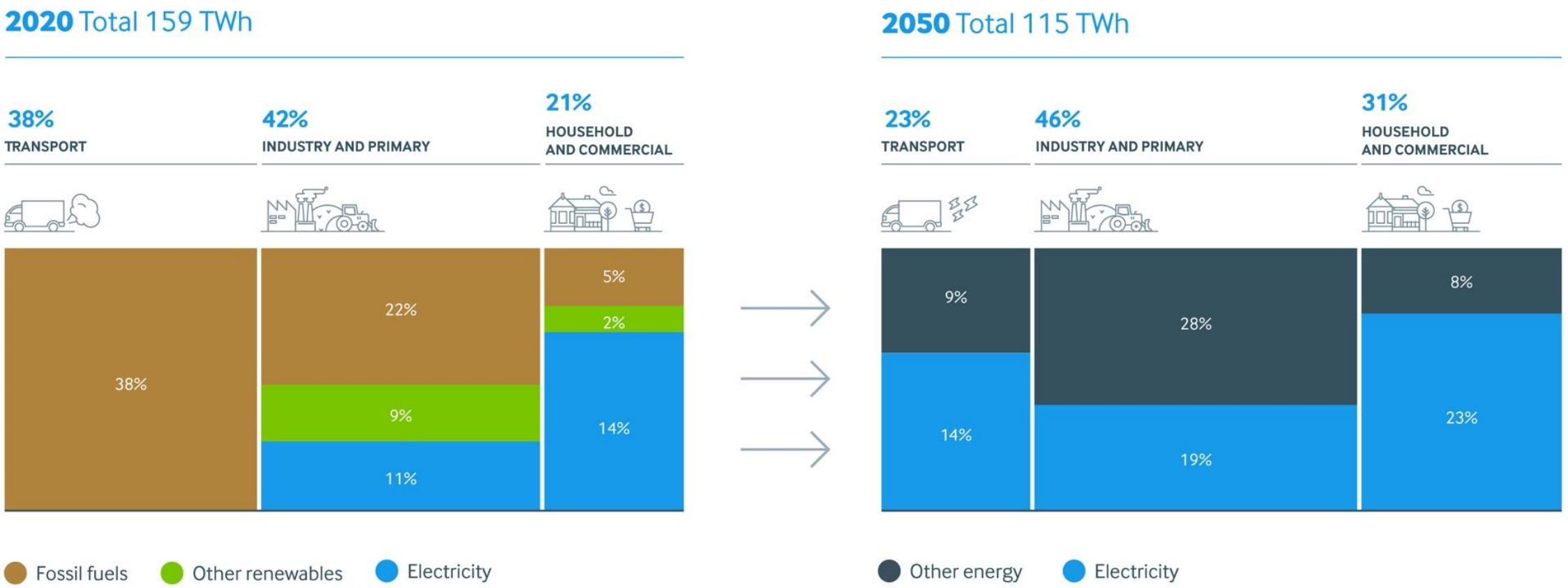


South Island process heating projects by optimal MAC

Number of projects and cumulative emissions reductions



Electricity grows from 25% of delivered energy today to 60% in 2050



Projections show electricity demand increasing 68% to 70 TWh by 2050
(and this doesn't even include potential aviation increases)

Strong new connection activity has continued

Connection Pipeline – May 2025

(Generation and energy storage)

Total pipeline = 90 projects (16,114 MW)

	Application stage	Investigation stage	Delivery stage
	0	3	1
	31 projects (7,579 MW)	43 projects (6,425 MW)	16 projects (2,110 MW)
	10 2,060 MW	9 1,613 MW	1 93 MW
	2 580 MW	2 168 MW	2 200 MW
	17 4,833 MW	31 4,454 MW	10 1,746 MW
	0 116 MW	0 0 MW	2 16 MW
	2 106 MW	1 190 MW	1 55 MW
May 2024	38 projects (8,354 MW)	32 projects (4,881 MW)	14 projects (1,764 MW)

Notes

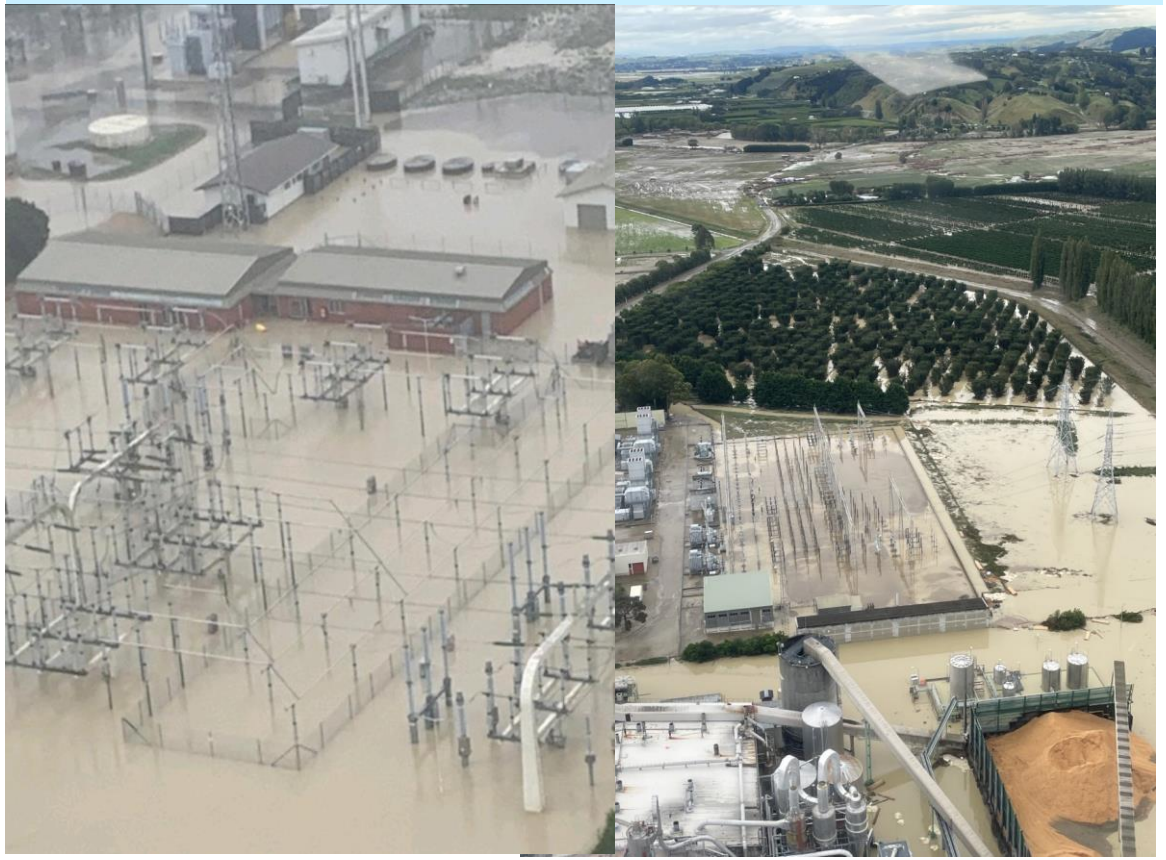
Number of projects includes those currently on hold at the customer's request (four in investigation, three in delivery).
Where projects include more than one type of resource, they are categorised under their primary output. Thirty projects in the pipeline also include battery energy storage systems.

[What's the latest with grid connections? | Transpower]

Resilience will become even more of a critical challenge as we move into the future

Flood damage in Auckland

Cyclone Gabrielle damage in the Hawke's Bay



Expenditure specifically for resilience initiatives during RCP4 and a resilience programme runs out to 2040

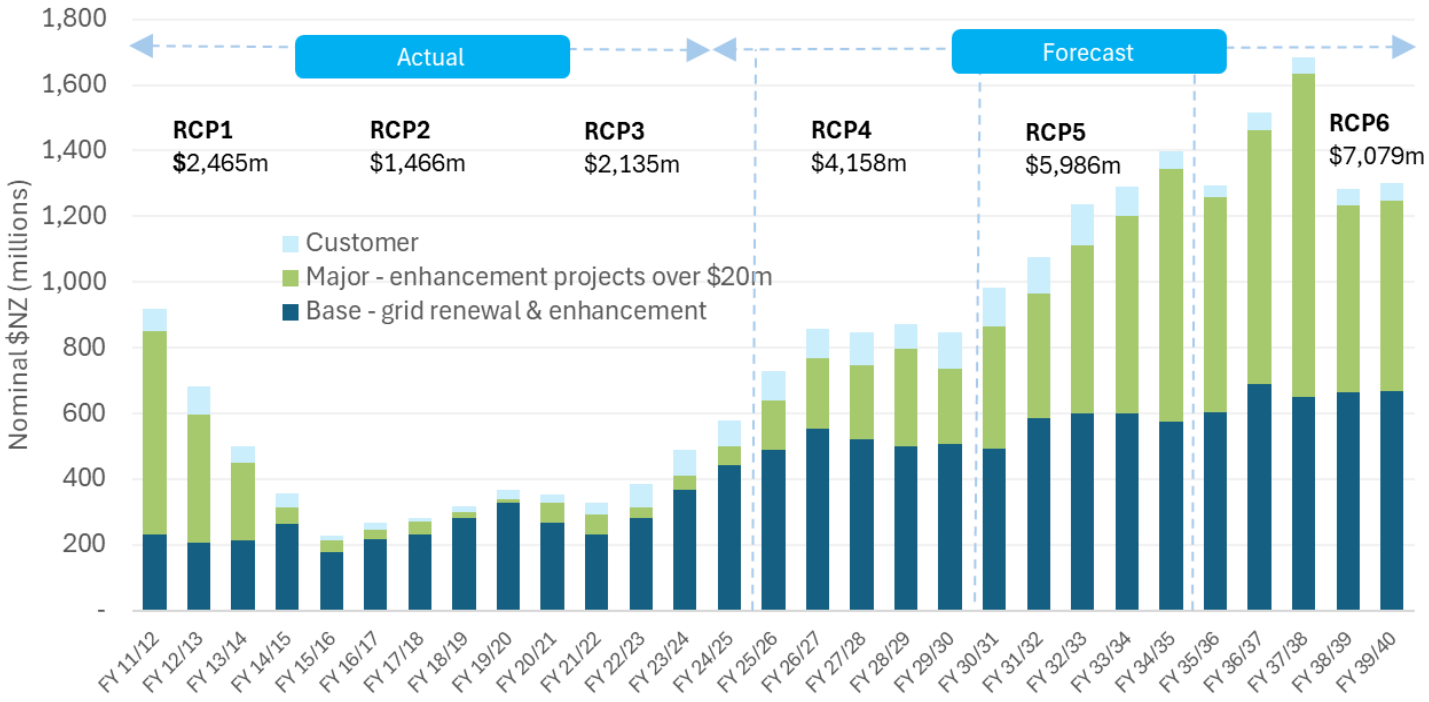
Transpower's investments are increasing to meet electrification demands and ensure a reliable and resilient supply

- In RCP4 (2025-2030), Transpower plans to deliver approximately 54% more work than it has in RCP3 (2020-2025). This will increase again through RCP5 and RCP6

- Our forecast expenditure for RCP4 (nominal) is:
  - Base Capex $2,574 million
  - Major Capex Projects $1,112 million
  - Customer $472 million

- Major Capex Project expenditure is forecast to increase x4 fold from RCP3

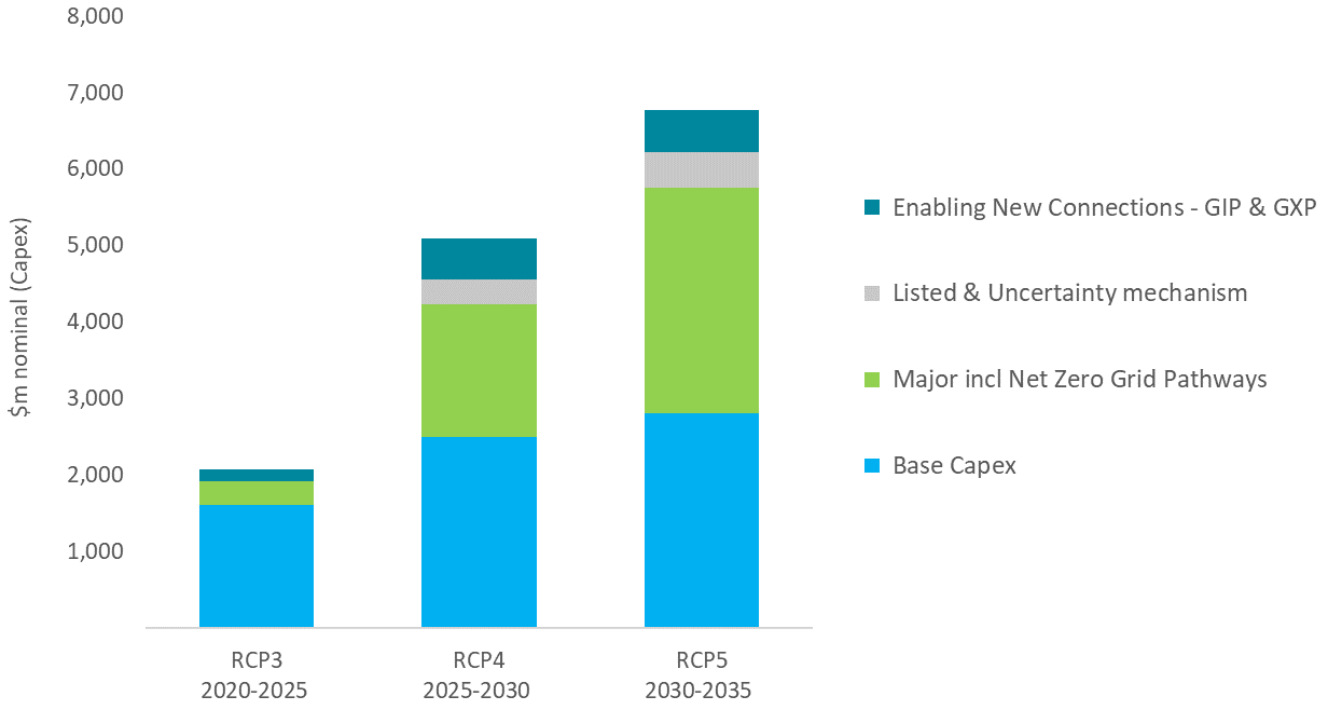
Transpower capital expenditure* forecast is ramping up



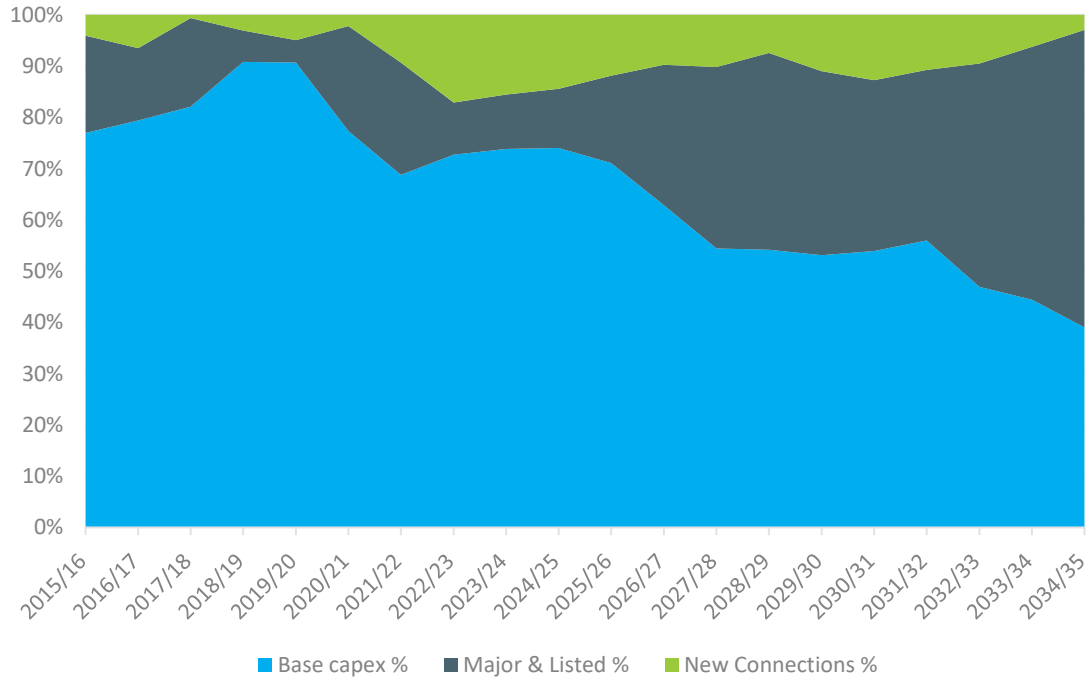
*These numbers represent the latest update, and subject to change. Base is RCP4 Proposal. Customer and Major is sourced from the Business Plan 2024/25.

The number of connection enquiries has increased over the last few years, and our transmission investment profile is expected to increase materially

Investment in transmission is required to meet this growth, while maintaining a secure and reliable electricity grid



The makeup of the work program is evolving with a greater proportion of expenditure driven by major capital programs and new connections

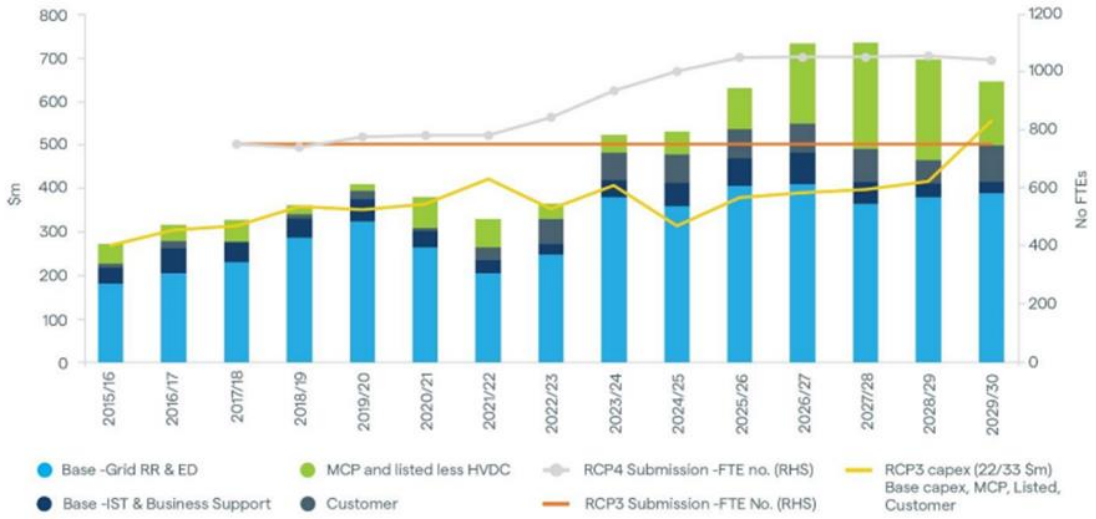


What’s changed?

Transpower will need to scale its workforce to deliver on its work programme

- We will need to draw from all sectors of our community to meet the challenge – morally and practically there has never been a stronger case to prioritise inclusion and diversity
- The material ramp up in investment means we forecast the need for an additional ~200 new staff and 600 additional staff across our Service Providers
- Our immediate challenge is developing our workforce materially to deliver the investments required for RCP4 and beyond

Indicative growth of FTE forecast to 2030

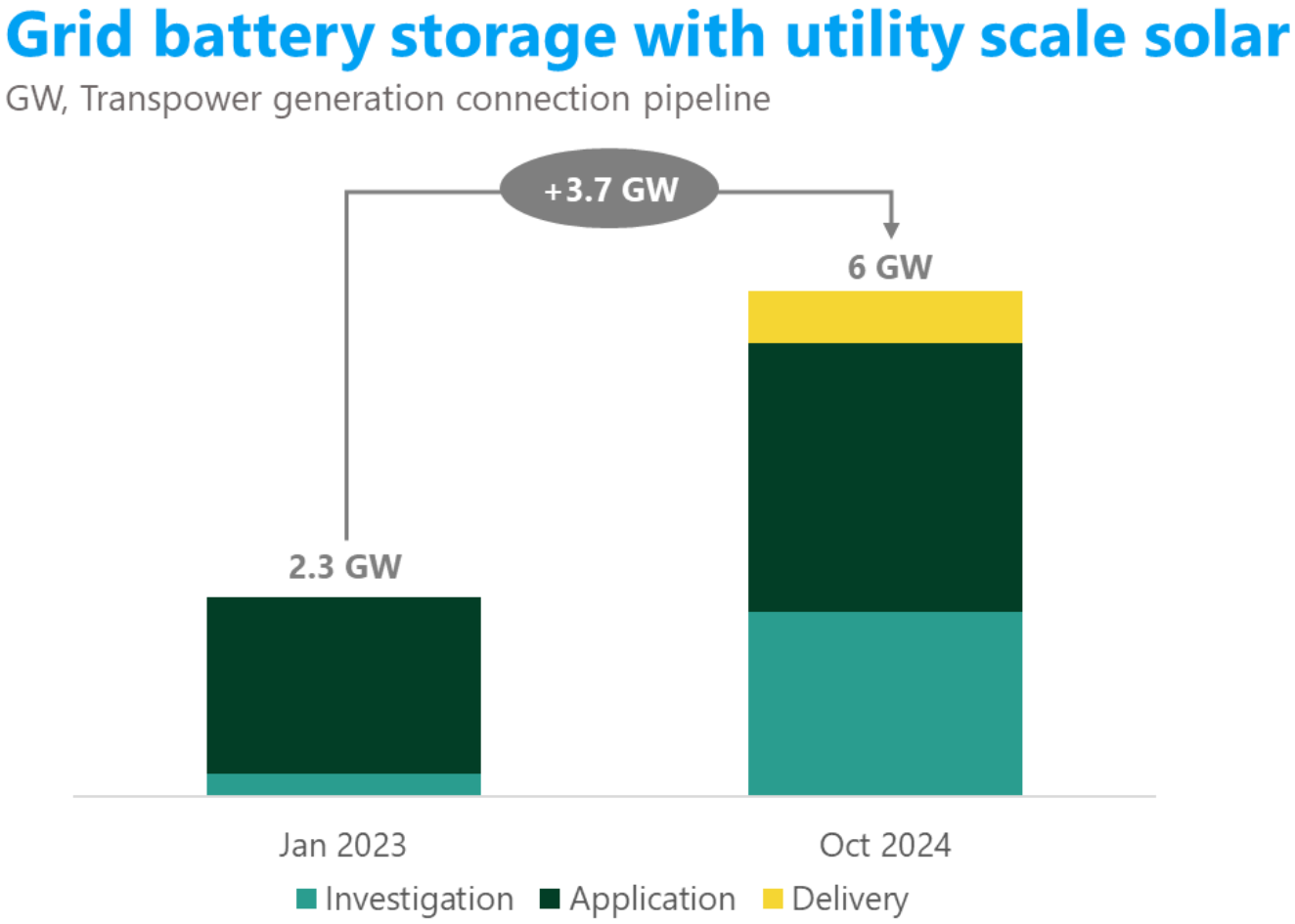


Resource growth for service providers to 2030

Category	Total growth (percent)	Total growth (number of people)	Months to 'ready to work'
Line mechanics	70 to 85 percent	~145 to 185	18
Power technicians	40 to 45 percent	~30 to 35	42
Substation maintainers	40 to 45 percent	~75 to 85	18
Tower painters	45 percent	~80	18
Maintenance switchers	To grow in line with other trades		18

The batteries are coming….

- 300 MW of BESS now underway through projects by Meridian, Contact, and Mercury
- Significant uptick in BESS being included in consents along with grid-scale solar
- BESS will add important firm capacity to help manage winter peaks
- But it remains to be seen how much BESS is economic in the NZ electricity market right now. Although a lot of BESS is consented, only the big Gentailers are building it



New industrial energy users' announcements signal intent for new electrification growth

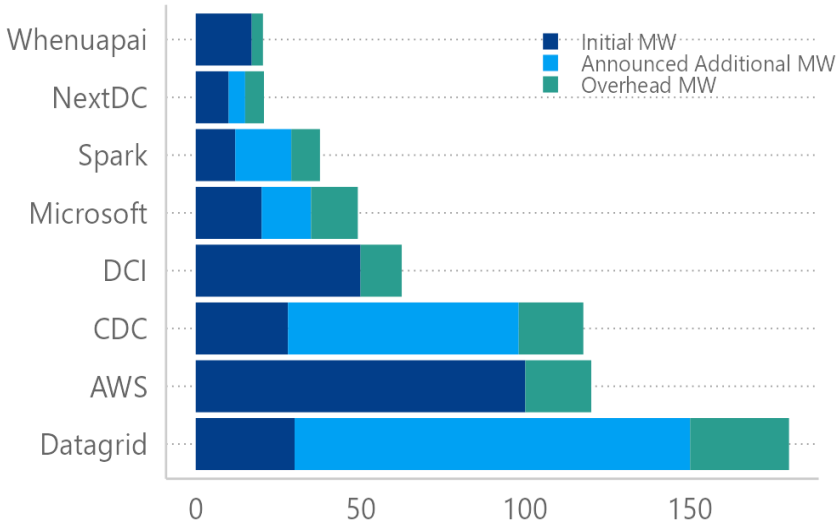
Datacentres

Microsoft

Amazon

Possible new hyperscale data centre load

Total MW, including overheads using estimated PUE



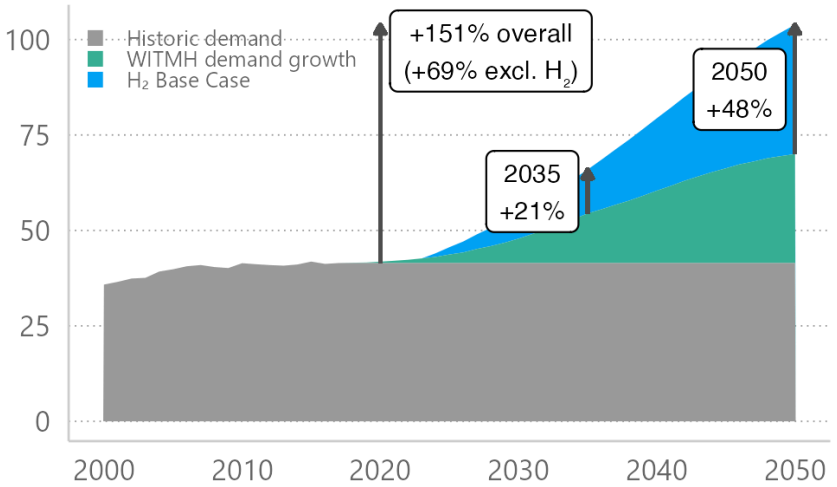
Source: Various media sources.. Last updated September 2023.

Hydrogen

SAF (Sustainable Aviation Fuels), including hydrogen

Comparison of WITMH projections with MBIE Hydrogen demand projections

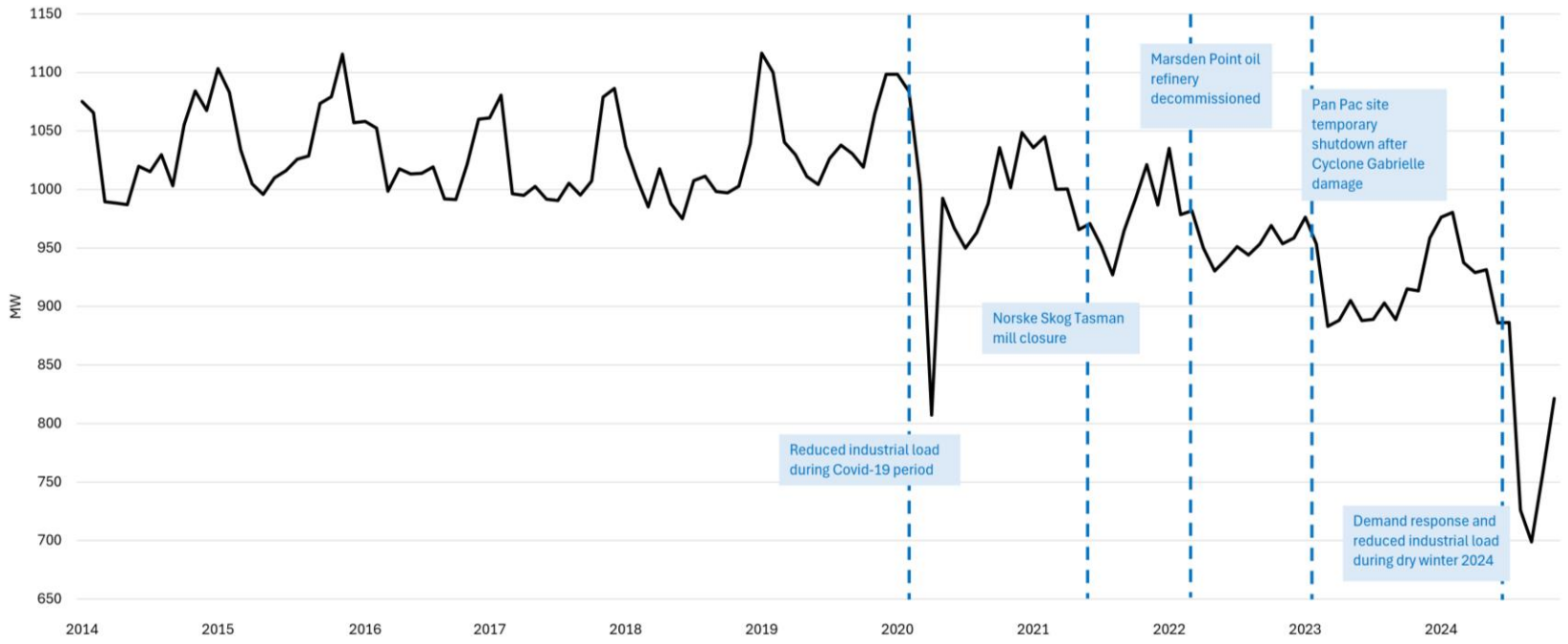
TWh, MBIE H_2 Base Case vs WITMH Accelerated Electrification

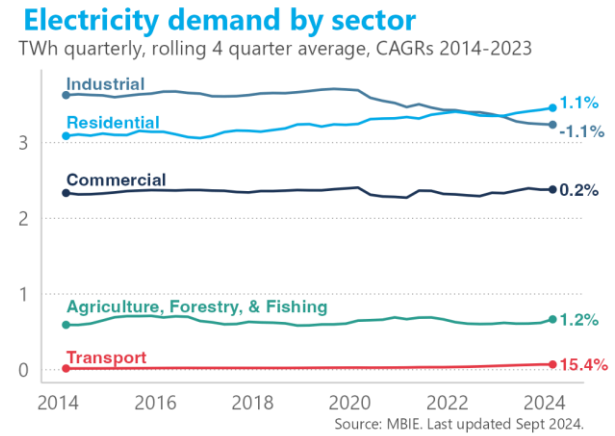


Source: Media releases and news articles.

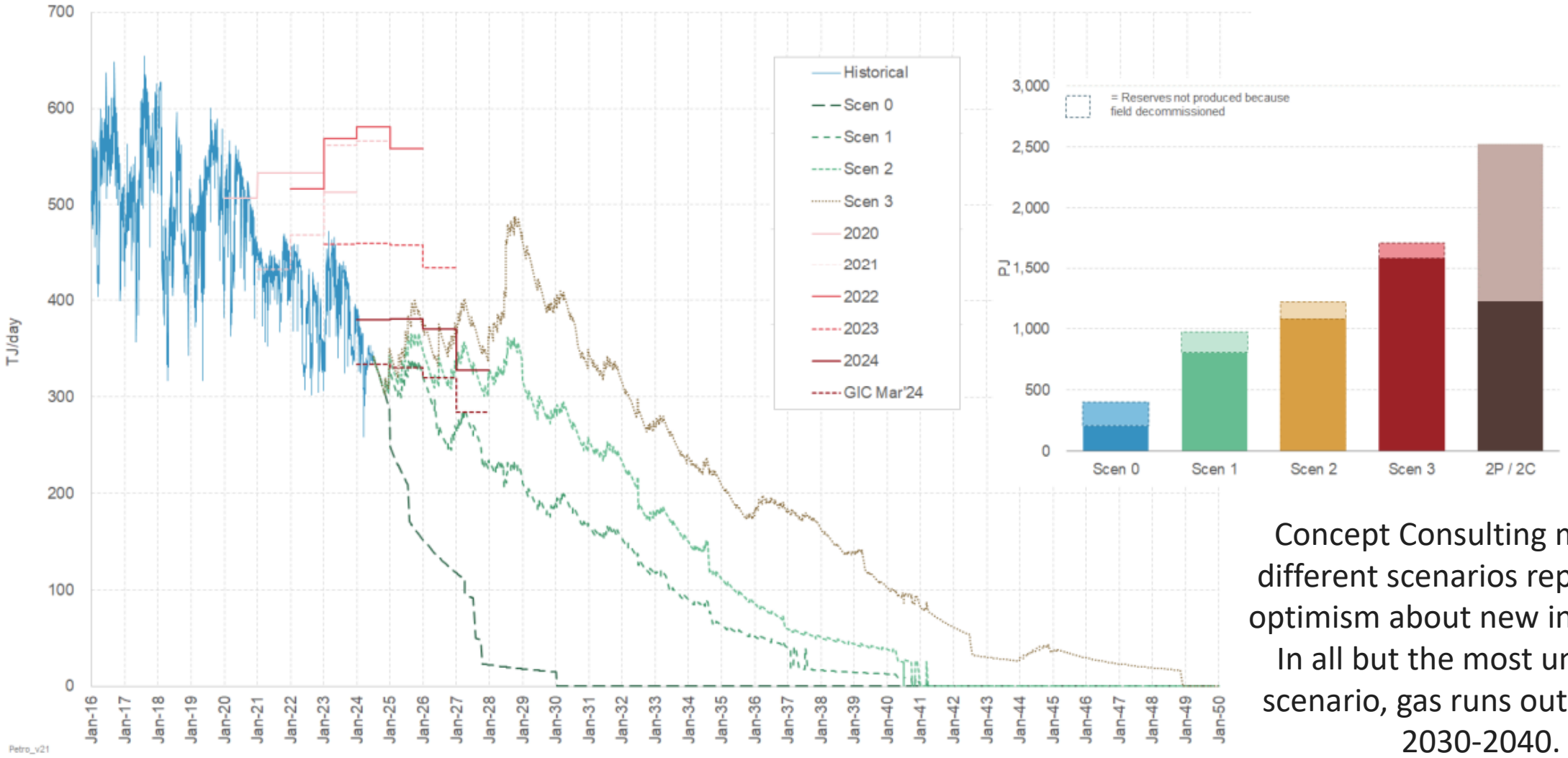
Industrial demand has been decreasing

Monthly average industrial load (MW):



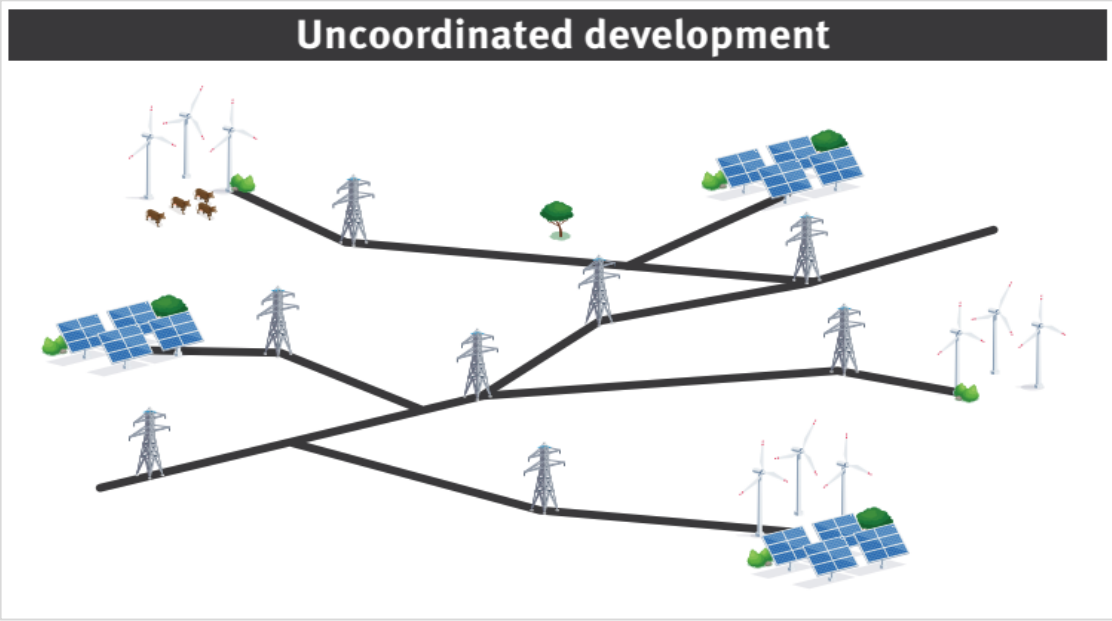


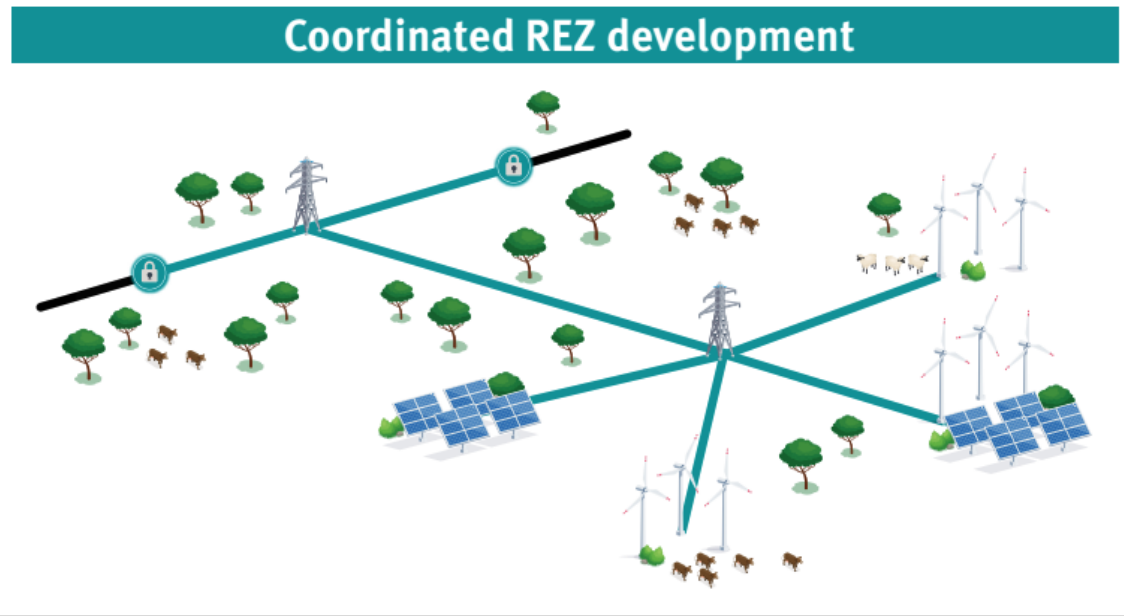
Our gas supplies are being constantly revised lower



Concept Consulting modelled different scenarios representing optimism about new investment. In all but the most unrealistic scenario, gas runs out between 2030-2040.

Three years ago, there was little interest in REZs in NZ



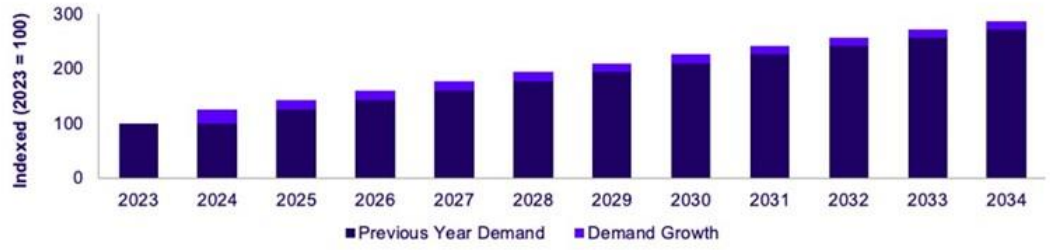


Source: Queensland REZ Roadmap

Major manufacturers warn of sustained long lead times for transformers

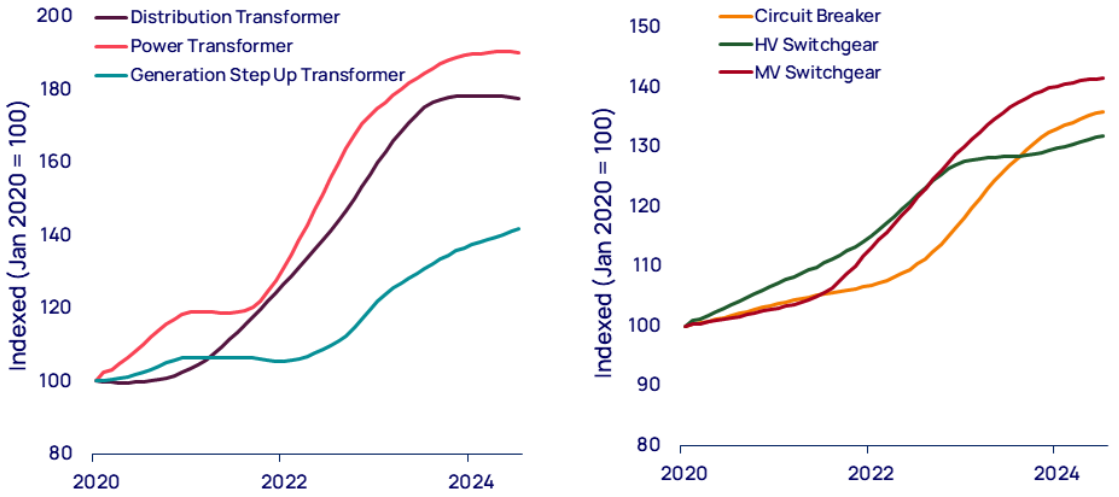
- Hitachi Energy, the world's largest producer of transformers has warned the industry is "overwhelmed" and unable to meet exploding demand for grid equipment, threatening delays to infrastructure projects and the global energy transition
- According to Rystad Energy, power transformers are currently the most severely undersupplied critical power grid equipment. Wood Mackenzie estimates that global demand for transformers will almost triple by 2034
- The direct result of the growing disparity between supply and demand is that the price of key equipment including transformers, circuit breakers and switchgear is soaring

Transformer demand will continue to surge over the next ten years



Source: Wood Mackenzie

Transformer (left) and T&D equipment (right) price trends



Source: Wood Mackenzie

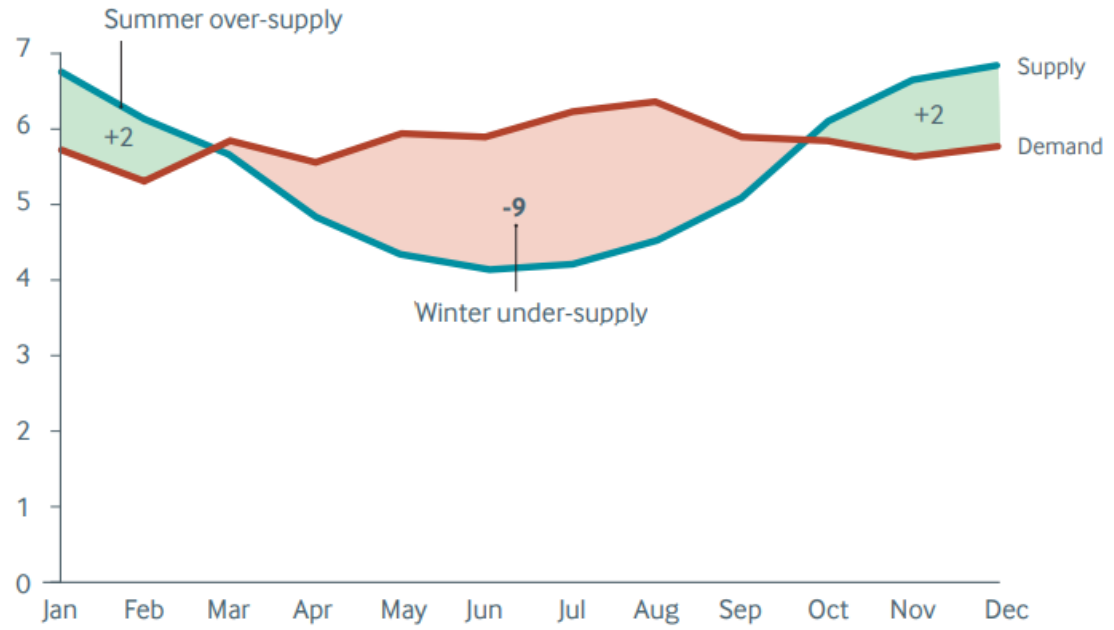
Financial Times

What’s still the same?

Energy and peak risk during dryer than average winters is still there

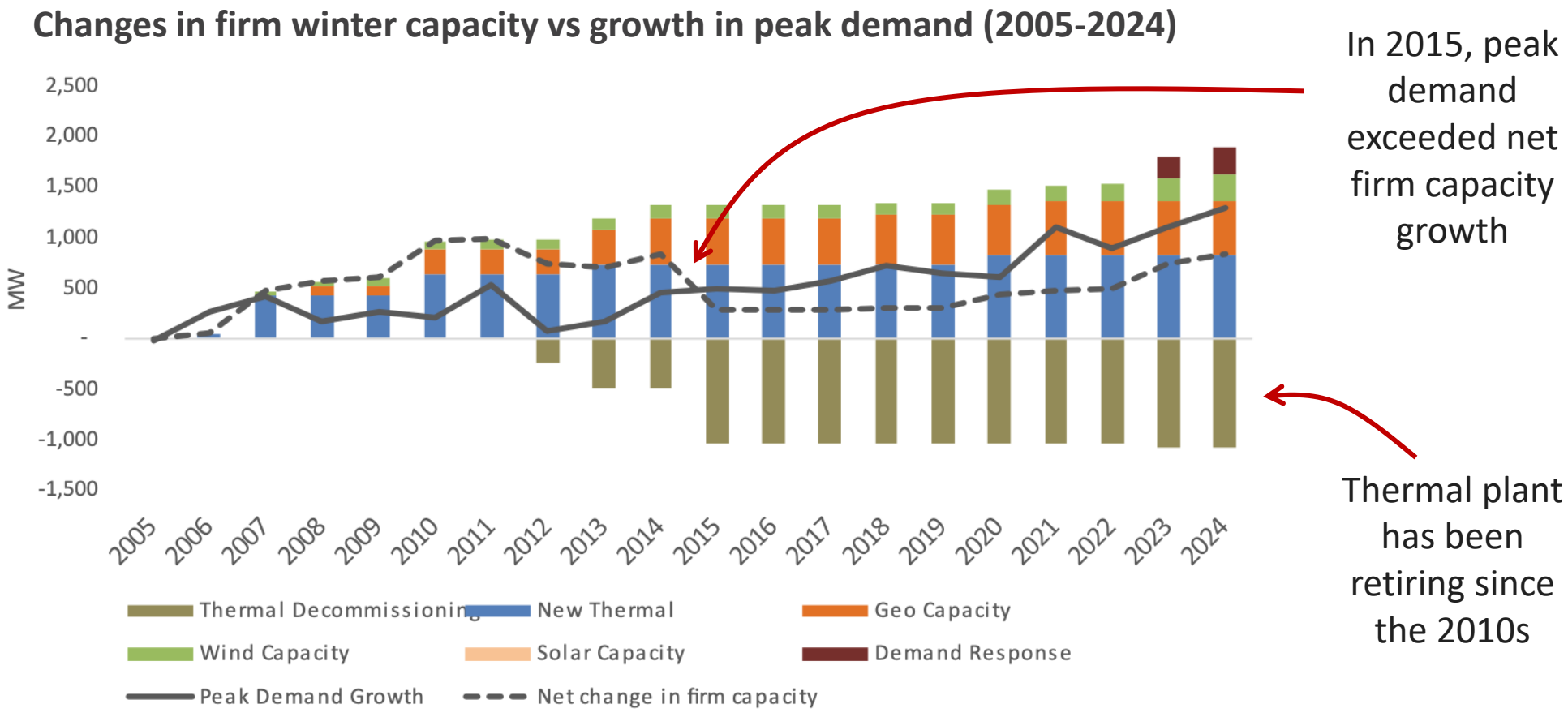
Figure 25: **Monthly supply and demand estimates for dry year**

(TWh, 2050)



If not Onslow, then what for dry year cover ?

Despite new generation coming online, we still lack sufficient investment in firm peaking capacity



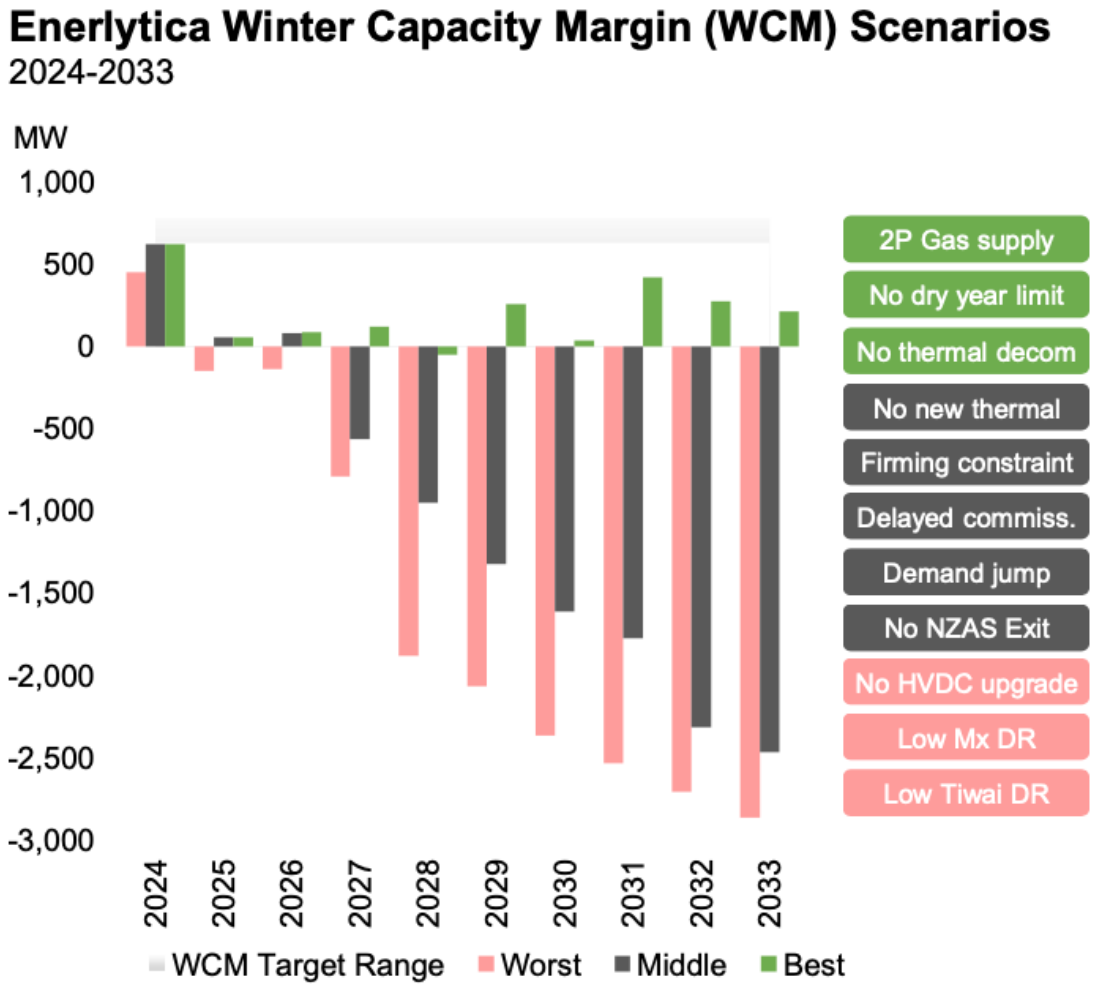
In 2015, peak demand exceeded net firm capacity growth

Thermal plant has been retiring since the 2010s

Source: Sapere (2024) Confluence of factors threatening electricity reliability

The situation is expected to remain tight for years to come

- Our Security of Supply Assessment (SOSA) paints a picture of difficult years ahead.
- TCC continuity coupled with fuel access (meaning Methanex demand response) are critical to our most optimistic scenarios.
- NZAS demand response is also important but the response magnitude it can offer in 2025 under existing commercial terms is significantly reduced after exercising its two largest demand response tranches in 2024.



Source: Transpower data, Enerlytica

Social licence remains as important (and difficult) as ever

Social licence challenges for new transmission

Public acceptability and understanding

Securing access rights and corridors across multiple landowners

Environmental controls and concerns

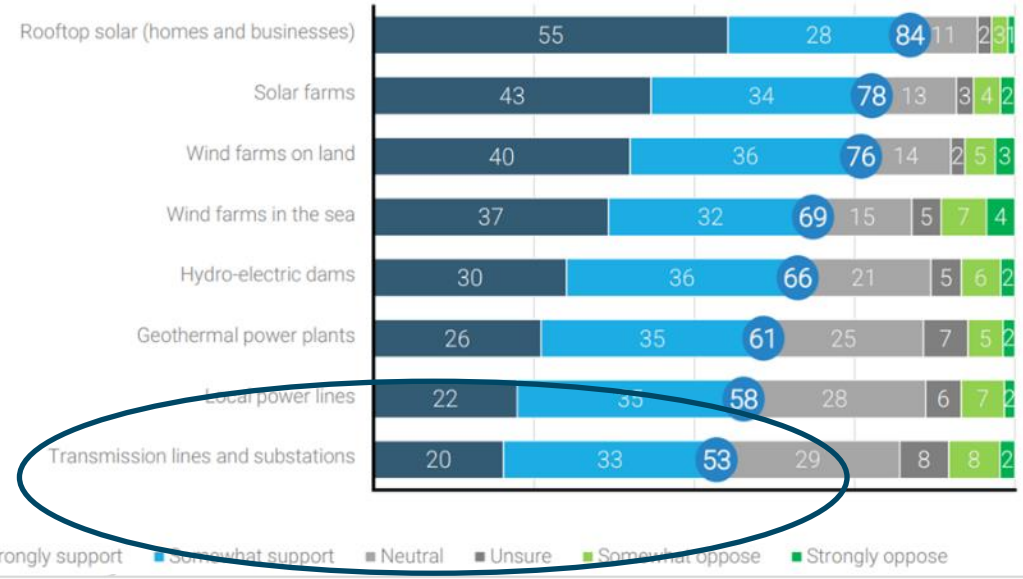
Consequences

Delayed and more costly transmission build

Initiatives

Ongoing local community benefits from projects

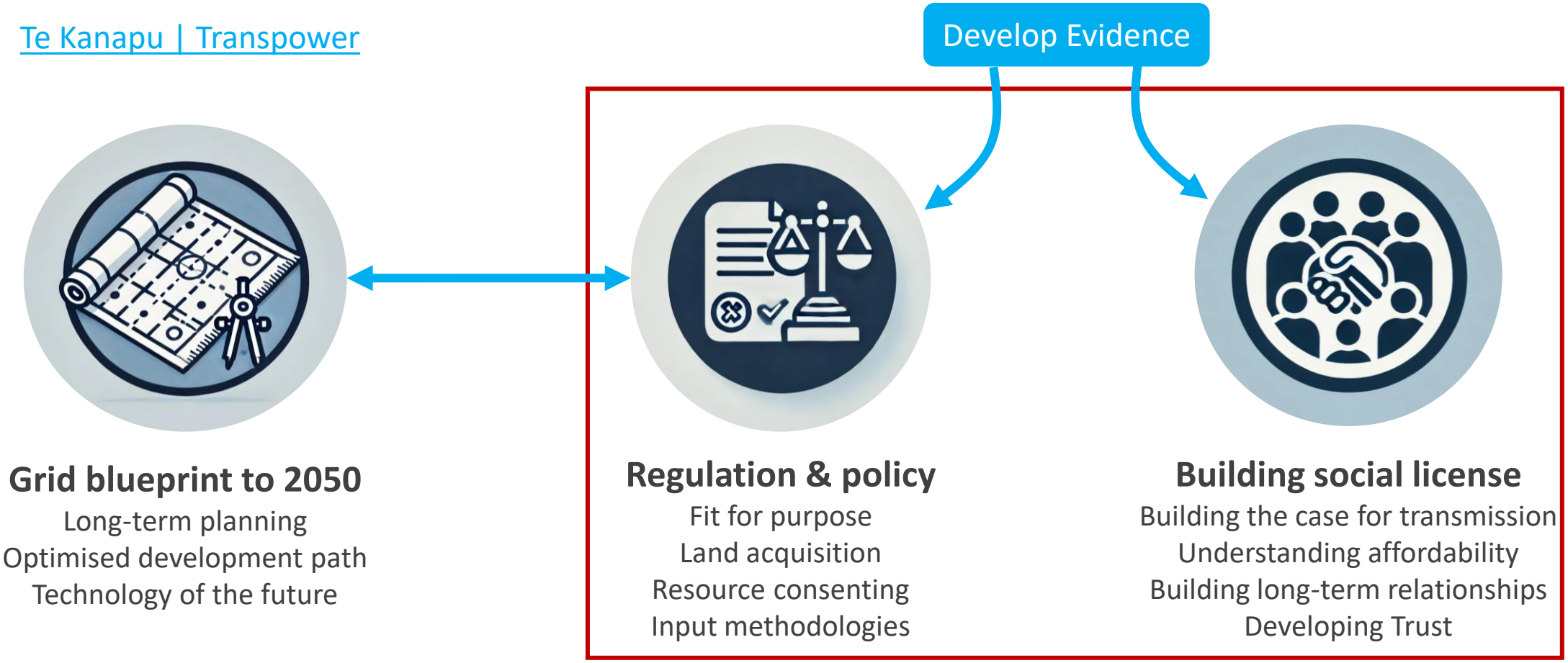
Different more and enduring compensation models



Looking to the future

We have launched Te Kanapu to develop a blueprint so the transmission network supports Aotearoa to thrive and grow as it electrifies

Te Kanapu | Transpower



Te Kanapu is not just about a blueprint. Through detailed modelling and targeted think-pieces, it will also **develop the evidence base** to advocate for a new approach with key stakeholders, e.g. regulators.

https://www.transpower.co.nz/our-work/te-kanapu

Thank you

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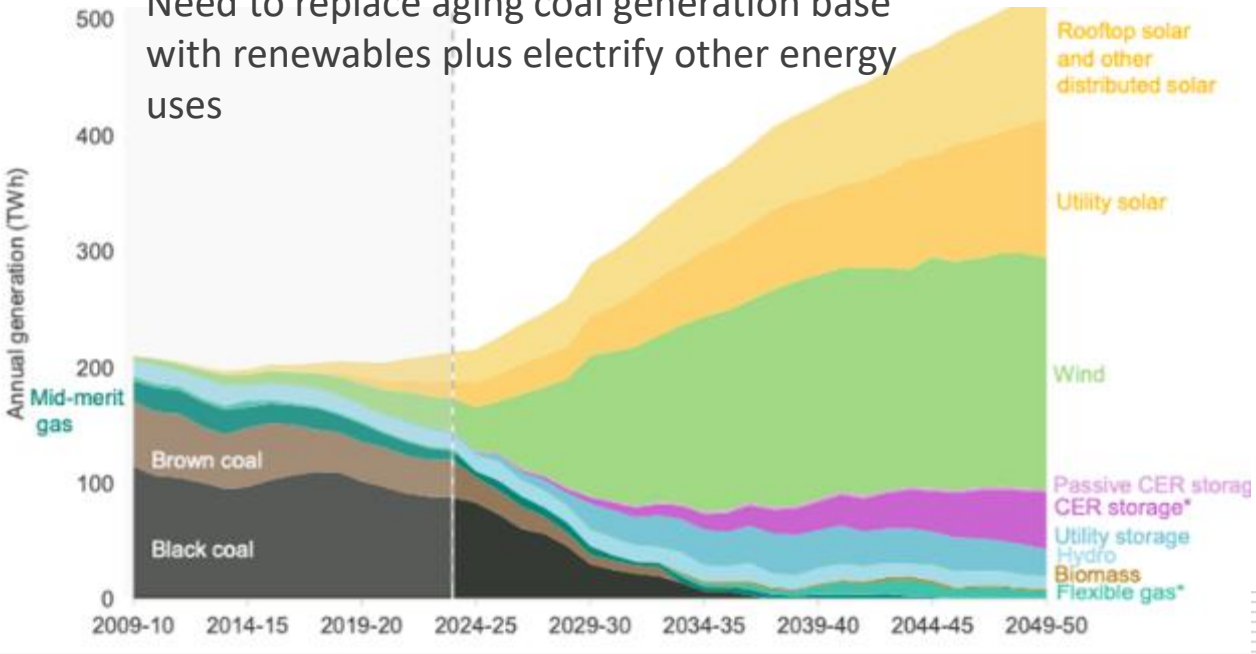
Australia

Peak ~56 GW, **Demand** ~200 TWh/year
Generation Mix: Coal: 55-60%, Gas: ~5-10% Wind, Solar, Hydro: ~35%,
Market Structure: NEM Real time bid/offer market with regional pricing. Primarily Energy only.
No interconnections.

Need to replace aging coal generation base with renewables plus electrify other energy uses



New Zealand

Peak ~9.5 GW, **Demand:** ~40 TWh/year
Generation Mix: Hydro: 60%, Geo 17%, Wind: 8%, Gas &Coal ~15%
Market Structure: Single wholesale LMP nodal real time market. Energy only.
No interconnections.

Need to accommodate more renewables to meet 70% uplift in demand by 2050 from electrification of other energy uses