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New Zealand Electricity Market  
University of Auckland  
2024

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# What we will cover

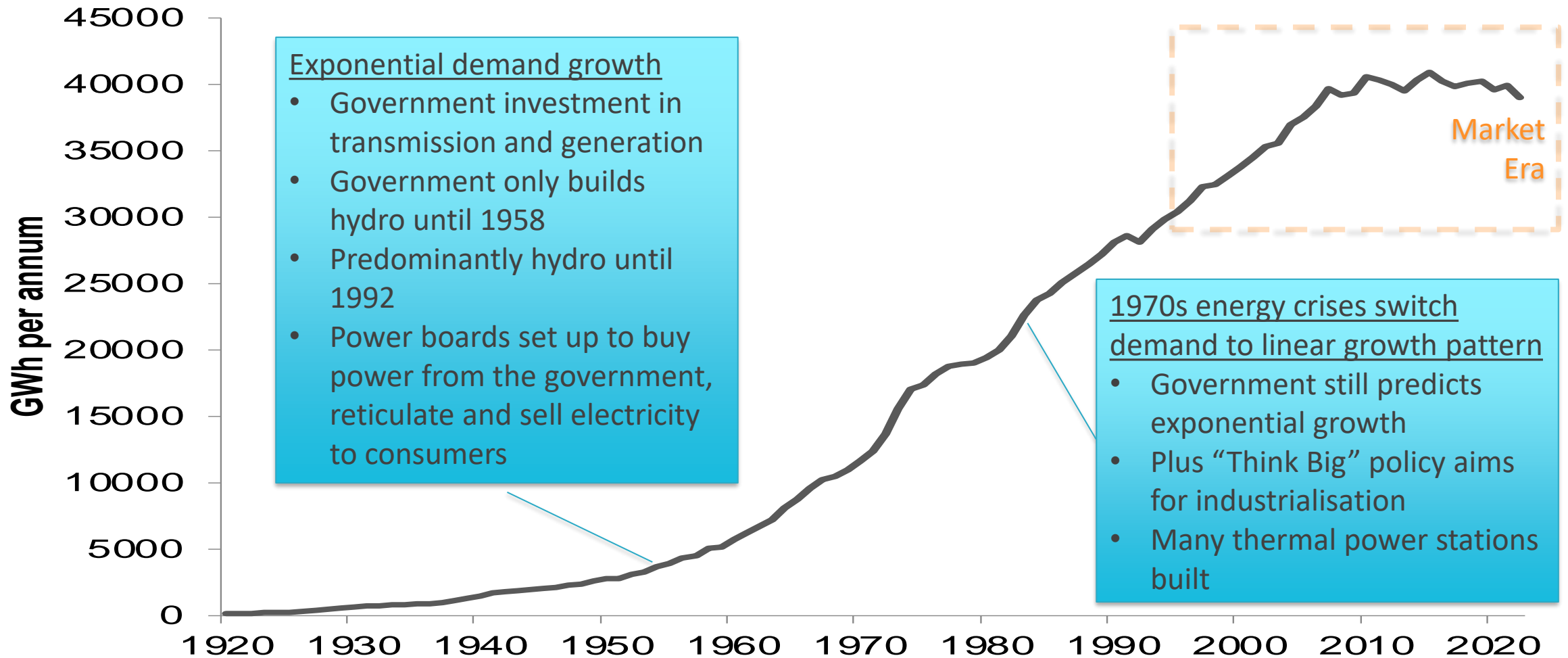
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1. Background to market evolution
2. Wholesale and retail markets
3. Current and future challenges
4. Questions



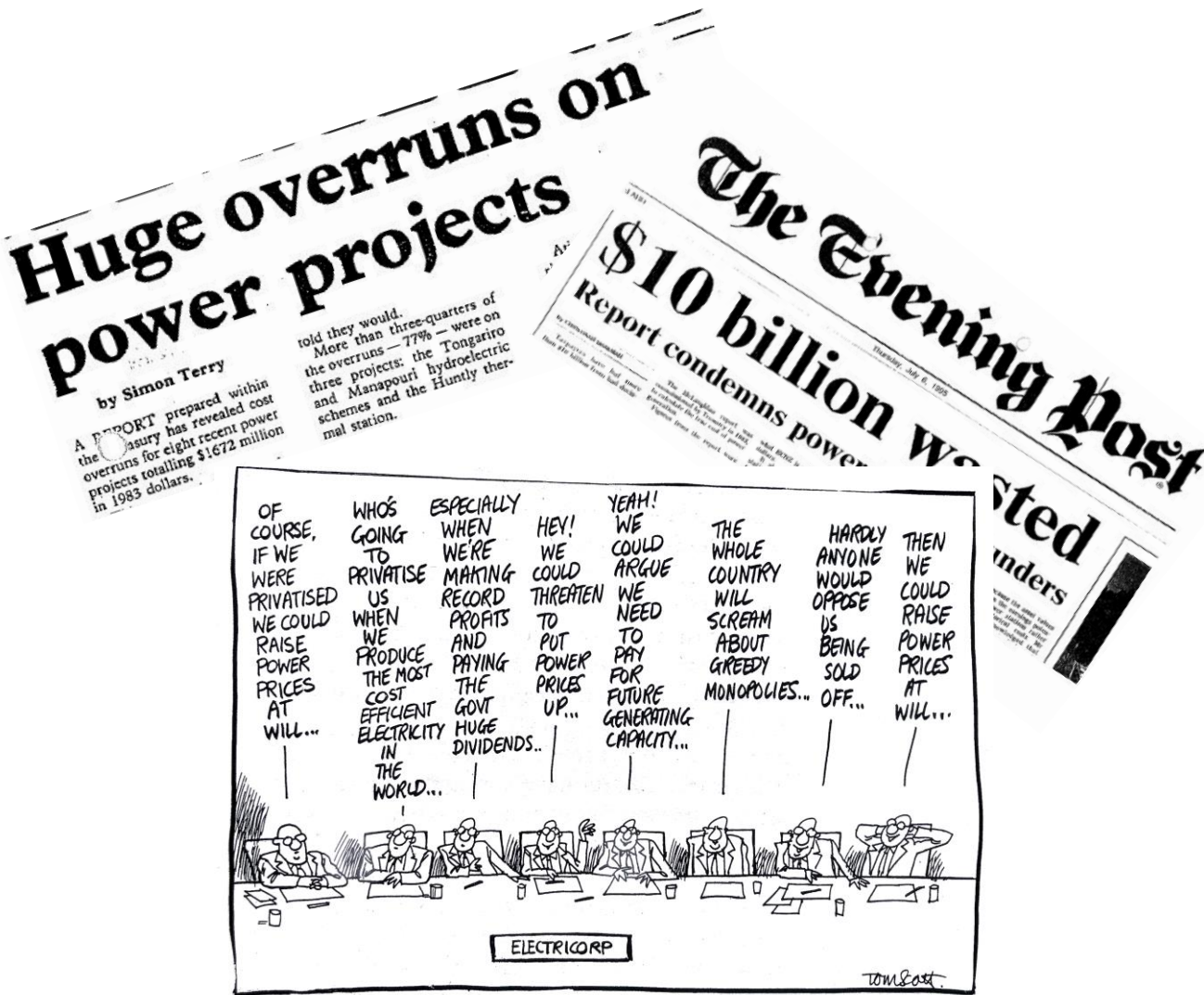
# History of electricity demand

## NZ Electricity Demand, 1920 - 2022



# Motivations behind reform in the 1990s - pricing

(from Batstone, Reeve, Stevenson 2018)



As part of the disastrous track record of government expenditure on power stations, the criticism of the Electricity Division of the Ministry of Energy in 1984 included non-commercial pricing.

The creation of ECNZ in 1987 had, at its core, an objective of acting commercially, bringing with it a focus on its bulk supply pricing (which now became “wholesale prices”). Counter to what many expected from a commercial monopoly, ECNZ allegedly\* pursued entry-deterrence through its pricing, i.e., keeping prices low to deter the entry of competing generation, balanced against rate of return. It argued that, with surplus capacity, this was efficient.

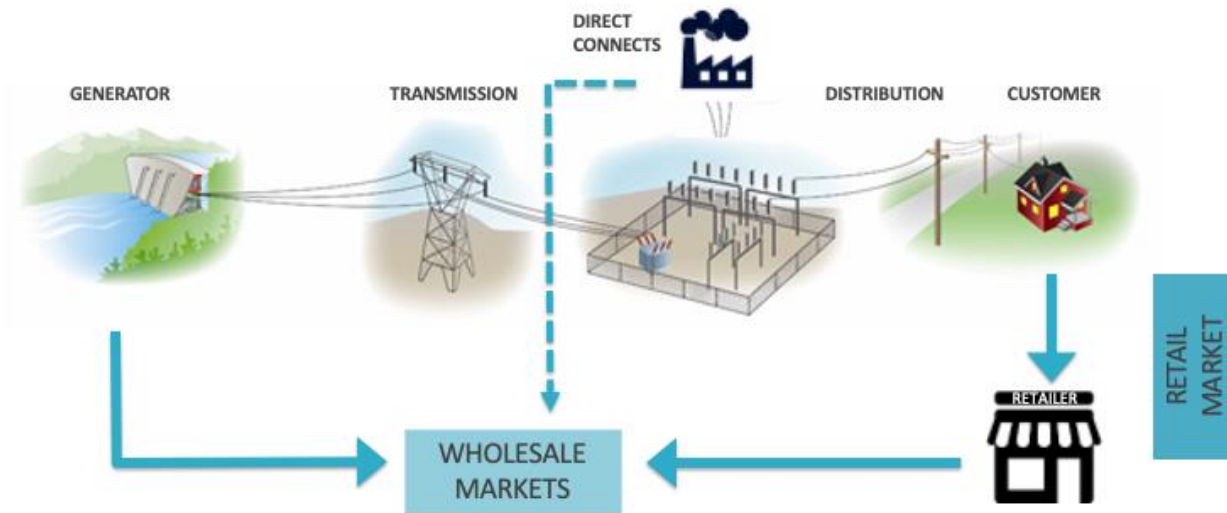
By 1991, prices had declined 20% (real) and ECNZ began to consider the prospect for new capacity within 10 years and announced a 3% price rise.

All hell broke loose.

\*Martin, John E (1998), *People, Politics and Power Stations*, p351

# The New Zealand Market: Overview

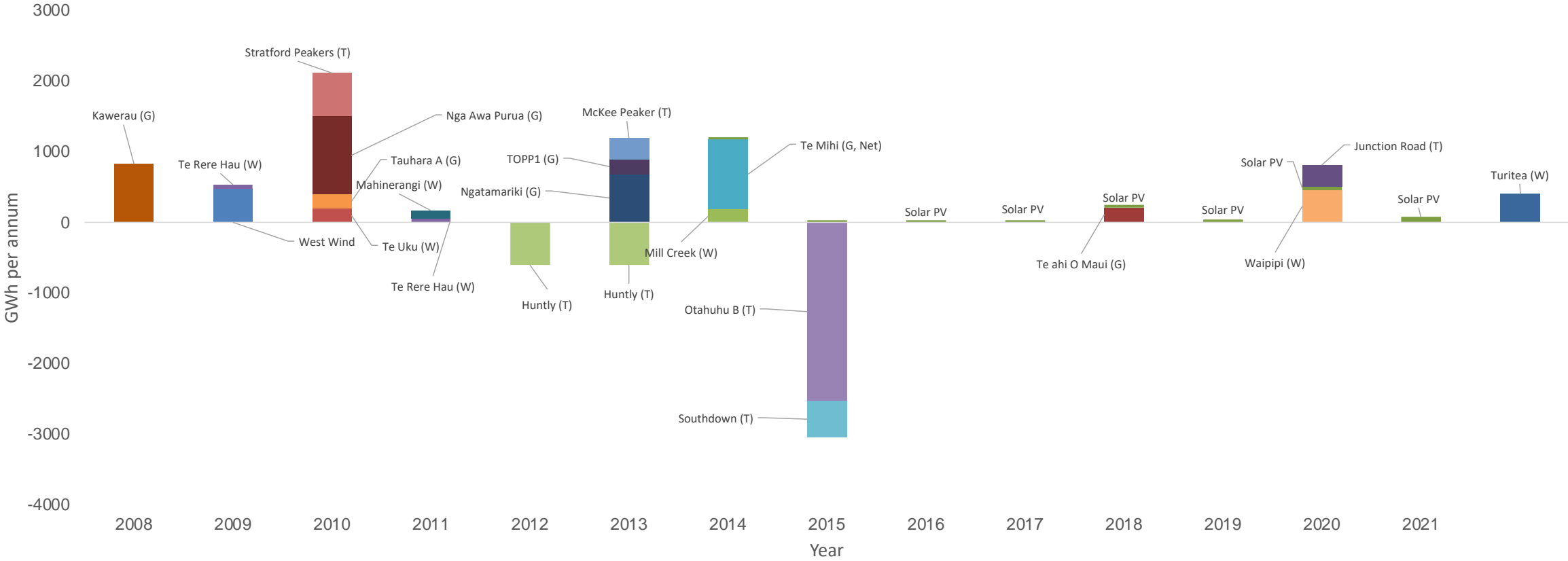
- 'Spot' (physical) markets (energy + reserve) commenced in October 1996
- Full retail market competition from 1998
- Rules for managing hydro risk emerged over 2001-2011
- Contract markets have emerged over time, most significant since 2010:
  - Over-the-Counter,
  - Exchange traded Futures
  - Financial Transmission Rights
- No long-term capacity market.



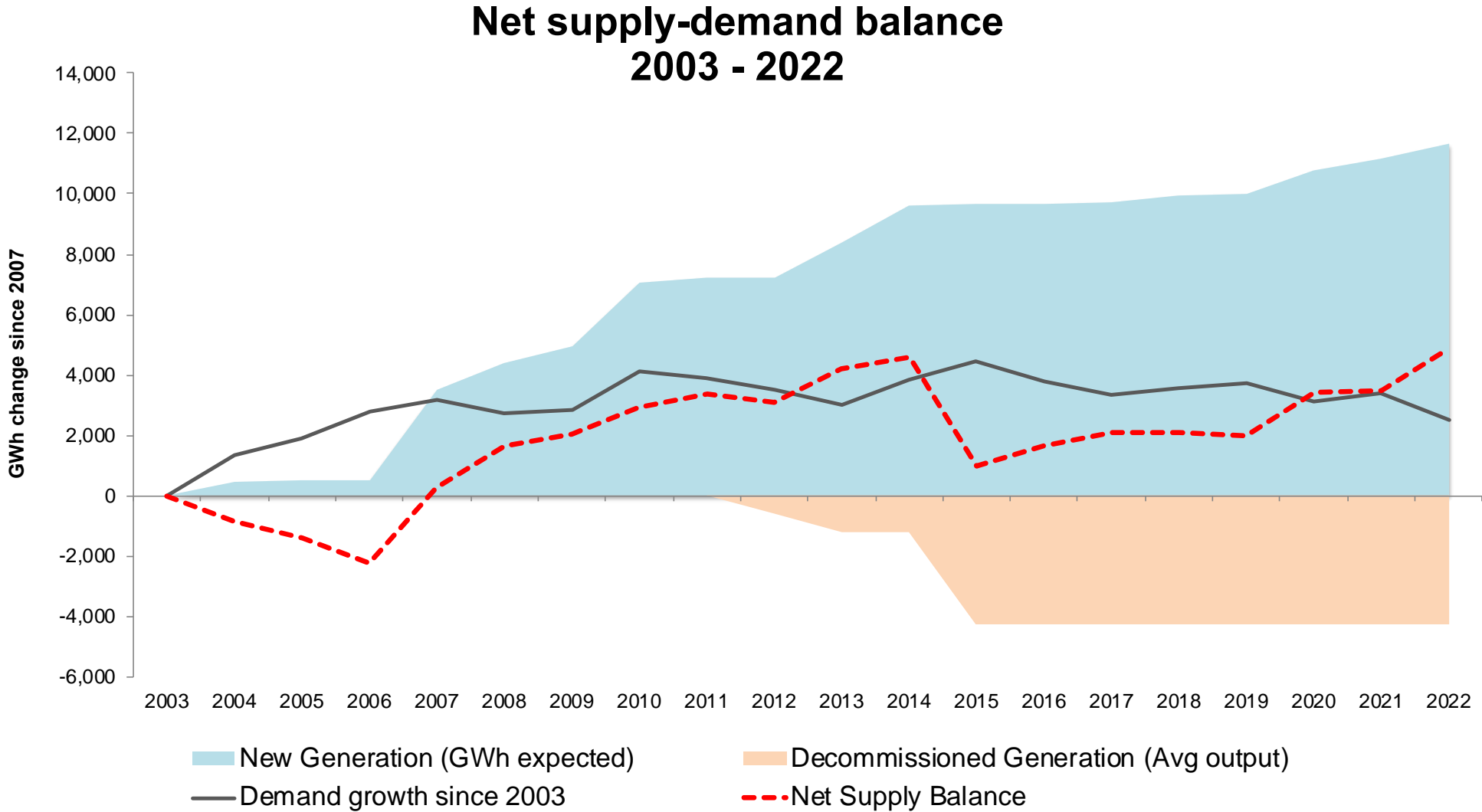
Overriding reason for change was DYNAMIC efficiency – investment and innovation

# An Electricity Market – what’s the point?

Investments and disinvestments in generation since demand went flat in 2007



# Staying on top of demand growth

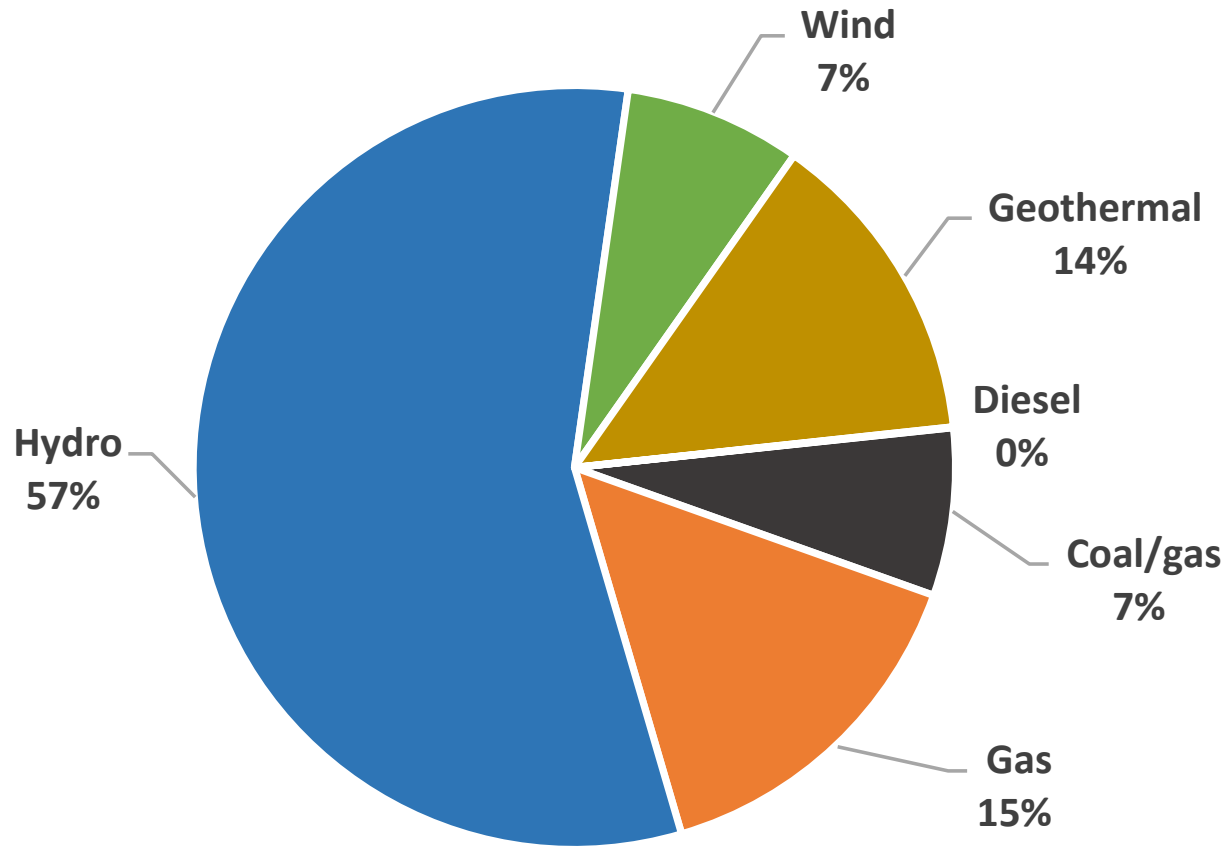


# The New Zealand Market: Overview

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## NZ Generation Makeup

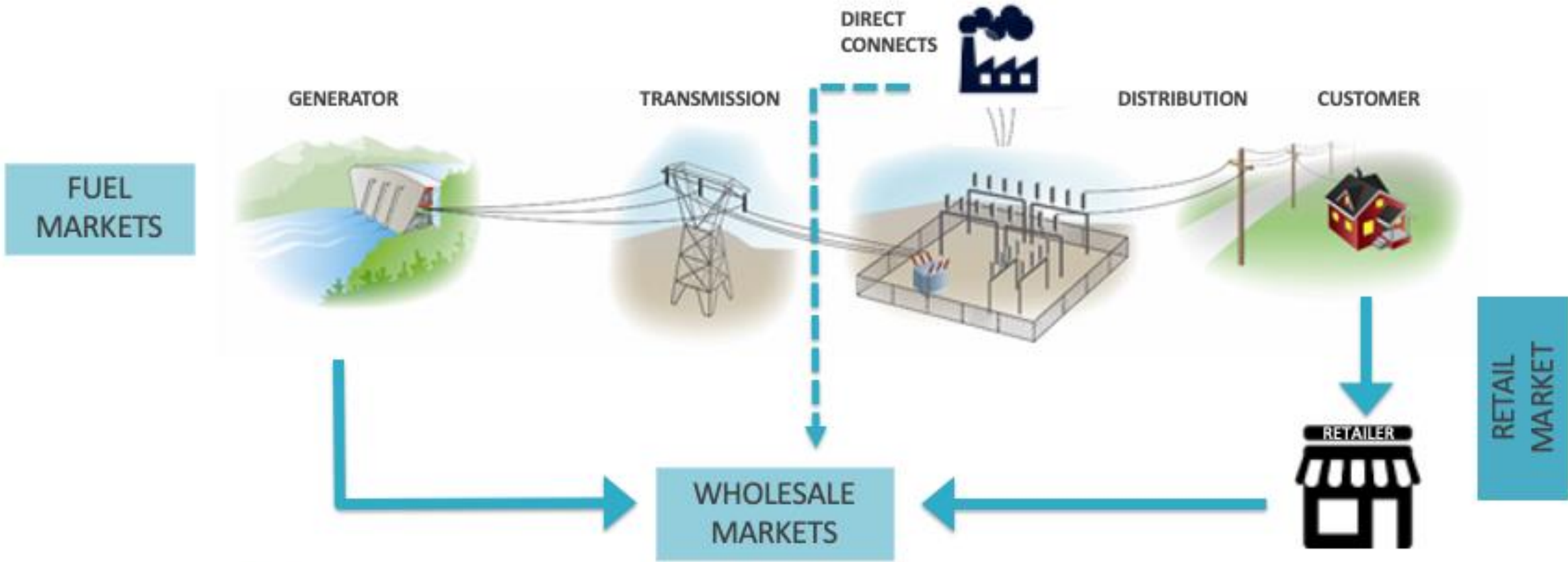
"Average" Year



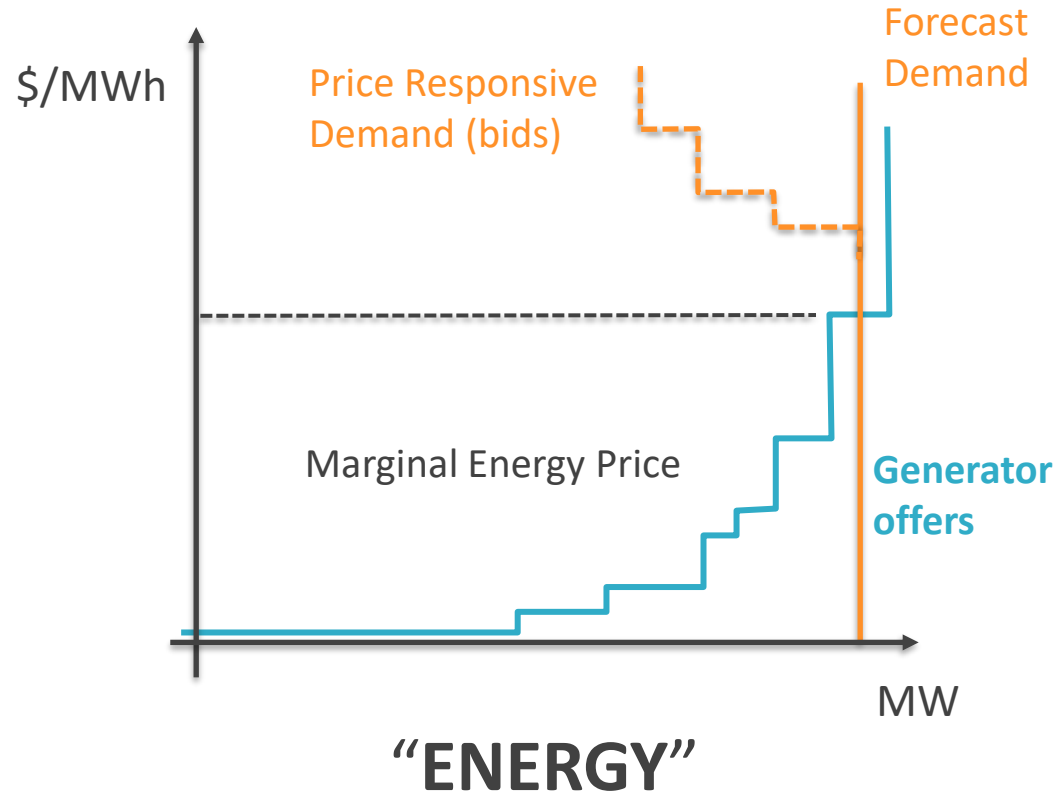


# Wholesale and retail markets

# The New Zealand Market: Overview



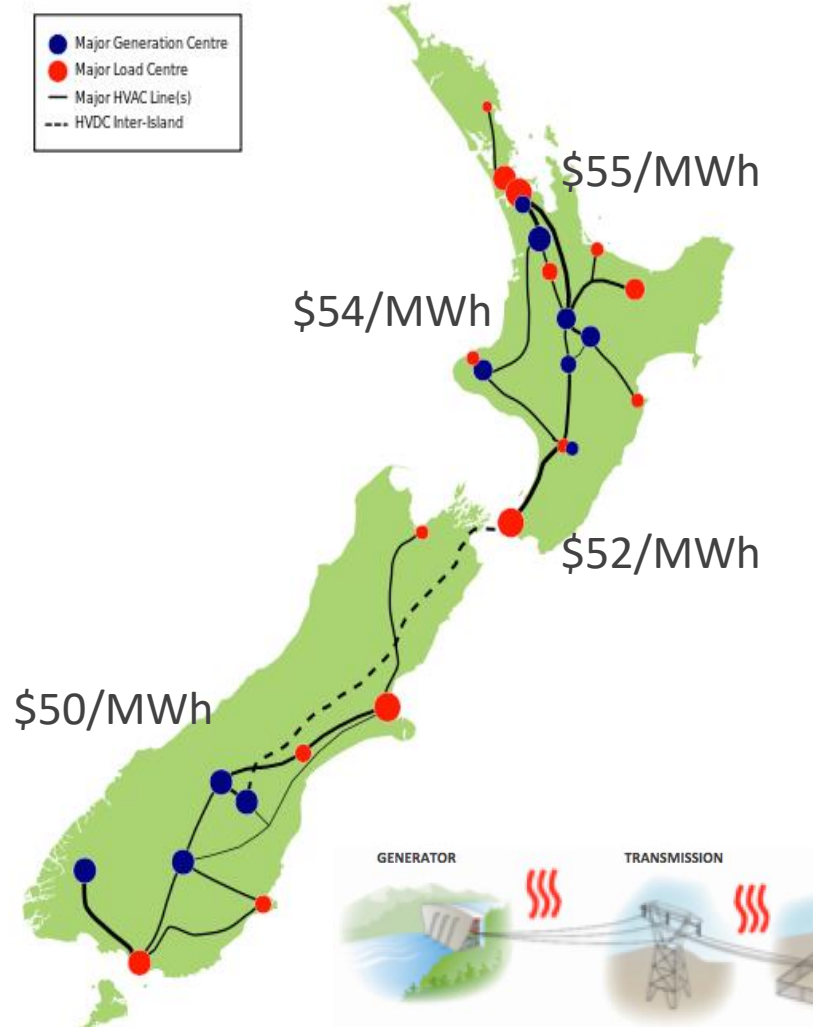
# The New Zealand Market: Bids and Offers



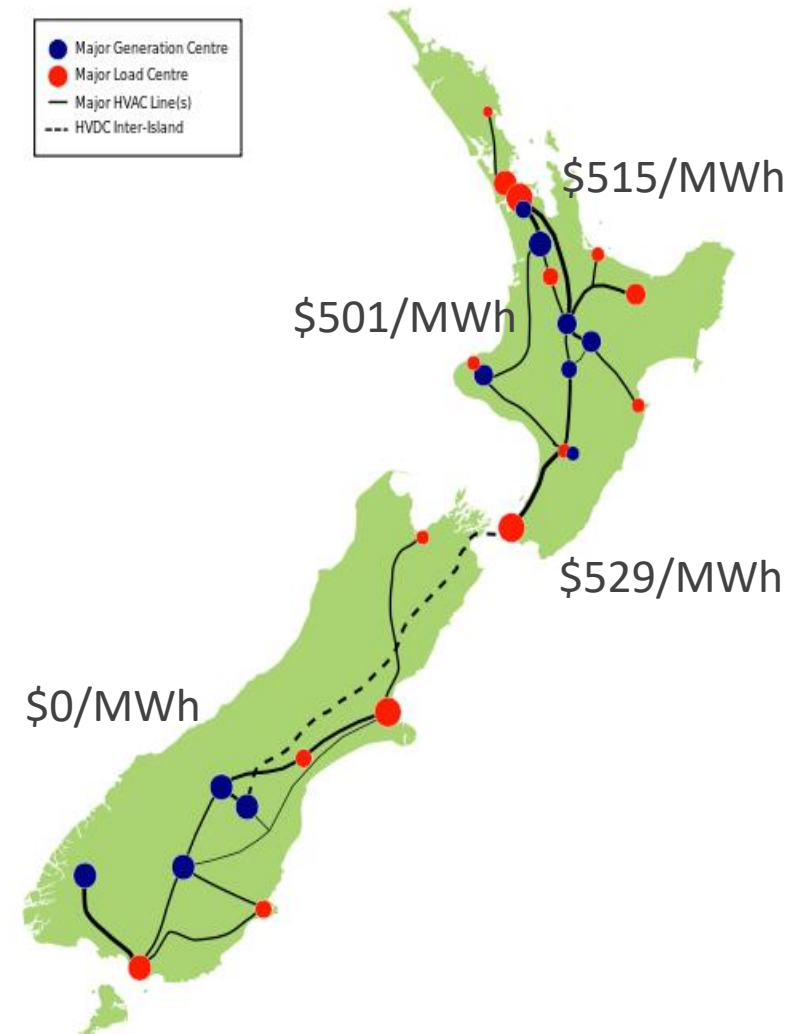
- Demand is “bid”, but close to real time is forecast
- No cap on offers
- Market clears every half hour
- Offers can be revised as half hour approaches

# The New Zealand Market: Locational Marginal Pricing

## Transmission Losses

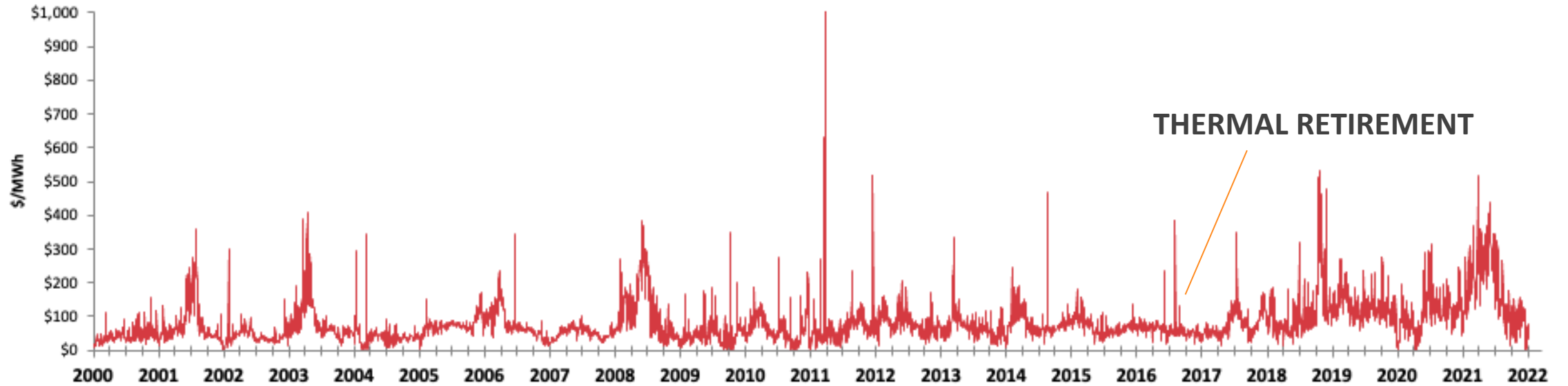


## Transmission Constraints



# Pricing reflecting fuel, investment and network

Auckland daily average wholesale prices  
2000-2022



'DRY' YEARS

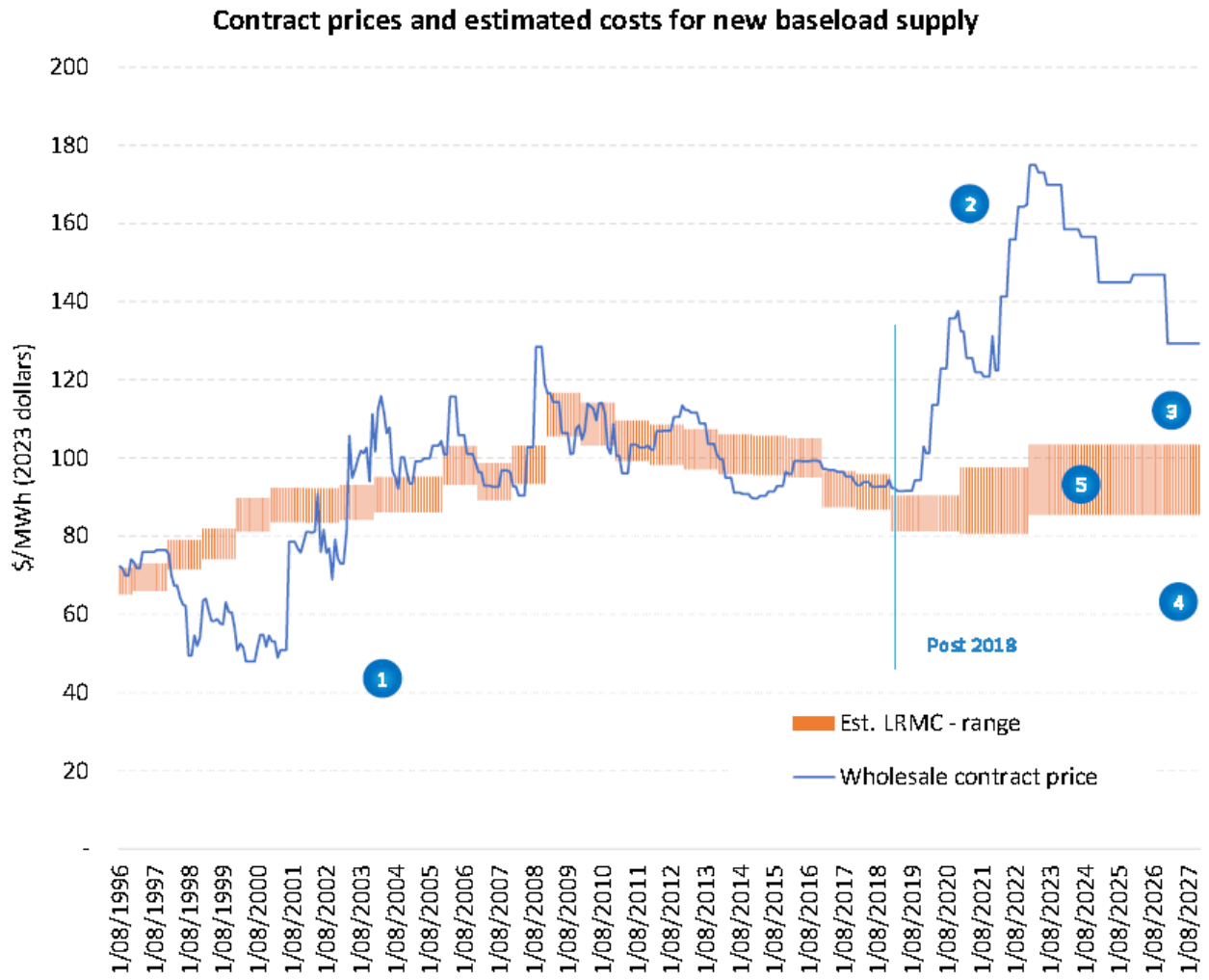


HVDC RESTRICTION

GEN "OVERBUILD"

GAS ISSUES

# Contracts market



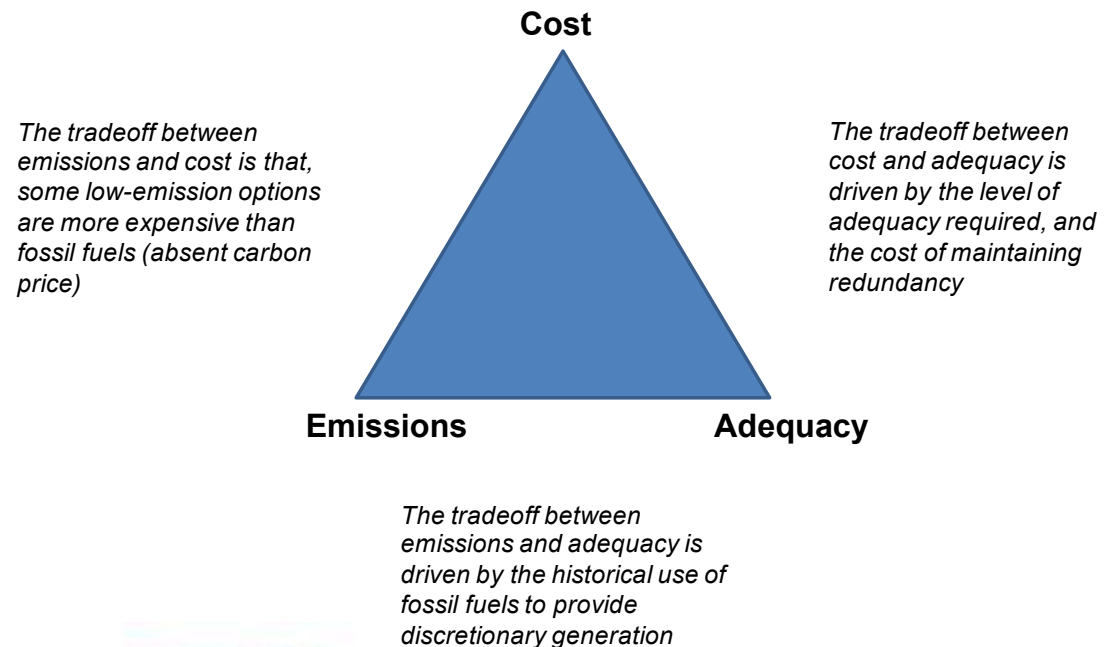
SOURCE: Generation investment summary - 2023 update – prepared for Electricity Authority – Concept Consulting

# Current and future challenges

# Policy uncertainty and the new Government

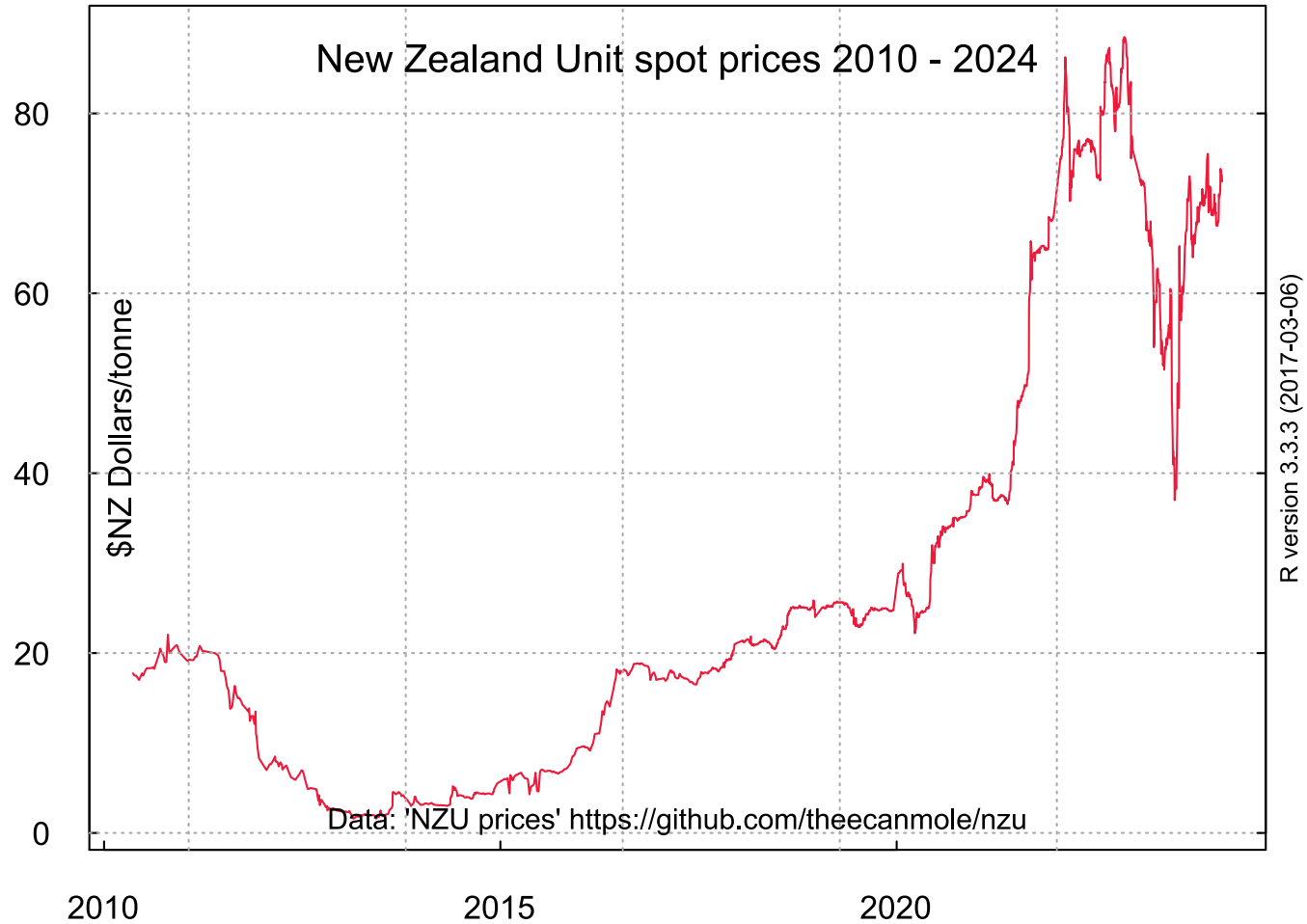
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- Uncertainty
- ETS pricing (ETS)
- When does decarbonisation and electrification really take off?
- Gas transition
- Market design
- Decarbonisation
- Government priorities
- And the trilemma...





# ETS – politically set



Scarcity recommended by CCC led to significant price increase

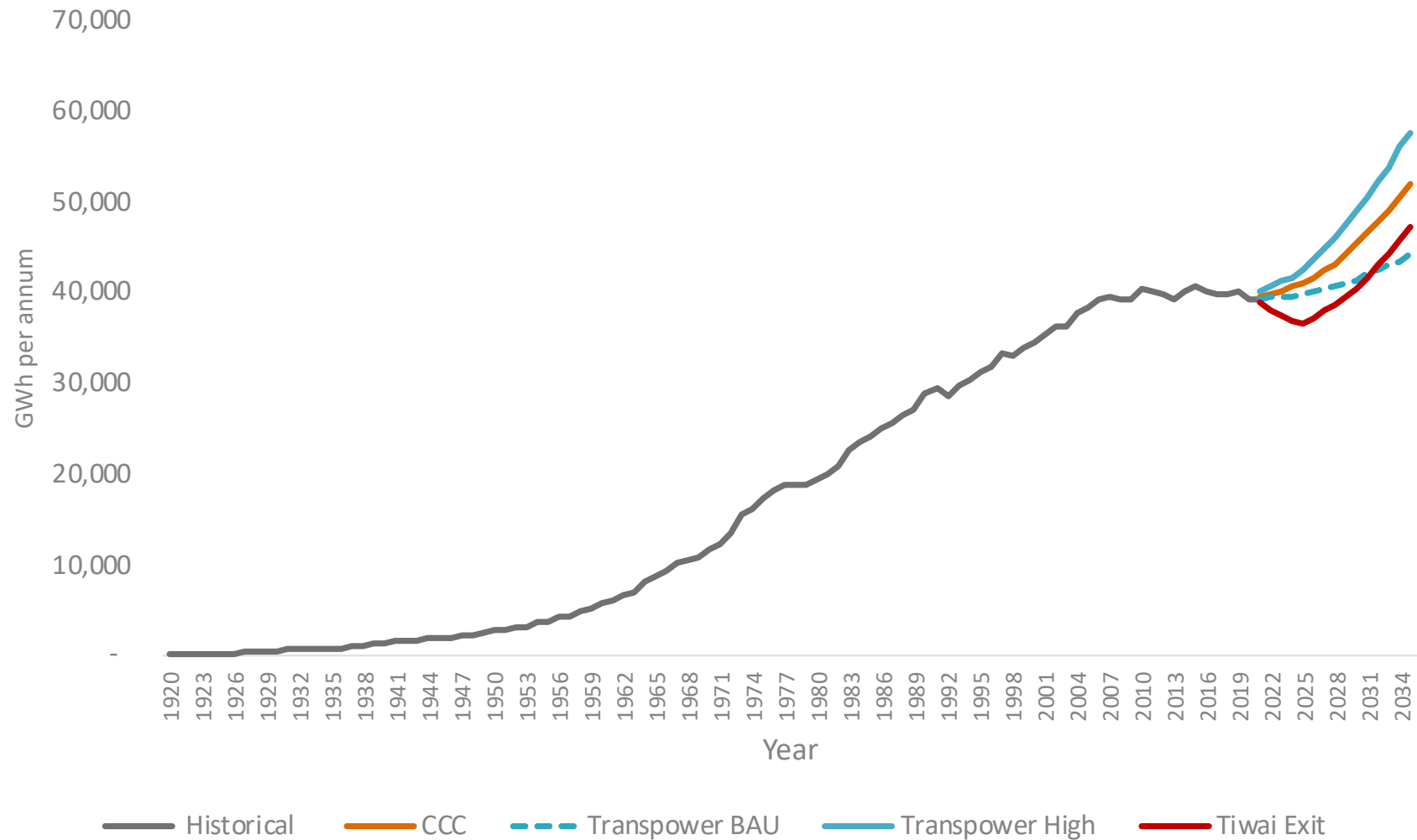
Was supposed to go even higher \$175/t.

Politicians tried to ease the price increase and the price dropped substantially

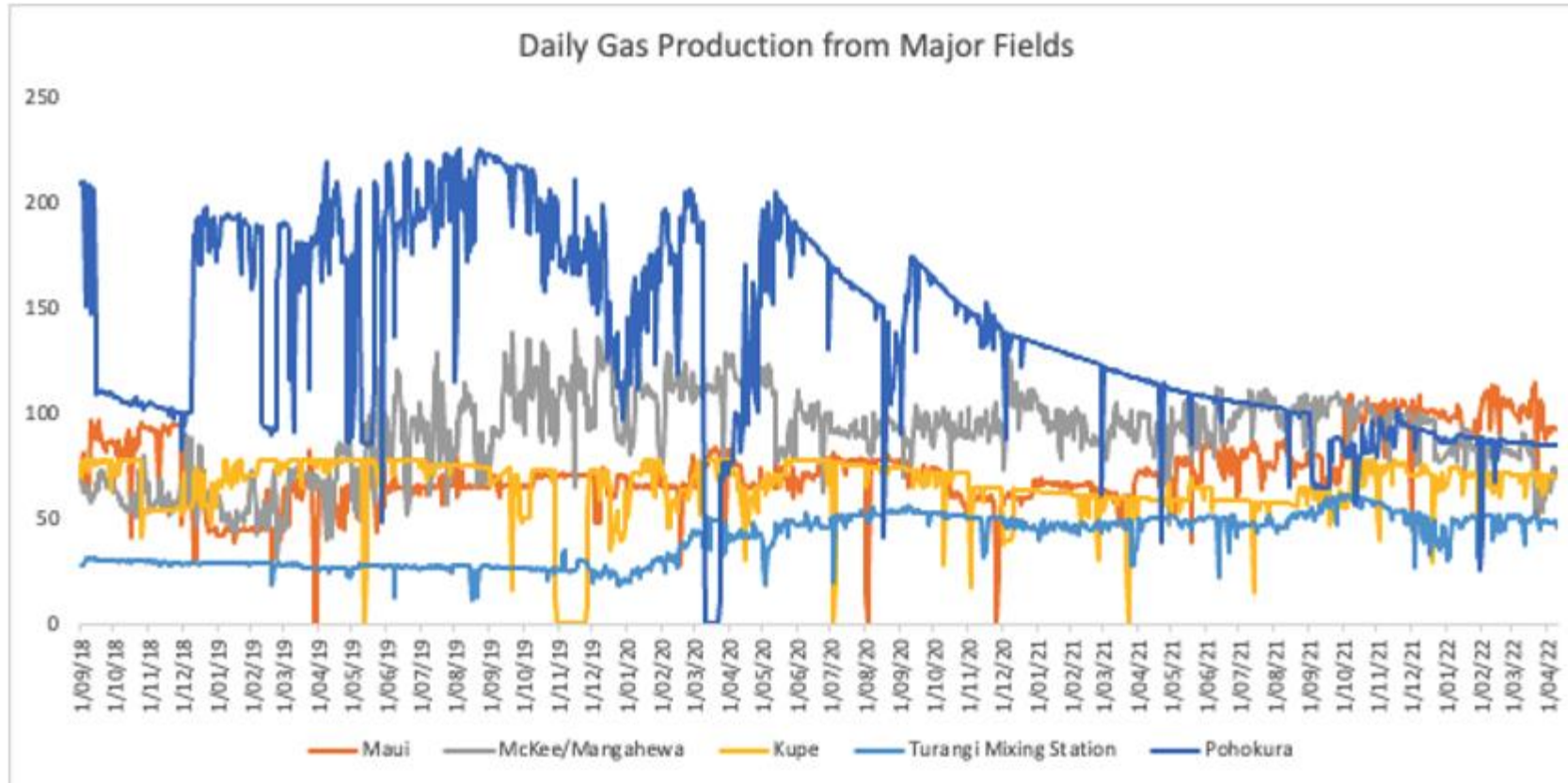
Current government remains committed to the ETS but no details on the auction settings

# Potential demand growth

**Annual Electricity Demand**  
Historical and Forecast, CCC and Transpower scenarios



# What is the role of gas as we decarbonise?

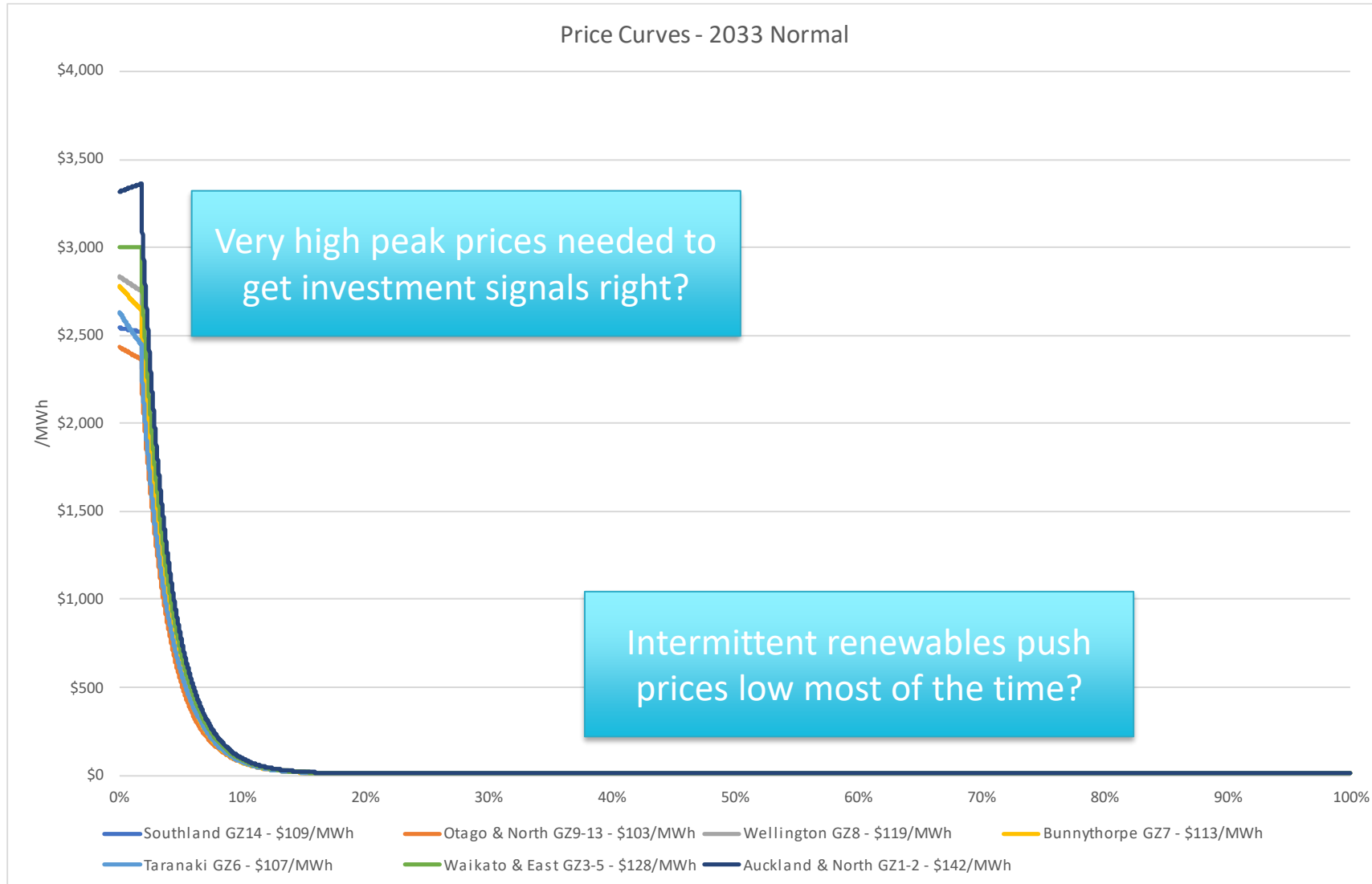


Many commentators see some gas use as critical to affordable, reliable electricity as we decarbonise transport and process heat, including the current Government

Coalition government policies:

- Assurances given that gas sector will get certainty
- Repeal of oil and gas ban
- Investigate production of hydrogen from natural gas with carbon capture
- Some potentially indirect support, e.g. investigate reopening Marsden Point

# Wholesale market price structure with intermittent renewables




- Does the market work with high amounts of renewables?
- Does this encourage investment in renewables?
- Does this encourage investment in security and reliability?
- Is market power a problem?
- Dry years?

MDAG has made important recommendations on this

Government policy priority is on security of supply

# Decarbonisation

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- Government remains committed to zero carbon act but no detail on meeting Climate Change Commission's carbon budget
  - Security of supply highest priority through reinvigorating natural gas – although NZ First suggests that coal is also required post-2040
  - Require Electricity Authority to make rules ensuring security
  - Policy to double renewable energy supply
  - 'Examine' transmission and connection pricing to facilitate cost effective connection of new renewable generation resources, both on-shore and off-shore
  - Fast track resource consenting for new infrastructure including renewable energy
  - 10,000 EV chargers, but needs robust business case
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# Government priorities

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1. Stop Onslow (NZ Battery)
1. Security of supply – gas
2. Double renewable energy – RMA
3. Decarbonise transport – EV chargers



# Questions

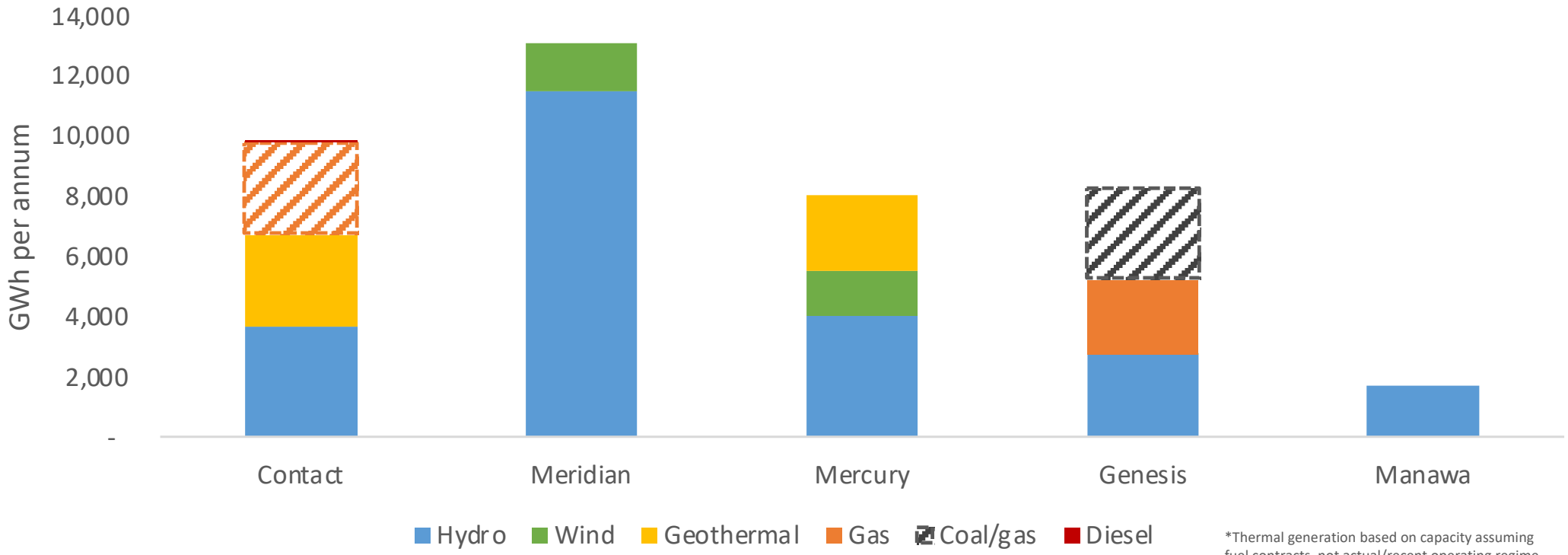
# Additional information



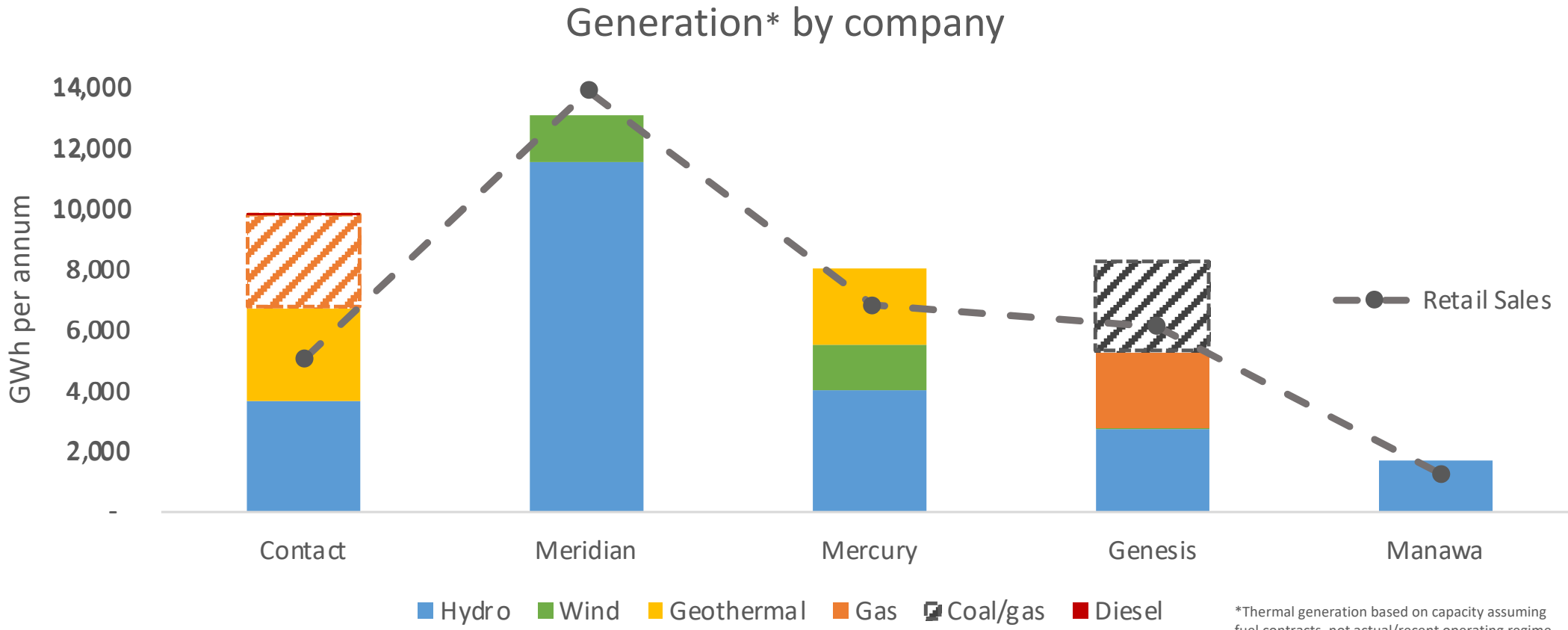


# The New Zealand Market: Importance of hydrology

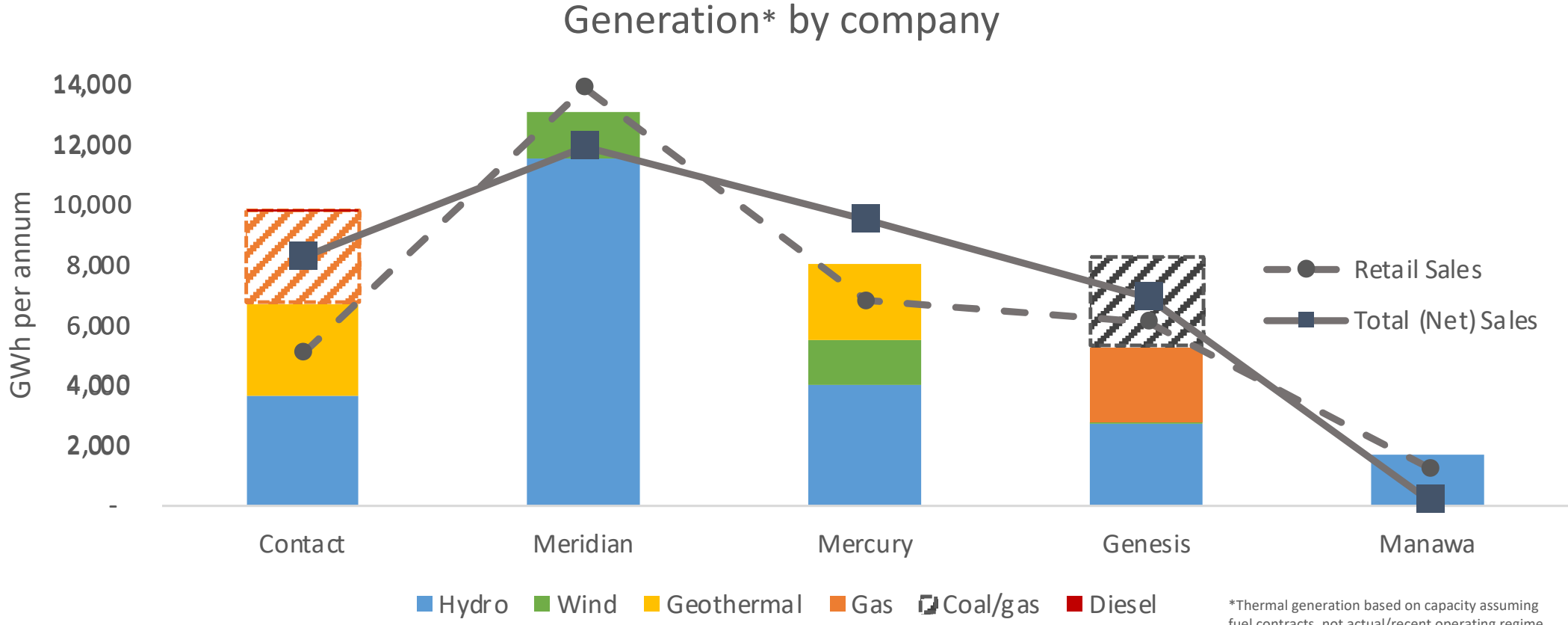
Generation\* by company



# The New Zealand Market: Importance of hydrology

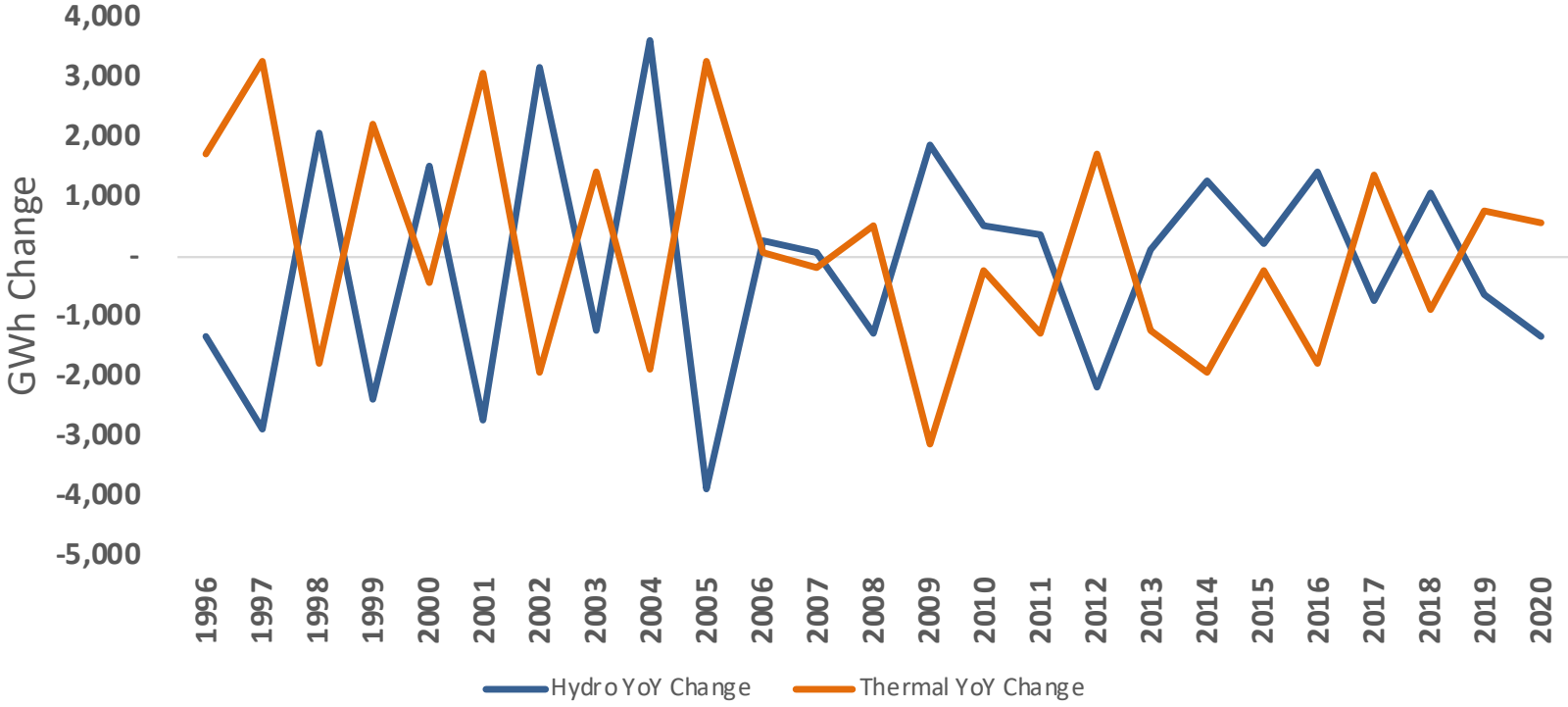


# The New Zealand Market: Importance of hydrology

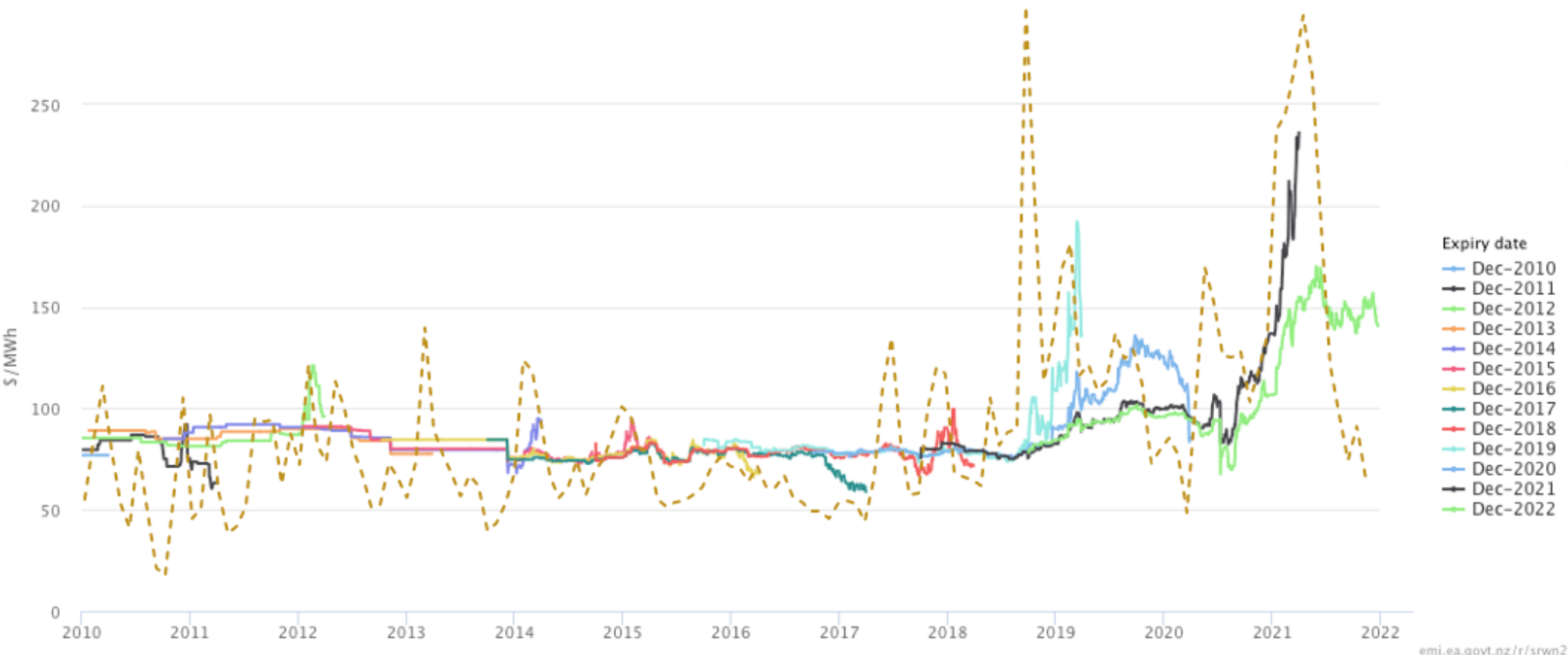


# The New Zealand Market: Importance of hydrology

Year-on-year changes in hydro and thermal

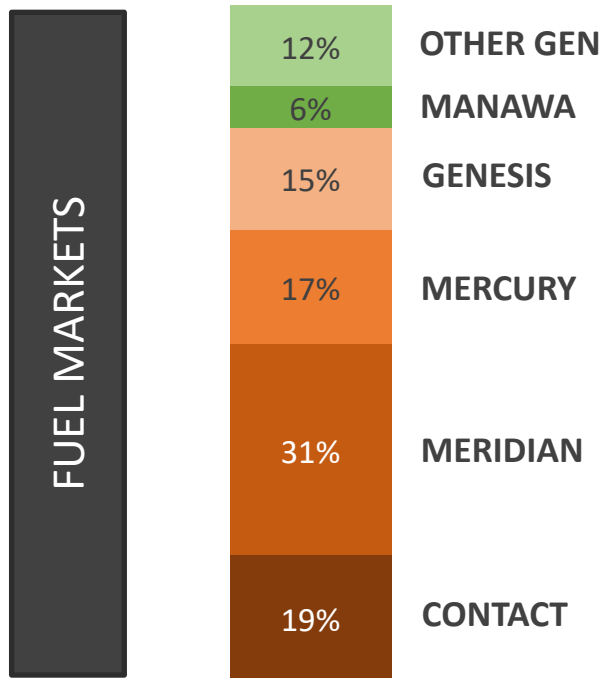


# Hedge Market



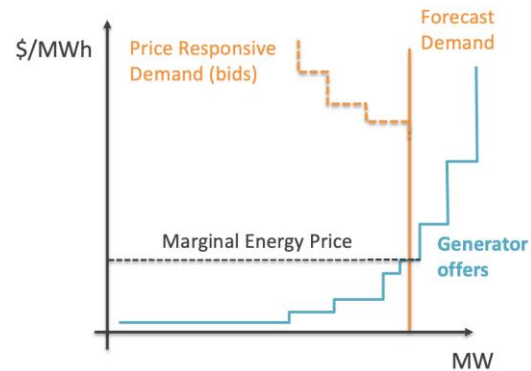
# The New Zealand Market: Market Makeup

## GENERATORS

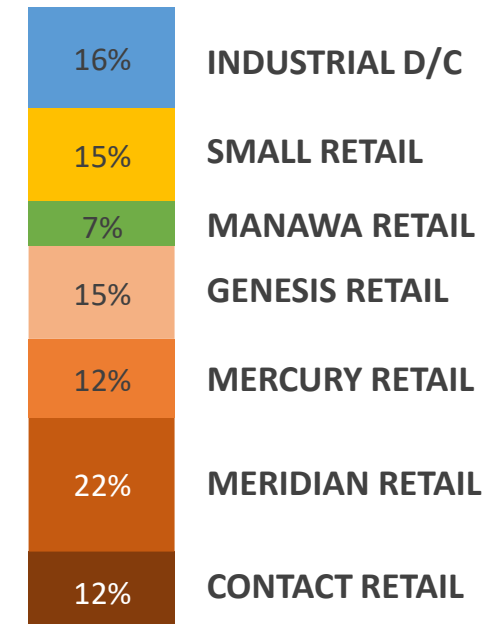


Generation FY22

## HALF-HOURLY SPOT (PHYSICAL) MARKETS



## PURCHASERS



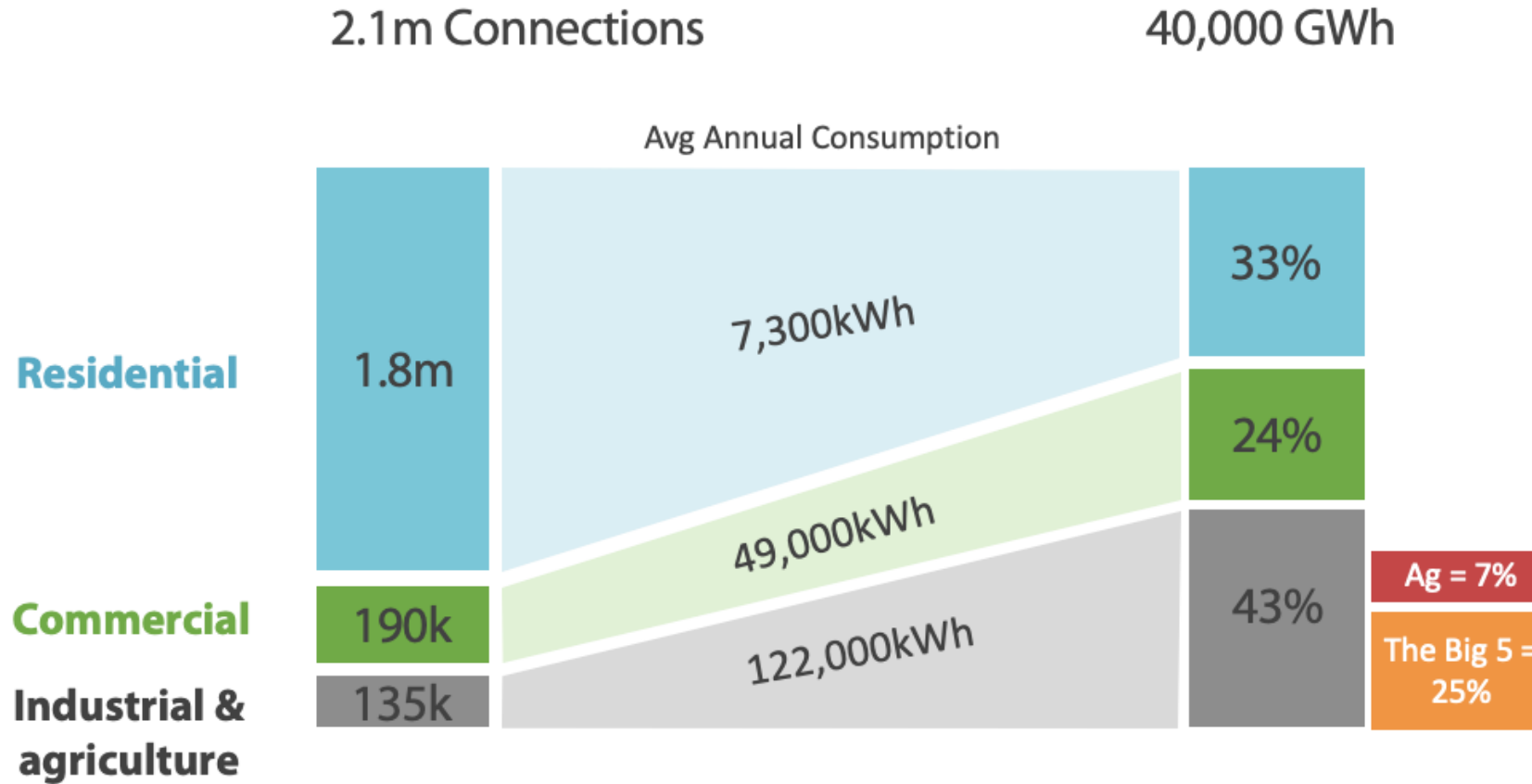
Purchases FY22

## RETAIL MARKETS

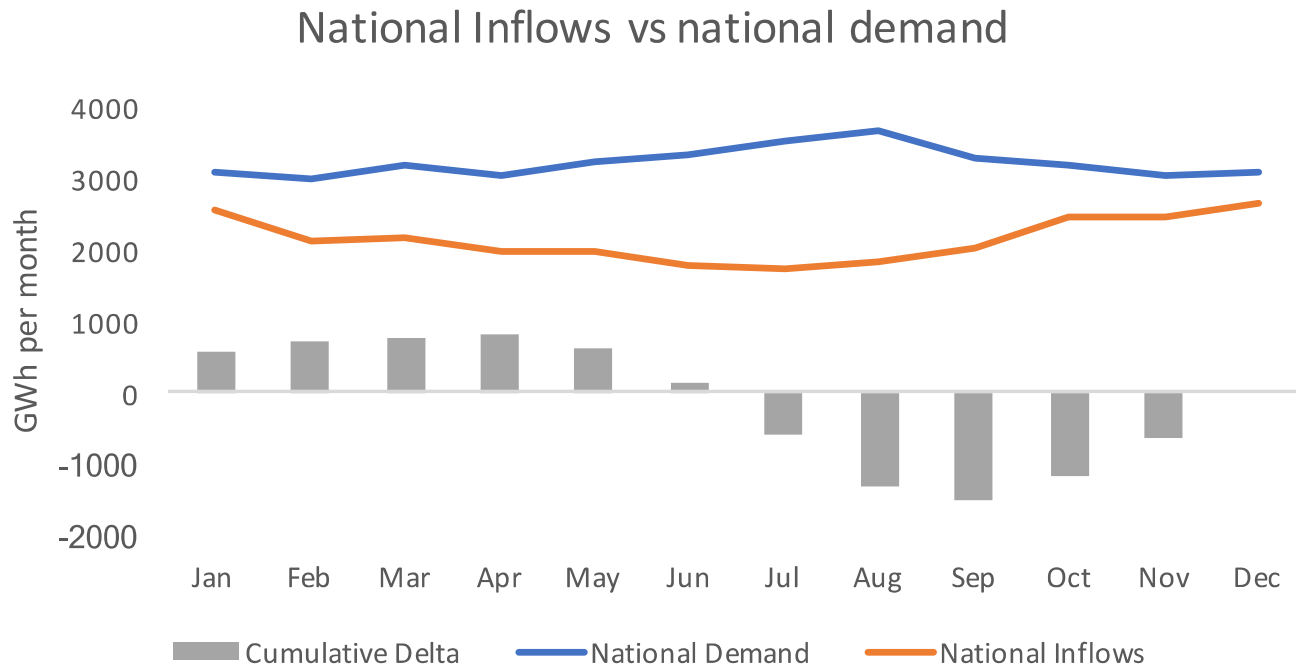


## HEDGE MARKETS

# The New Zealand Market: Overview



# The hydrology problem – low carbon solution



- We shift fuel around currently through:
  - Coal stockpiles (<2,000GWh)
  - Gas reservoirs (2,000GWh)
  - Flexible gas contracts
  - Batteries (short term only)
  - Hydro reservoirs (4,000GWh)
- Hydro is slightly problematic in that it provides some energy “shifting”, but its ability to do that over the medium term is limited by inflows and storage, which are not well correlated with demand. Over a long enough timeframe it is also “intermittent”.
- So we have a third requirement – the ability to meet demand during a (prolonged) period of low inflows



# NZ Battery (Onslow)

- \$15.7bn plus a couple billion in transmission upgrades
- Alternative is only slightly cheaper
- Fundamentally about 100% renewable electricity
- Also attractive because it gives the Government certainty (and potentially control)
- Cancelled by current Government

