



meridian

Analyst Presentation

Managing Hydrology Risk

Disclaimer



This presentation may contain projections or forward-looking statements regarding a variety of items. Such forward-looking statements are based upon current expectations and involve risks and uncertainties.

Actual results may differ materially from those stated in any forward-looking statement based on a number of important factors and risks.

Although Management may indicate and believe that the assumptions underlying the forward-looking statements are reasonable, any of the assumptions could prove inaccurate or incorrect and, therefore, there can be no assurance that the results contemplated in the forward-looking statements will be realised.

Furthermore, while all reasonable care has been taken in compiling this presentation, Meridian cannot guarantee it is free from errors.

Reservoir management: uncertainties, risks, and rewards



- Sources of uncertainty
- The role of hydro in New Zealand
- Reservoir management concepts
- Portfolio management
- Maximising value through asset management, hydrology, wholesale market

About Meridian



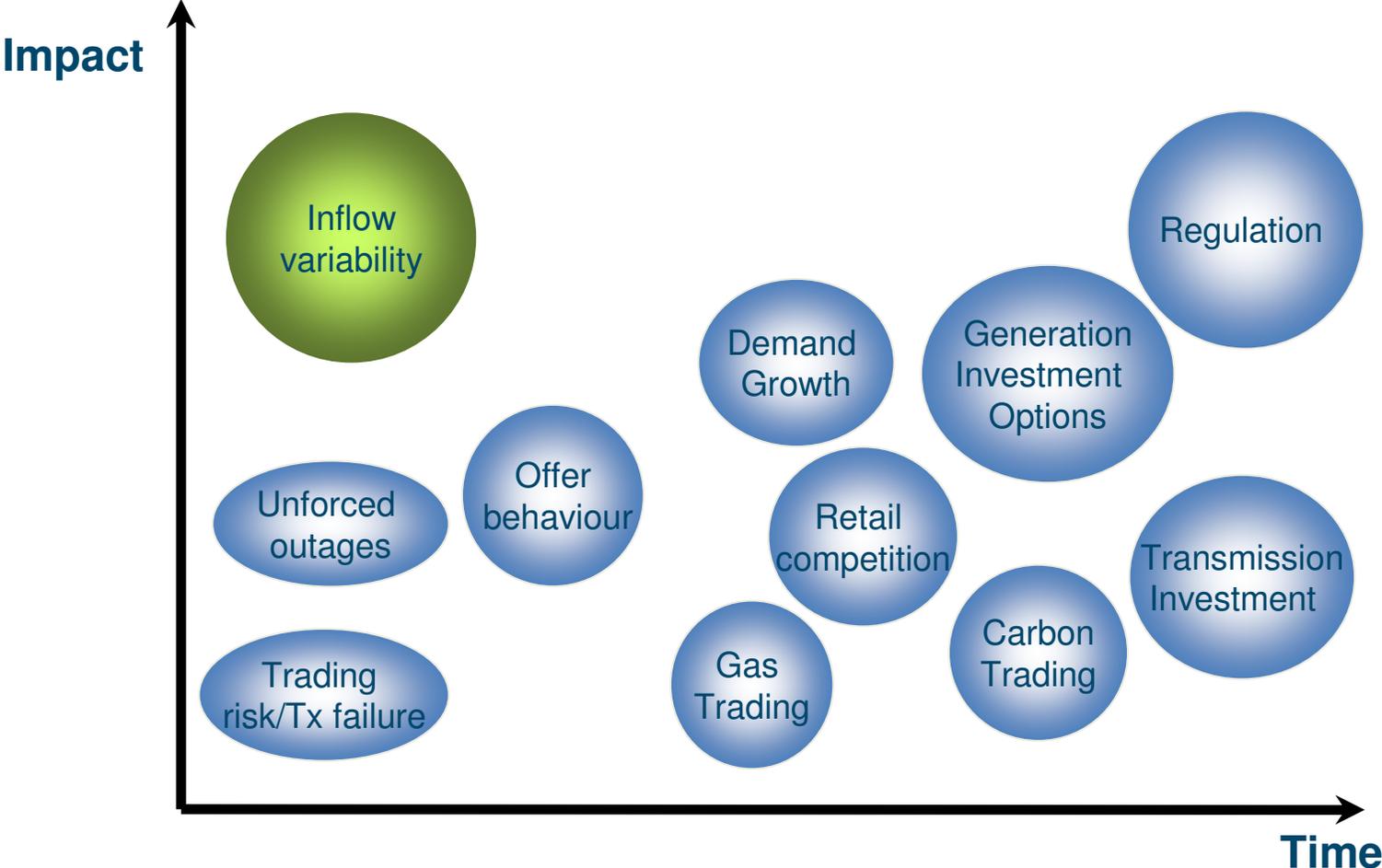
- Integrated renewable generator and retailer
 - New Zealand's largest electricity generator
 - 272k* customers – Meridian Retail (239k) and Powershop (33k)
- International wind and solar generation facilities
- Strong portfolio of future generation options in New Zealand and internationally
- Innovating in new products and services

* As measured by ICP's

Hydrology: one of many sources of uncertainty Meridian manages

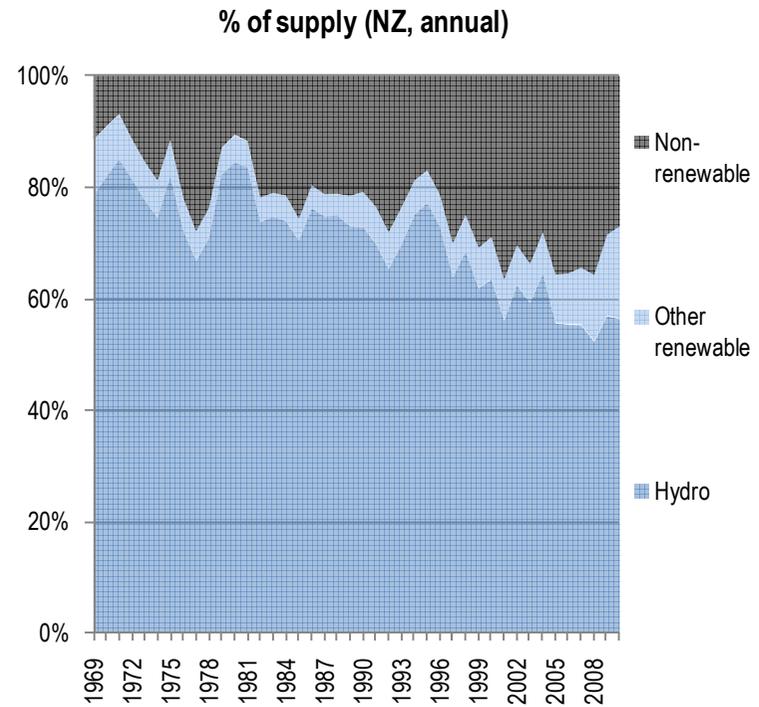
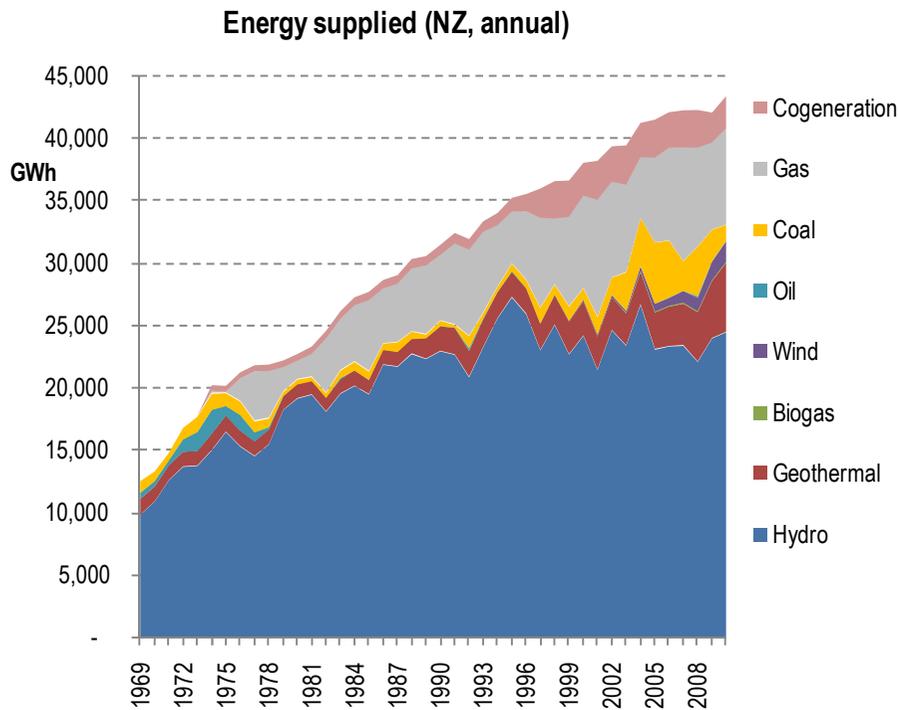


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Source: Meridian

Hydro generation is the cornerstone of NZ's electricity supply ...

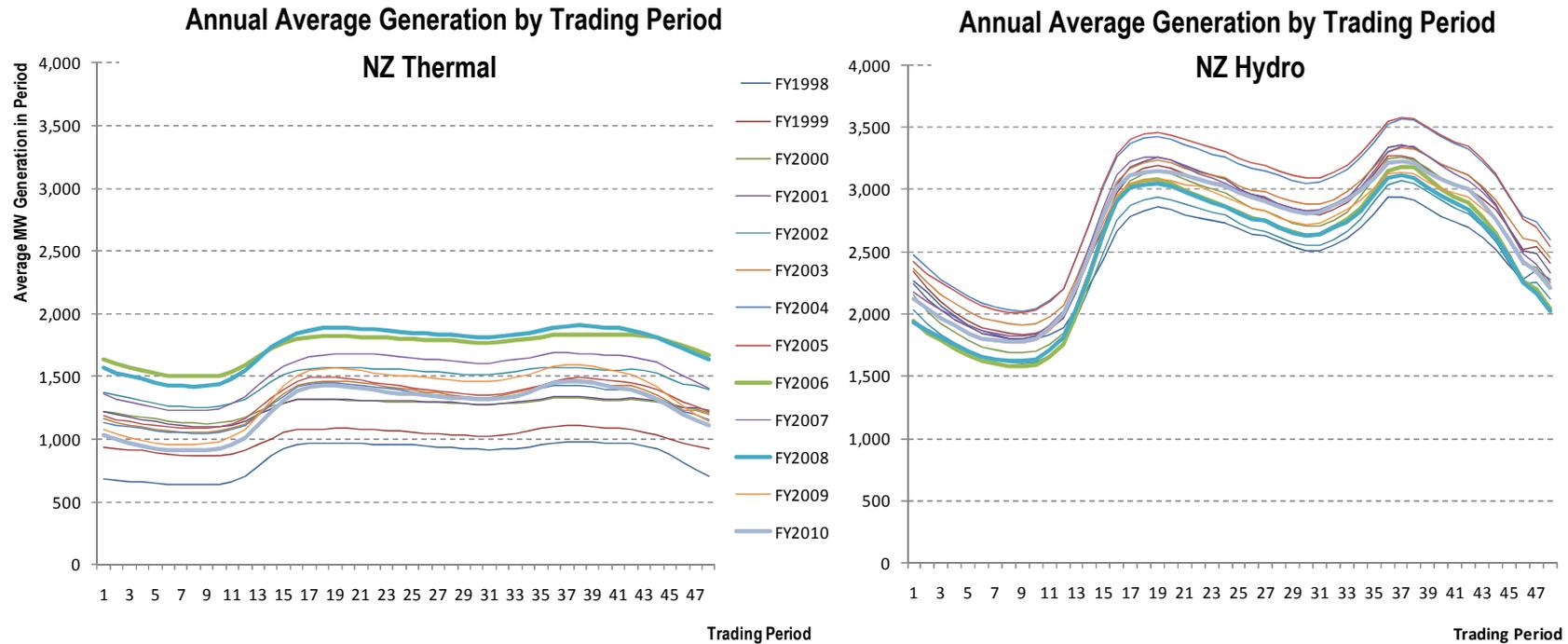


Source: MED Energy Data File, Meridian

...and underpins NZ's flexible electricity system



- Hydro's lowest average output exceeds thermal's highest average output



Source: Centralised Dataset, Meridian

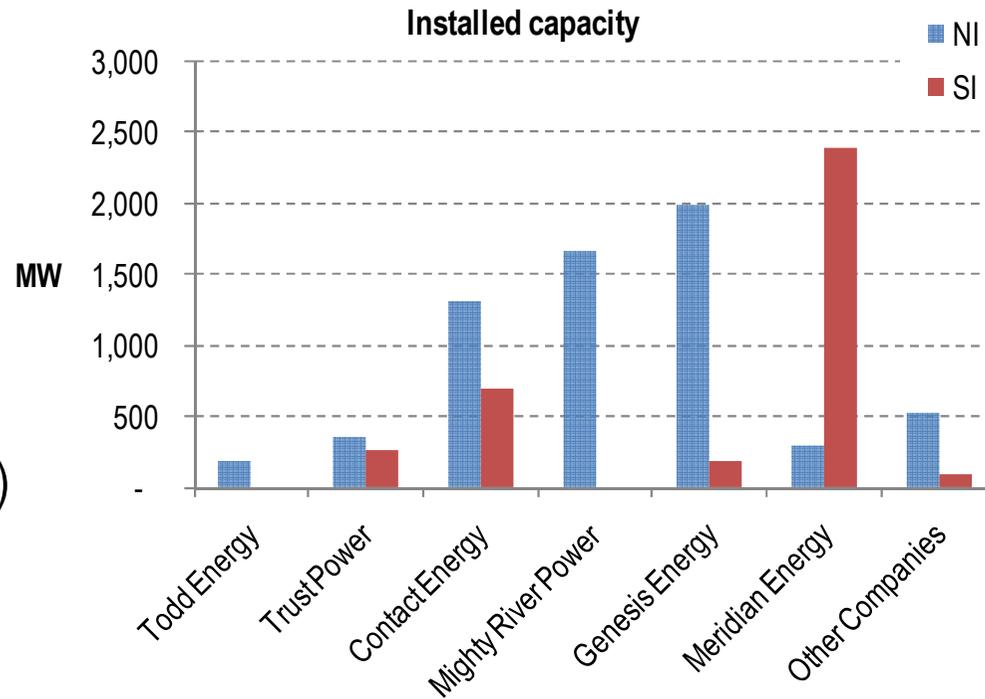
Meridian's portfolio



- Manapouri
 - 800MW / ~5,100 GWh p.a.
 - Storage 440 GWh

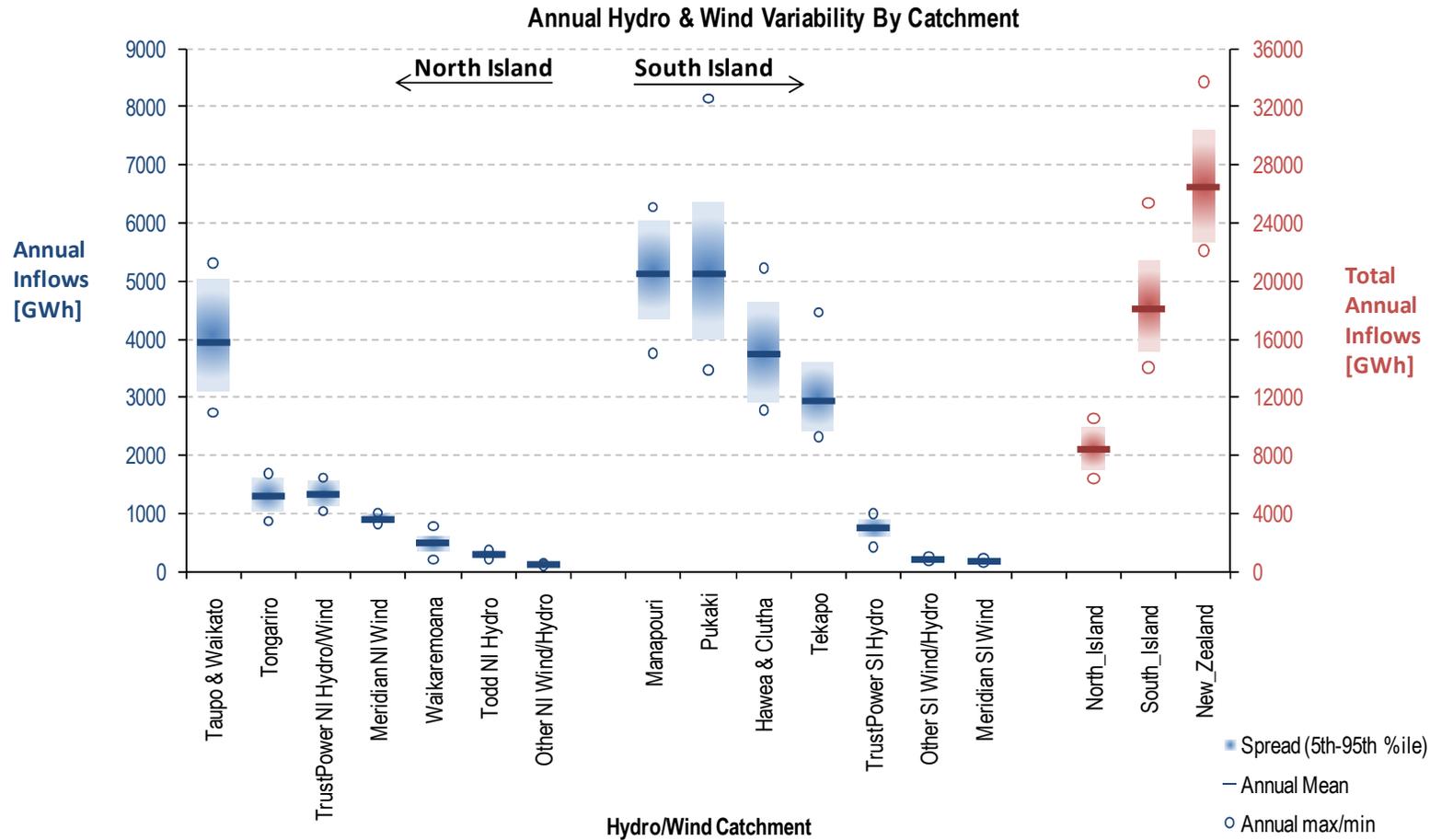
- Waitaki scheme
 - 1,538MW / ~7,000 GWh p.a
 - Storage ~1,700 GWh (Pukaki)

- Wind
 - NI: 298MW / ~1,150 GWh p.a.
 - SI: 58MW / ~190 GWh p.a.



Source: Meridian

New Zealand hydrology: sum of many moving parts



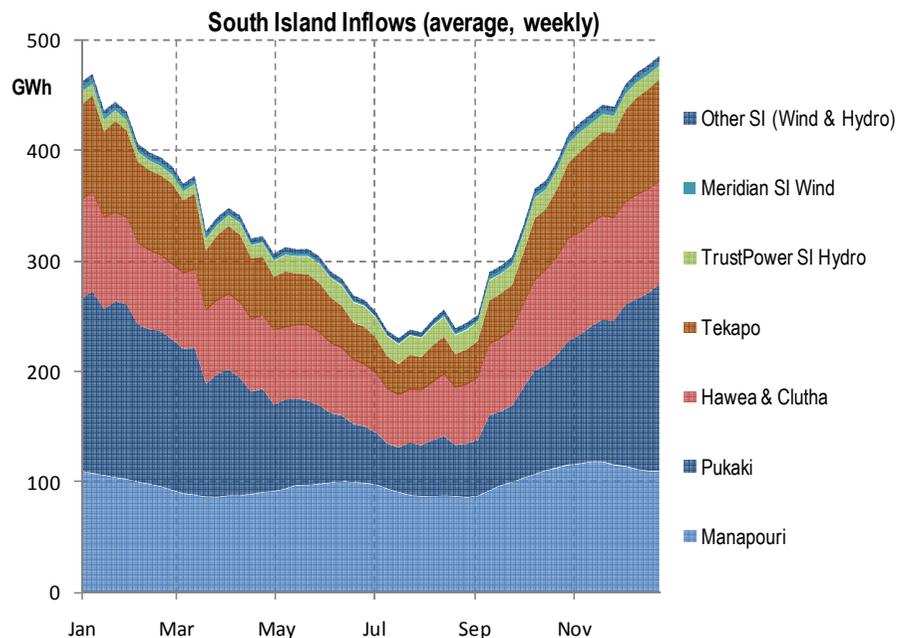
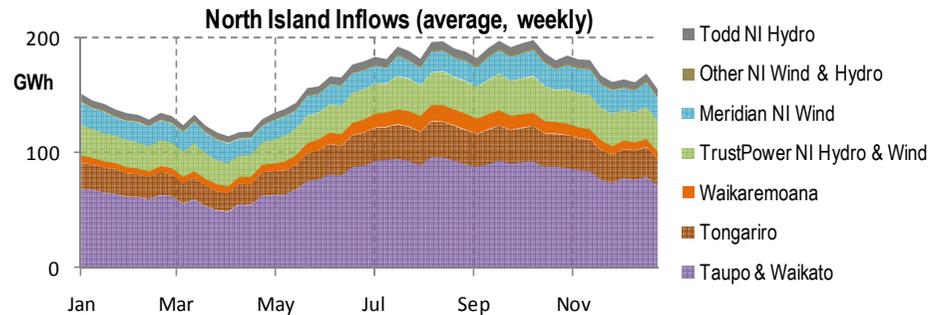
Source: Meridian.

Note: Tekapo and Pukaki inflows reflect energy generated from all Genesis and Meridian stations in the Waitaki scheme

Average weekly inflows anti-correlated between islands within the year...

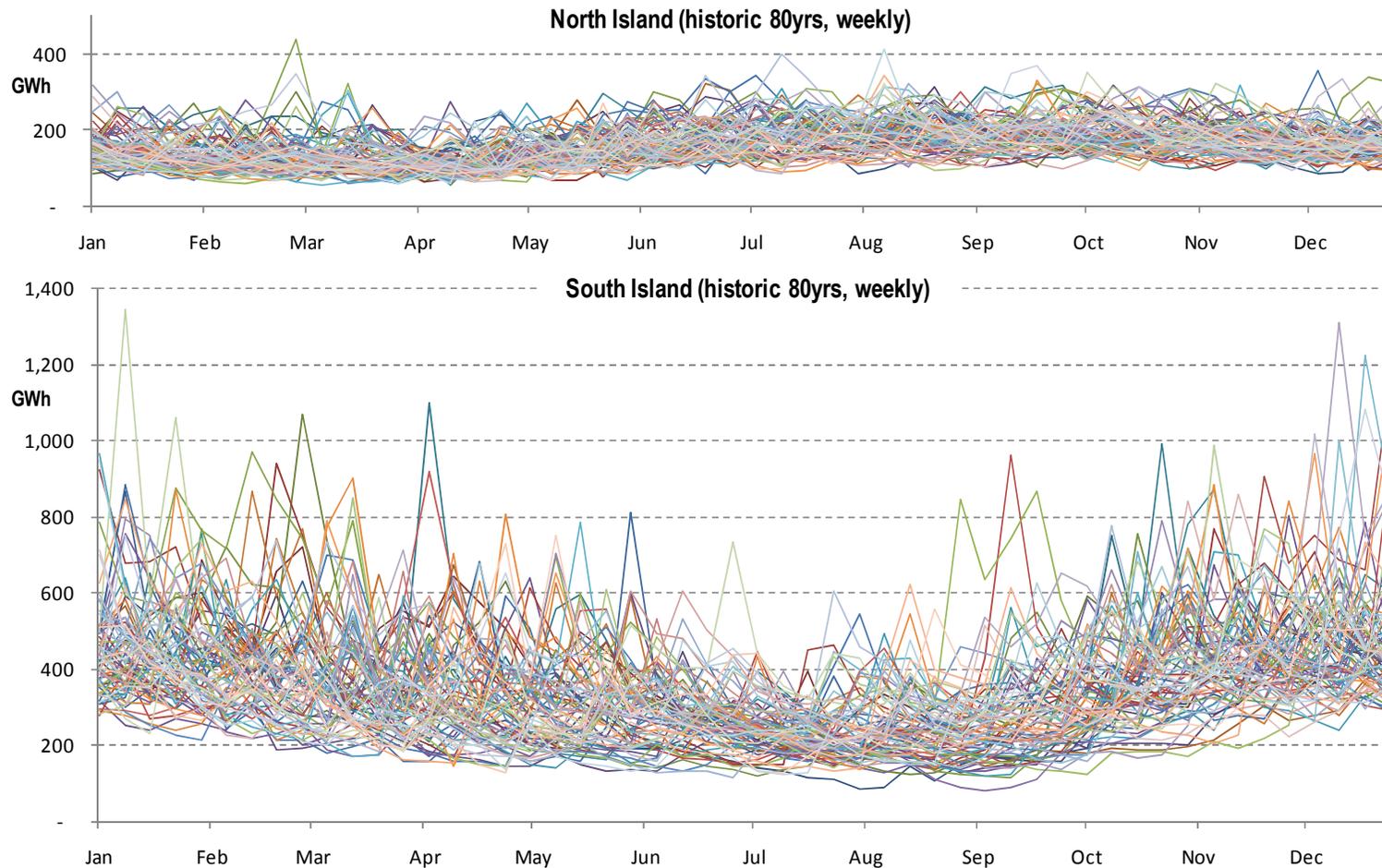


- Inflows dominated by rainfall and snow
- NI inflows driven by winter/spring rainfall
- SI profile driven by snowmelt over summer
- However, anti-correlation effect is limited



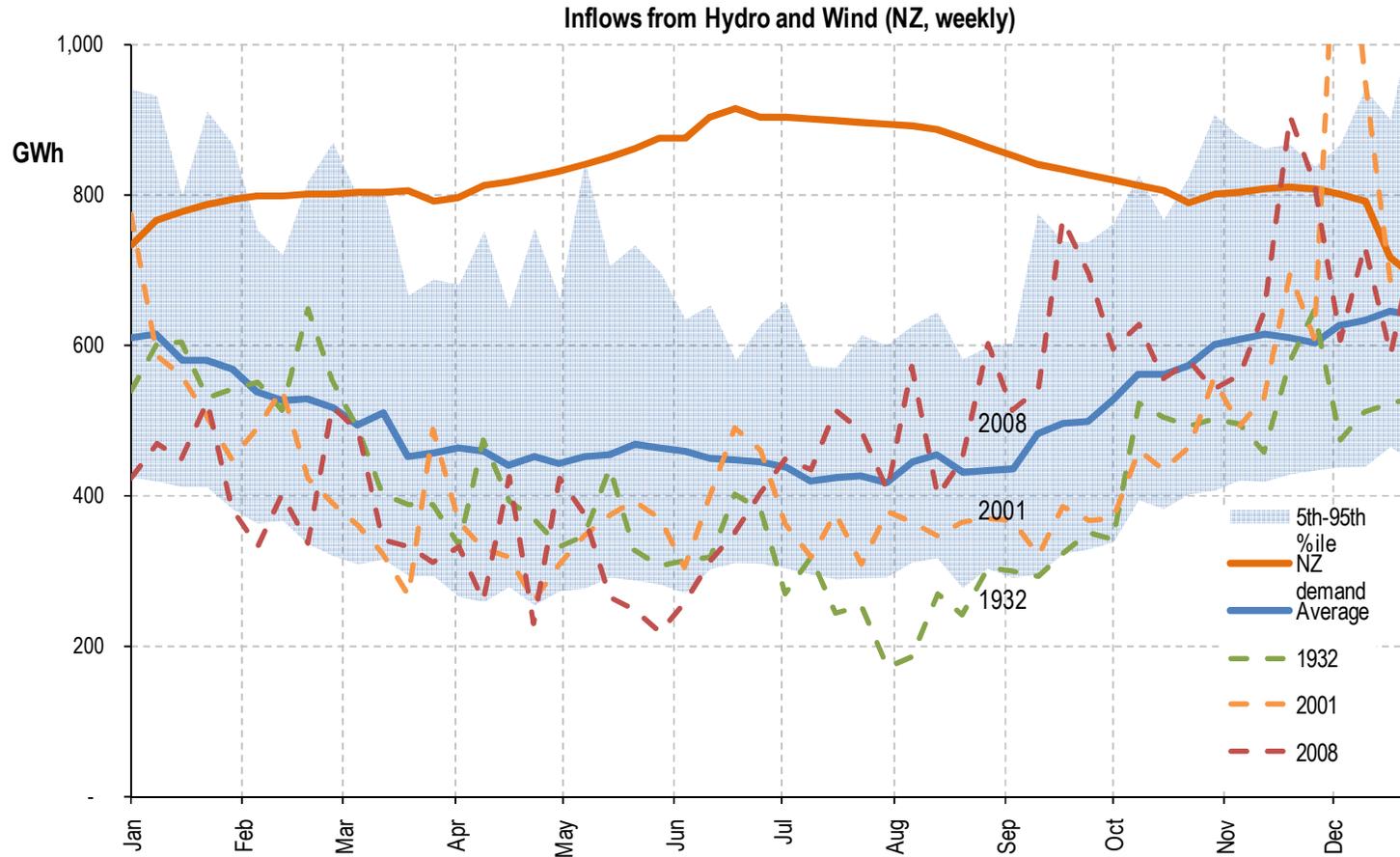
Source: Meridian

... and inflows vary markedly across weeks & seasons ...



Source: Meridian

...while inflows are anti-correlated with demand

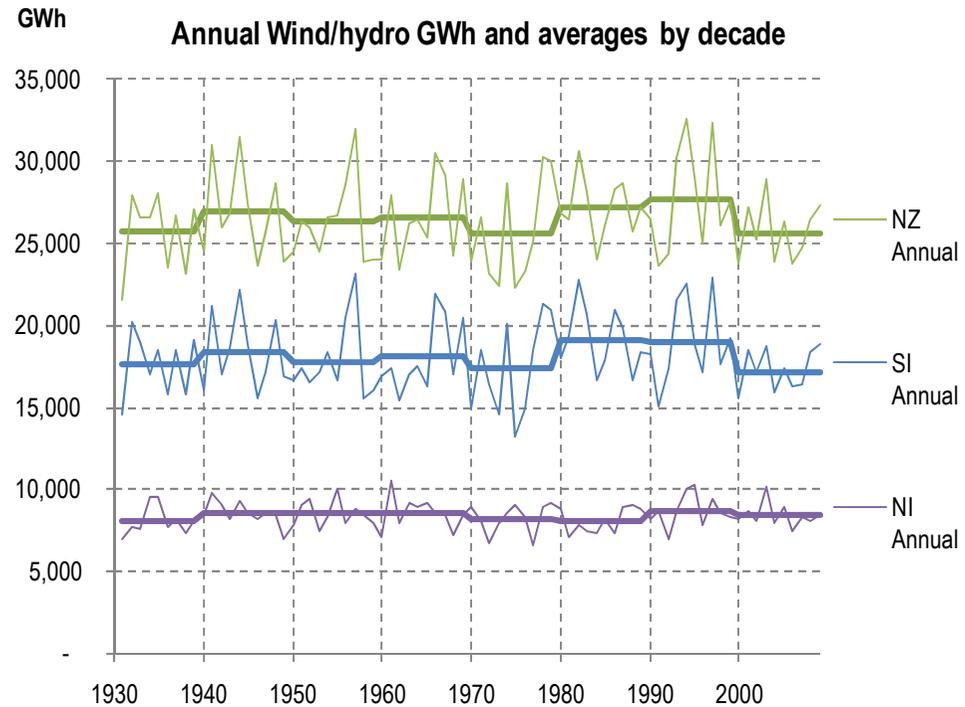


Source: Meridian..

Limited long run trend information is available from historical information



- Science of weather prediction inexact (expected vs forecast)
- Long-term cycles observable after the fact
- While we do model snowpack and gain some insight from snow storage...
- ...historic distributions best indicator of future variability

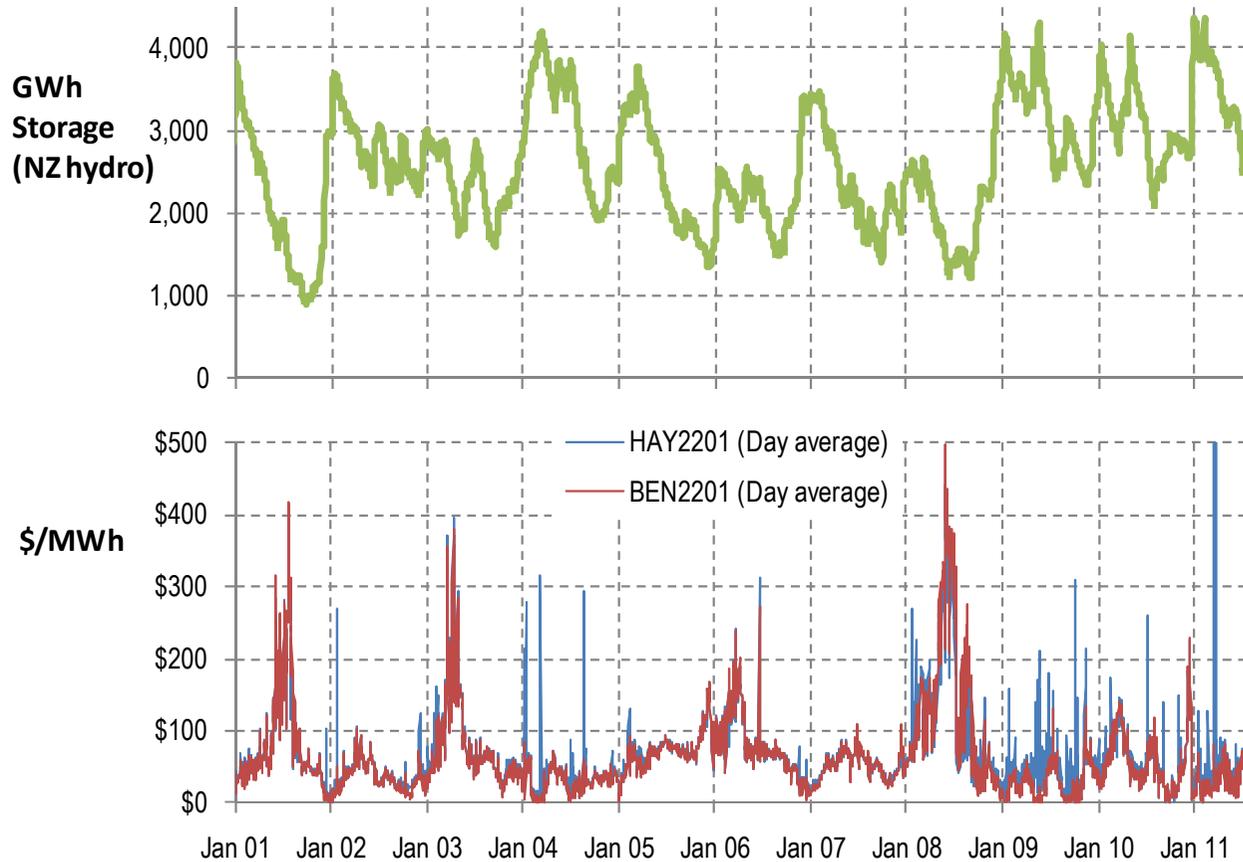


Source: Meridian

All this volatility reflected in wholesale prices



- This price volatility impacts **all** market participants

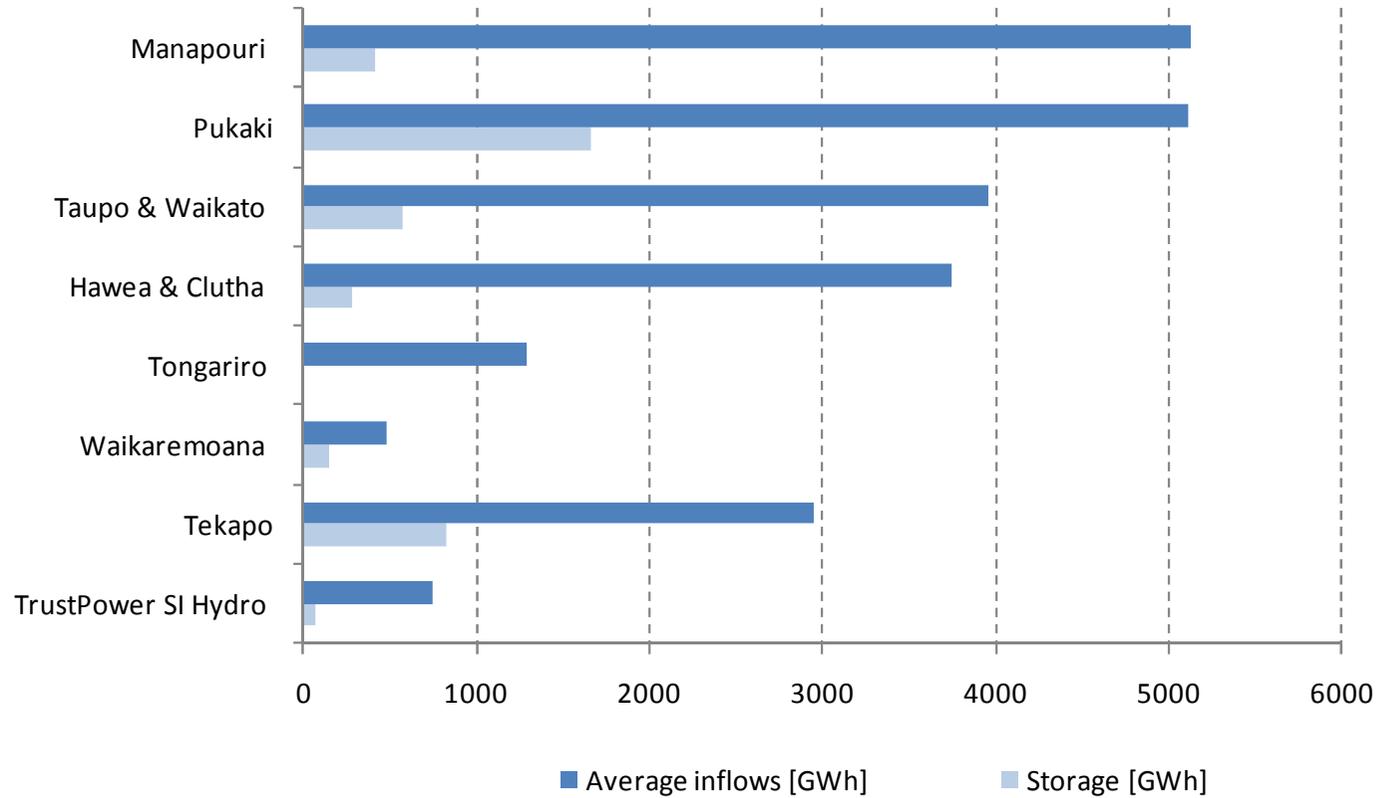


Source: Meridian

Inflows can be stored, but capacity varies

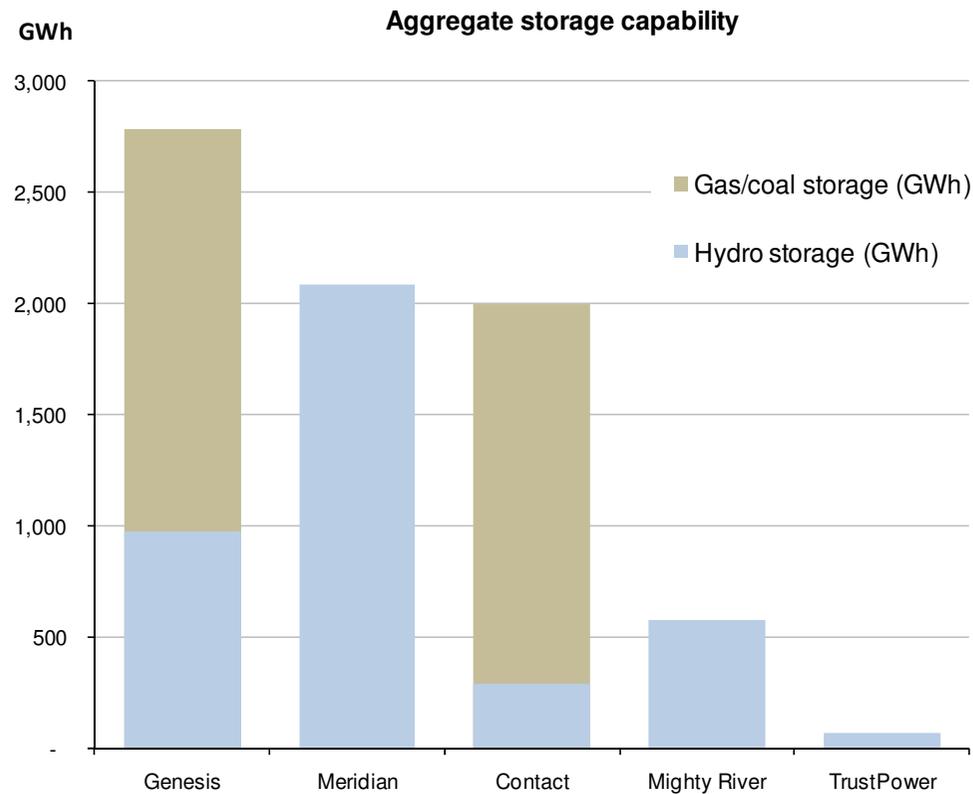


Storage and average annual inflows (GWh)



Source: Meridian

Thermal fuel storage is material

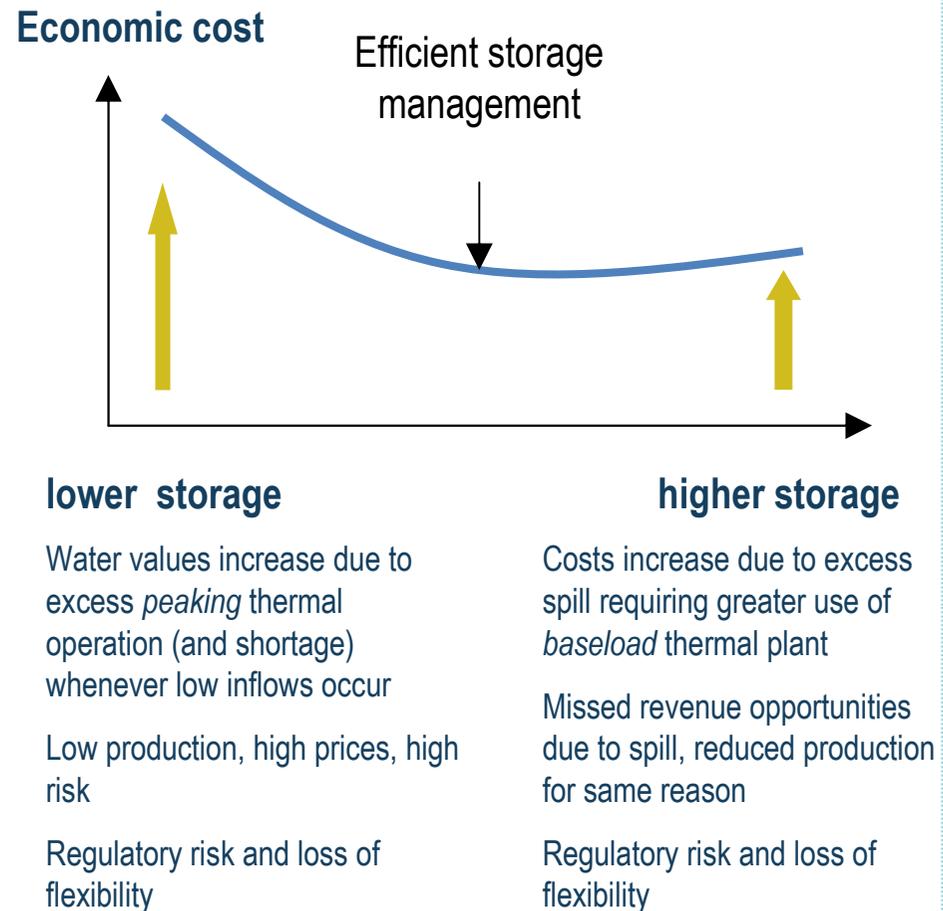


Source: Meridian. Thermal fuel storage reflects estimates of both physical storage capability and plant efficiency.

Reservoir management



- Reservoir management
 - Choice of weekly release of water
 - Balancing value of production for week against potential value if stored for release in later weeks
- Impacted by
 - Demand
 - Offered cost of thermal fuels now but more importantly in the future
 - NZ wide energy storage (both hydro and thermal) for that time of year

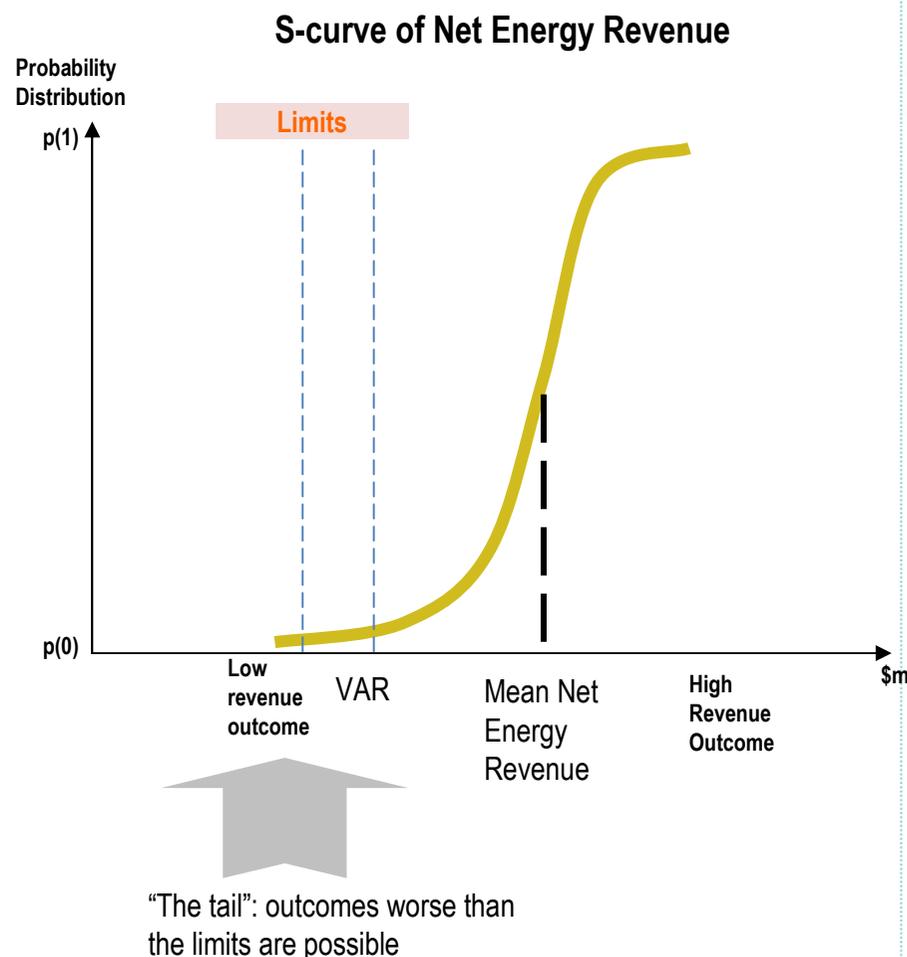




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Meridian Earnings Risks: S-curves

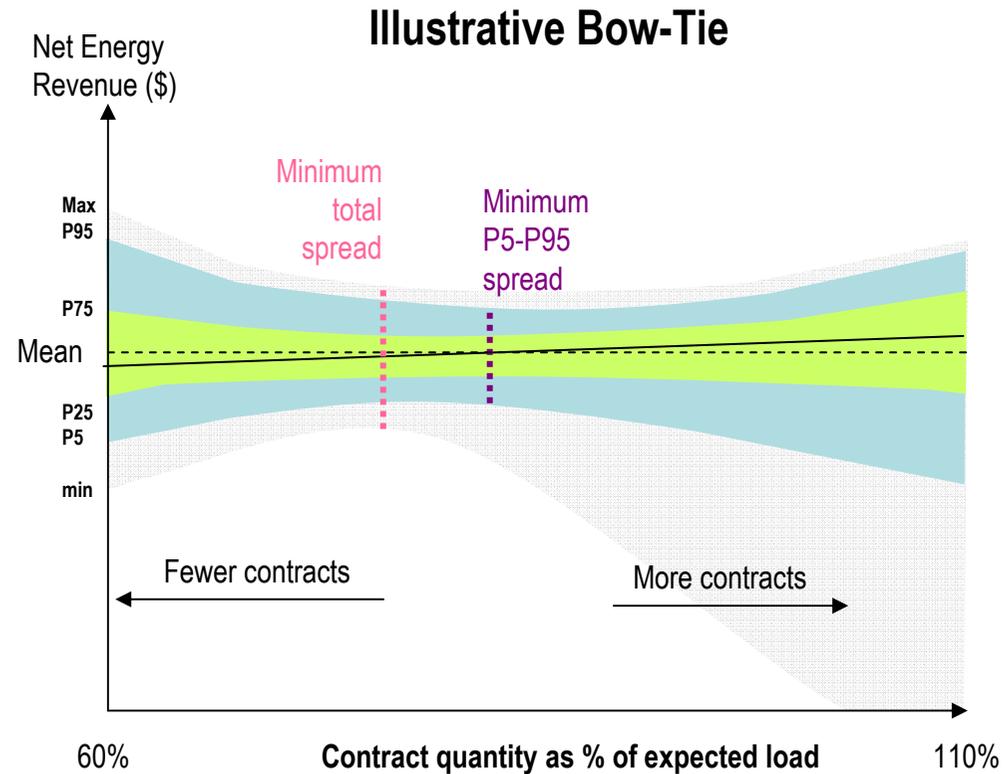
- Portfolio planning process manages the evolving S-curve
 - Committed sales and optimal position combined with simulated price/quantity outcomes indicate direction for trading
- Variability in revenue assessed for each quarter over next 3-5 years (updated weekly)
- Meridian's lower revenue outcomes can be driven by low *and* high inflows



Portfolio Optimisation: Bowtie Indicators



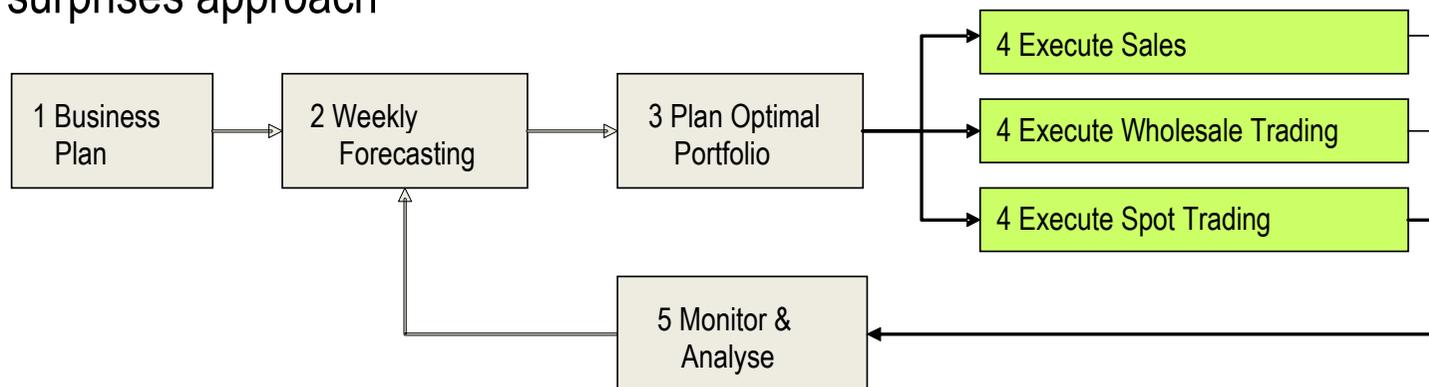
- “Bow tie” a key metric for assessing future revenue risk and contract position
 - Captures interaction of contract position and synthetic price distributions on net energy revenue distributions
- Calculated across multiple timeframes
 - Within-year variations due to load-shape, season and location factors



Meridian operates and executes a portfolio management process



- Clearly defined Governance from Board supported by policy and regular reporting
- Appropriate levels of balance sheet headroom, debt/funding facilities in place
- Consistent framework for measuring performance and revenue risks across different timescales and scenarios
- Assumptions scrutinised and updated routinely as market evolves and information revealed
- Extensive experience across all aspects of planning and execution phases
- No surprises approach



We operate a sophisticated modelling toolset

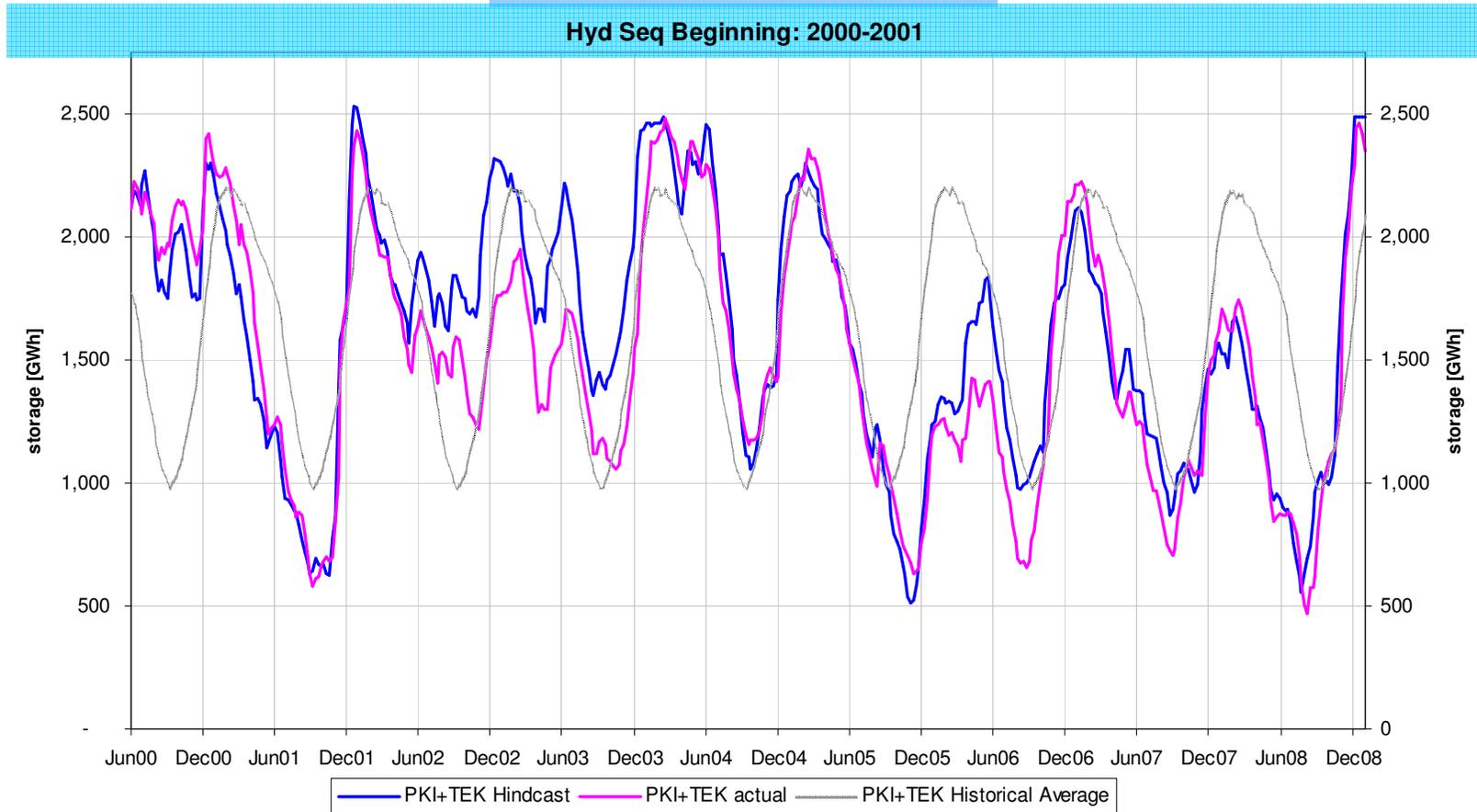


- Analytic tools/models used to explore and manage issues over multiple timeframes
 - Market simulation
 - Snowpack
 - Wind and weather forecasting
 - Demand forecasting
- Tools used to inform experts who ultimately decide and are accountable
- A variety of models used to simulate revenues
 - Modelling impacts of uncertainty in a range of future market conditions
 - Input assumptions reflect future market state via market offers, plant availability, inflow variability, demand and transmission
 - Outputs (water-values and releases) inform trading, reservoir operation and contract valuation

How good are the tools? Hindcasting provides a means to assess effectiveness



Pukaki & Tekapo Hydro Storage: Hindcasting versus Actual

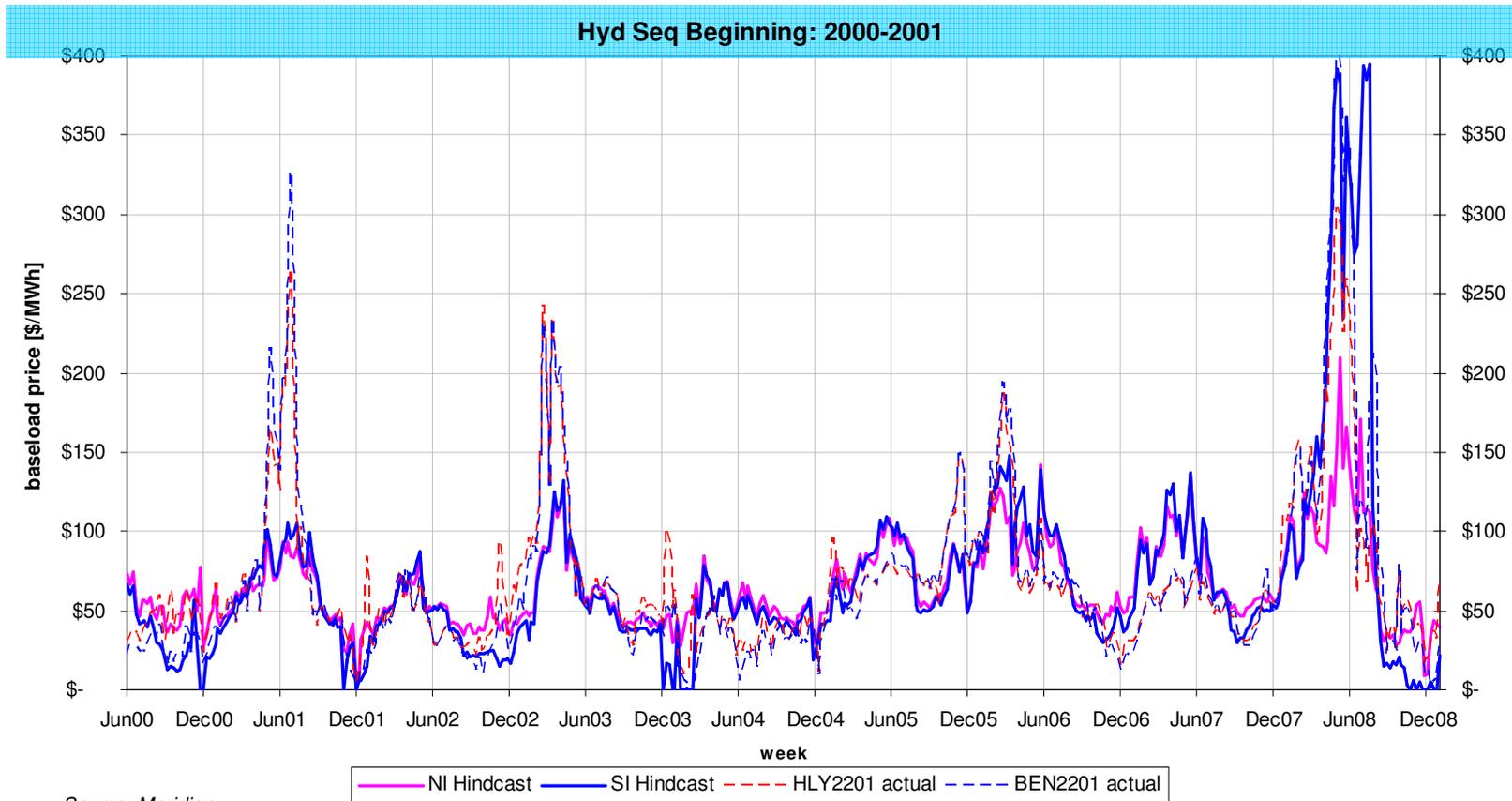


Source: Meridian

Price hindcasting shows similar results, even for extreme hydrology periods



Wholesale Market Prices: Hindcasting versus Actual

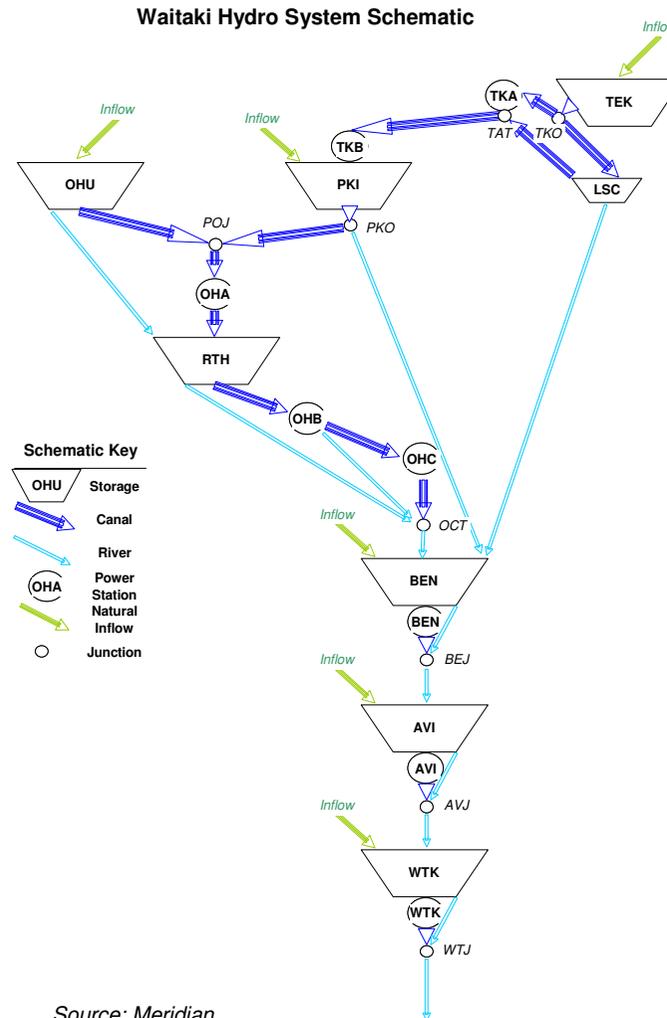


Source: Meridian

Utilising water in real time is complex ... flexibility valuable



- Real-time operations
 - consider physical constraints on storage and head ponds
 - + Local transmission constraints, unit outages, market conditions
 - + environmental and resource constraints
- Uncontrolled or tributary flows vary across schemes and are material
- Strong links between operations and trading



Source: Meridian

We maintain our assets to sustain our ability to maximise revenue



- Reliable and flexible assets required for executing long and short-term strategies
- Individualised asset management strategies depending of the fit of each asset in the portfolio
- High performing assets
 - 0.18% hydro forced outage factor
- Recently completed GKS Hydro benchmarking analysis
 - 40 stations, 1,525 generating units with 100,000 MW of installed capacity
- Comparatively
 - Manapouri a leader
 - Waitaki in the upper quartile
- Cost performance
 - sub \$5/MWh cost in upper quartile, well below average of ~\$20/MWh
- Continuous improvement opportunities remain and are built into regularly reviewed asset management plan

Summary



- Inflow variability is the dominant uncertainty faced by us and all market participants
- We understand hydrology risk and manage it effectively
- Our asset management capabilities are effective and support our hydrology management and wholesale trading activities
- Reliable hydro plant, storage capability, and expert analytics give Meridian significant flexibility to maximise the value from the assets, particularly post Pole 3 commissioning