JARDEN

An equity analyst perspective on capacity markets in NZ

Discussion document for MDAG meeting

21 April 2020

Nevill Gluyas, CFA +64 4 496 5338
nevill.gluyas@jarden.co.nz

Summary

One analyst's perspective on proposals to introduce capacity mechanisms

- **Resumption of renewables growth expected** fall in average prices seems likely, new builds likely to achieve GWAPs >= LCOE. Decline of thermal baseload set to continue.

- **Electricity market appears to be operating well, energy-only market arrangements still seem sufficient.** (although UTS claim decision will be interesting). More depth and cap-type instruments on the forward market will always desirable, remains a work-in-progress. Using vanilla non-gamed SRMC offers, our hydro-thermal model suggests low-use thermal reserves remain economic even after a large renewable build programme.

- **Toying with capacity markets or strategic reserve?** Questions being asked by politicians and some in the industry whether existing energy-only market arrangements might be unfit for a renewable future, on the basis there may be insufficient incentive to build/retain capacity for security of supply.

- **Careful with choices made in other jurisdictions.** Unlike offshore markets, NZ prices are heavily influenced by water values. Shortage pricing and high cost backup are factored into daily spot prices via water values, which respond dynamically to moving forecasts of market-wide grid, fuel and generation capacities. Also unlike many overseas markets, peaking/storage plant in NZ can earn revenue streams from both traditional peak demand plus hydro-firming roles.

- **Hydro-thermal modelling is required to inform the right decision.** ICCC's detailed work is the only modelling we've seen that might address these concerns in an NZ context. But it is set 15 years in the future, warranting caution for such a long-dated window. Our H-T model can only make a rough pass over these questions (reserves, grid and hydrology are incorporated, but wind regulation and strategic reserve operating rules aren't).

- **Key concern is that a shift to managed capacity targets and/or strategic reserve could undermine generation investment signals.** We perceive a high risk for sector economics if capacity market or strategic reserve mechanisms are introduced: our modelling indicates NZ's hydro-thermal market outcomes would be sensitive to risk-averse capacity decisions. Our biggest fears would be **1) displacement of private capacity investment** outside the managed scheme (encouraging new demand response and using growing flexibility at Huntly Unit 5 seem important) **2) over-procurement of capacity diluting build incentives for new renewables, and 3) efficient operation of hydro storage may mean greater use of lake storage ranges in the presence of a strategic reserve**, and so activate the reserve more often than might have been intended.

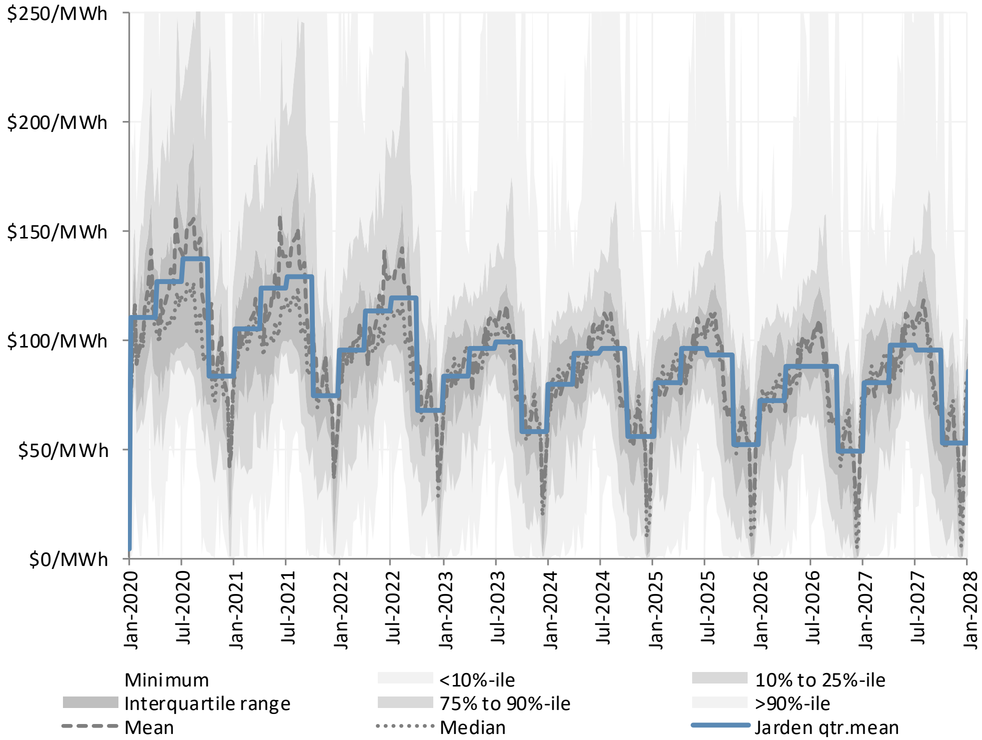
- **Consider a simple market traded product first?** Before leaping into a capacity management program which could stall market-based decision making, we suggest looking into a simple cap product to capture key properties of swaptions, which might be usefully traded in the forward market.

Resumption of renewables growth expected

Broadly inline with possible company intentions, but isn't an optimised expansion plan

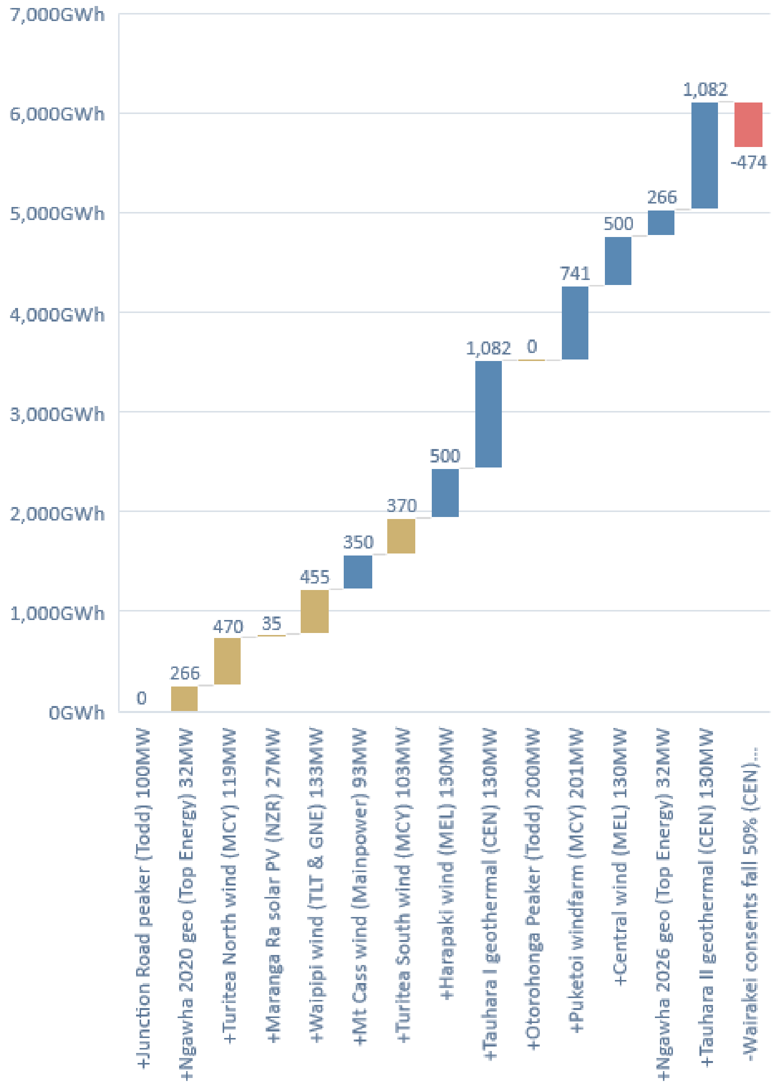
- **Assumes 0.75%pa demand growth forecast**
- **Fall in average prices seems likely, but new builds still achieve GWAPs >= LCOE**

OTA forecast prices distribution across inflows ($/MWh)



Source: Jarden estimates

Jarden base case assumed build profile



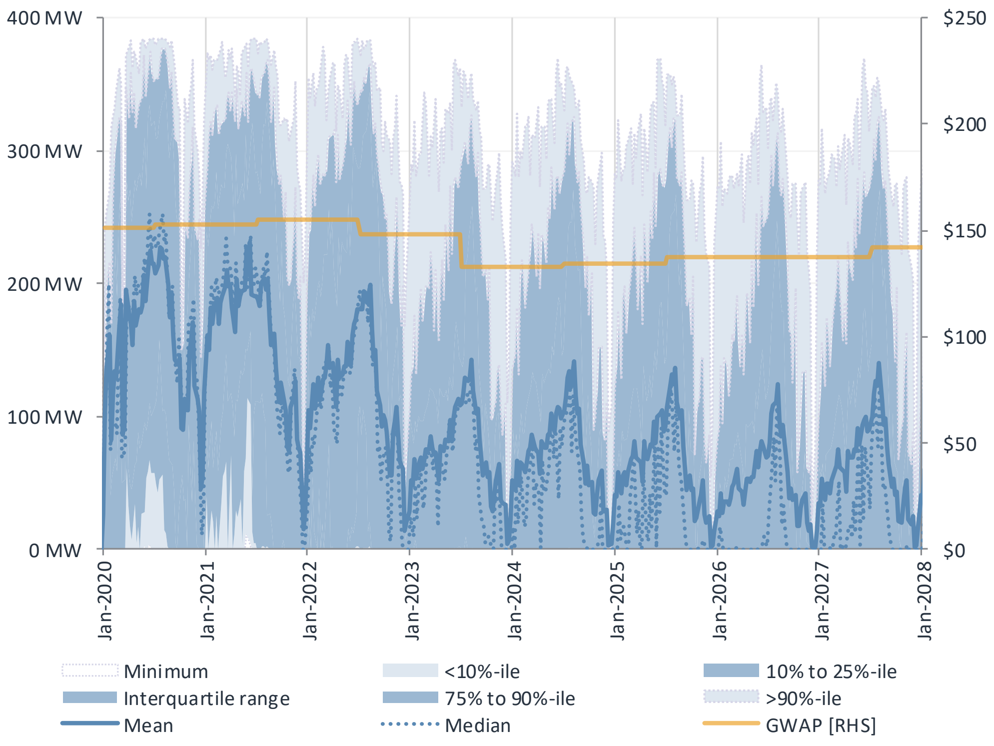
Source: Jarden estimates

Decline of thermal baseload set to continue

New renewables and reduced ToP gas obligations should reduce baseload offers from Huntly Unit 5

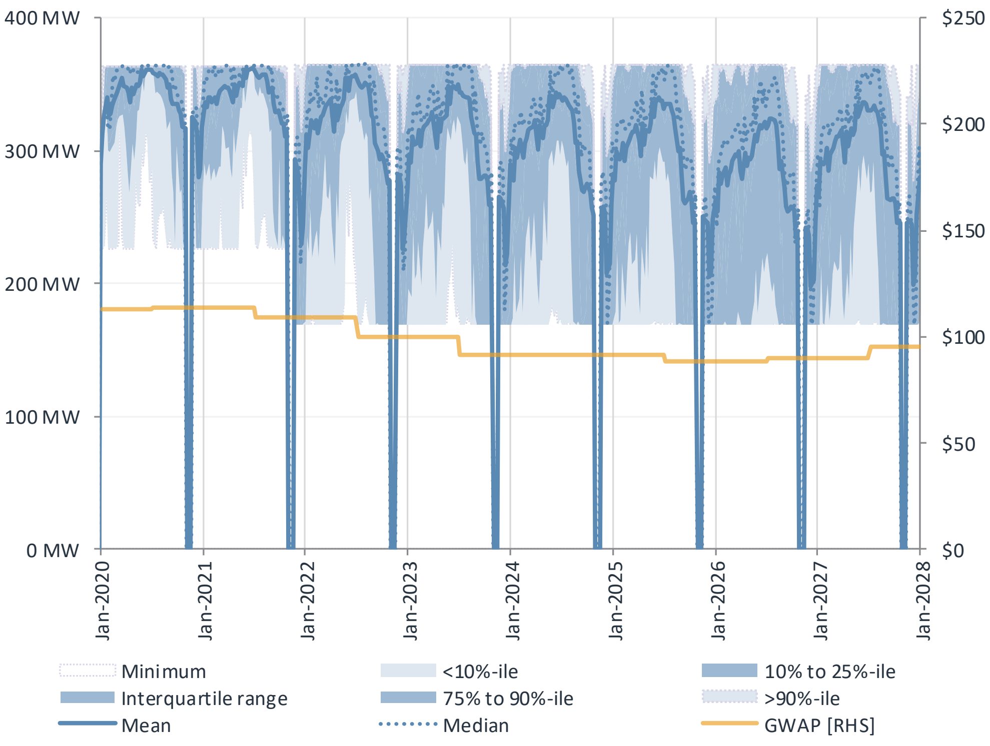
- TCC thermal retirement expected by 2023
- Nova 100MW Junction Rd peaker now completed, are more at Otorohonga likely?

Modelled Huntly Rankine output across inflows (average MW)



Source: Jarden estimates

Modelled Huntly Unit 5 output across inflows (average MW)



Source: Jarden estimates

Flexible thermal still looks economic

Model suggests plant can recover sufficient $/MWpa to recover fixed O&M + capex

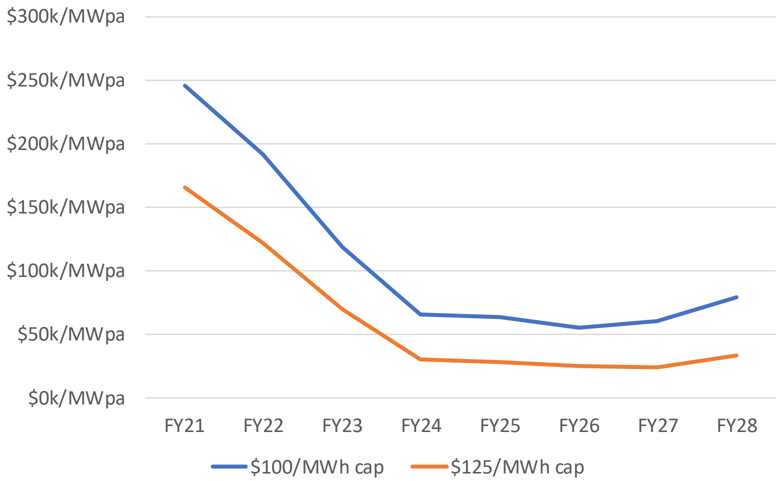
- **Huntly Rankines may need ~$62k/MWpa** to recover ~$30mnpa totex (contrast with $120k/MWpa swaption revenue to 2022) over and above SRMC on coal ~$97/MWh (~$5.70/GJ, $35/tCO2 & 11,000HHV), or above SRMC on gas ~$118/MWh (~$7.50/GJ, $35/tCO2 & 10,500HHV)
- **Junction Road may need ~$105k/MWpa** (= ~$80k/MWpa to recover ~$1mn/MW construction cost @7%, 30 years plus ~$25k/MWpa for $2.5mnpa O&M) over and above SRMC ~$89/MWh (~$7.50/GJ, $35/tCO2 & 9,600HHV)
- **Model only dispatches plant when spot prices are >=SRMC (no gaming assumed). Our base case model output indicates net excess revenues broadly inline with the annual recovery amounts above.**
- **We'd like to see simplified traded contracts that can mimic these payoffs. Table below shows annual payoffs from a modelled 1MW weekly cap contract (i.e. contract pays greater of $0, or 168MWh x [weekly TWAP minus strike])**

Modelled payoffs for a hypothetical 1MW weekly cap

Payoffs to 1MW OTA weekly cap contract		
	$100/MWh cap	$125/MWh cap
FY21	$245k/MWpa	$165k/MWpa
FY22	$191k/MWpa	$121k/MWpa
FY23	$118k/MWpa	$70k/MWpa
FY24	$65k/MWpa	$30k/MWpa
FY25	$63k/MWpa	$28k/MWpa
FY26	$55k/MWpa	$25k/MWpa
FY27	$60k/MWpa	$24k/MWpa
FY28	$79k/MWpa	$33k/MWpa

Source: Jarden estimates

Modelled payoffs for a hypothetical 1MW weekly cap



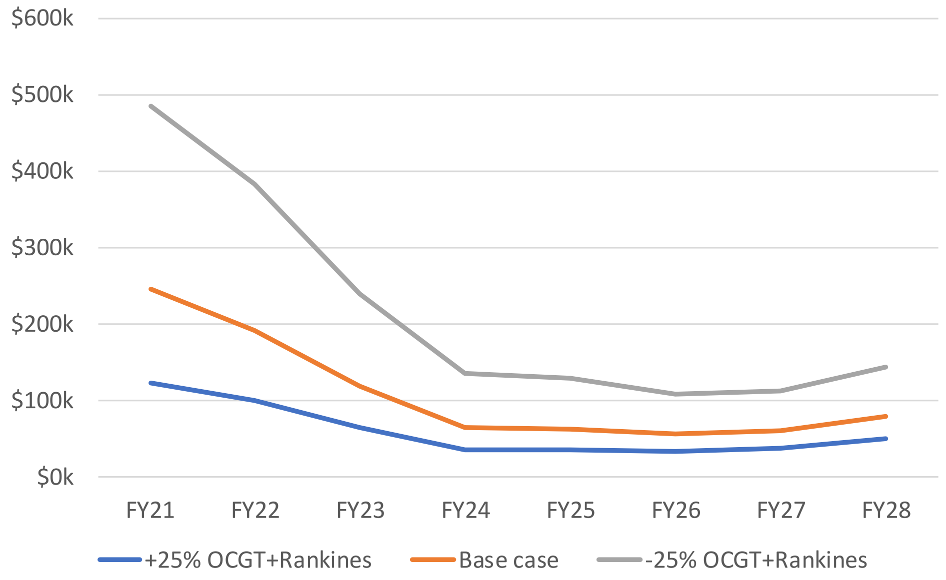
Source: Jarden estimates

Capacity market conservatism could upturn price signals

- **Mean annual payoffs from weekly cap products are a useful way of illustrating the sensitivity to the amount of flexible capacity available to the market, and shown below (re-running the hydro-thermal model assuming a +/-25% or ~250MW sensitivity to OCGT & Rankine available capacity)**
- **Modest increases in available reserve readily translate into much lower cap revenue. So risk-averse procurement of excess capacity would likely to crowd out merchant investment, whereas insufficient reserve procurement seems to readily produce price signals**

Payoffs to 1MW OTA weekly $100/MWh cap contract ($000s/MWpa)			
	+25% OCGT+Rankines	Base case	-25% OCGT+Rankines
FY21	$123k	$245k	$485k
FY22	$99k	$191k	$382k
FY23	$64k	$118k	$240k
FY24	$35k	$65k	$136k
FY25	$35k	$63k	$128k
FY26	$32k	$55k	$108k
FY27	$36k	$60k	$113k
FY28	$49k	$79k	$143k

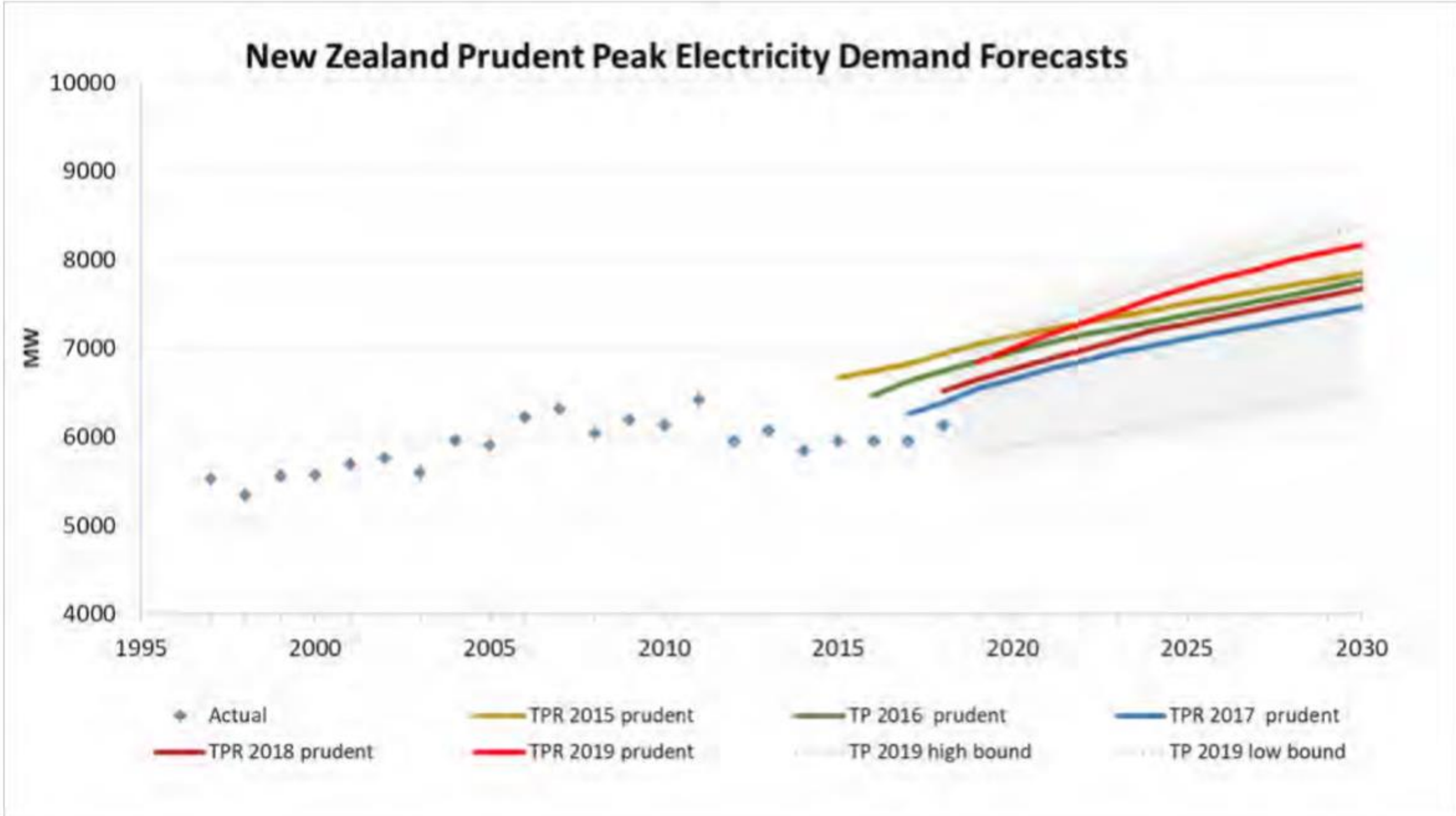
Source: Jarden estimates



Source: Jarden estimates

Managed capacity targets would likely tend to risk-aversion?

Figure 3-2: Comparison of 2019 TPR prudent peak demand forecast with previous TPR forecasts



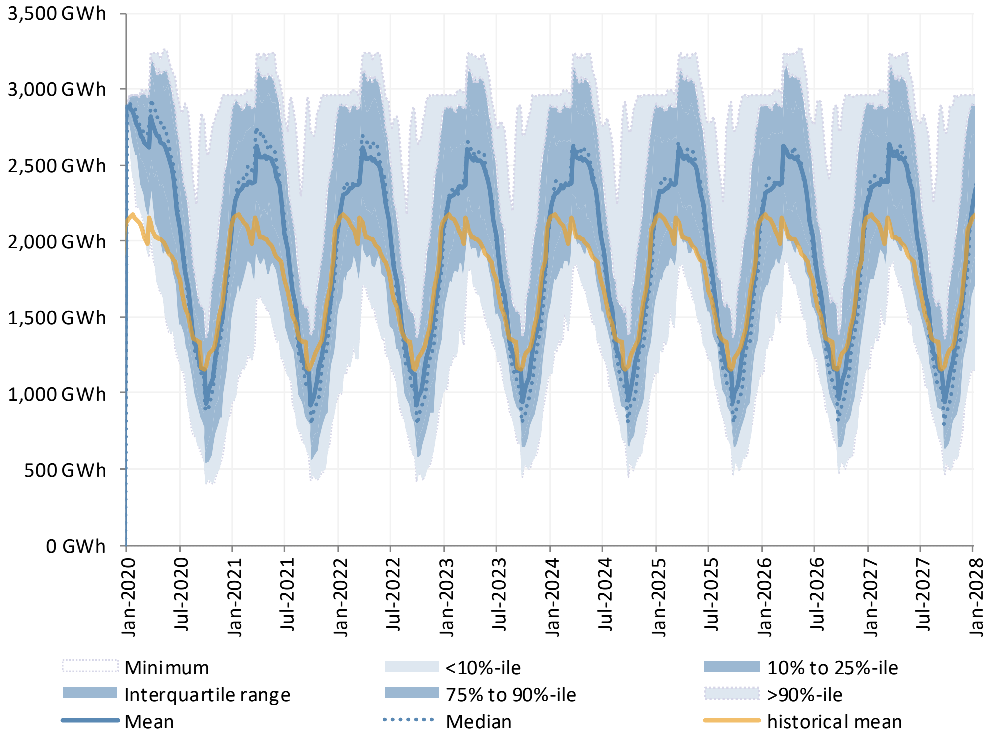
Source: Transpower Transmission Planning Report 2019

Hydro storage use in the presence of strategic reserves

- We don't have mechanisms in the model to reflect an HRC-based dispatch of strategic reserve plant, but is similar to increasing reservoir storage and/or reducing VOLL when storage is empty

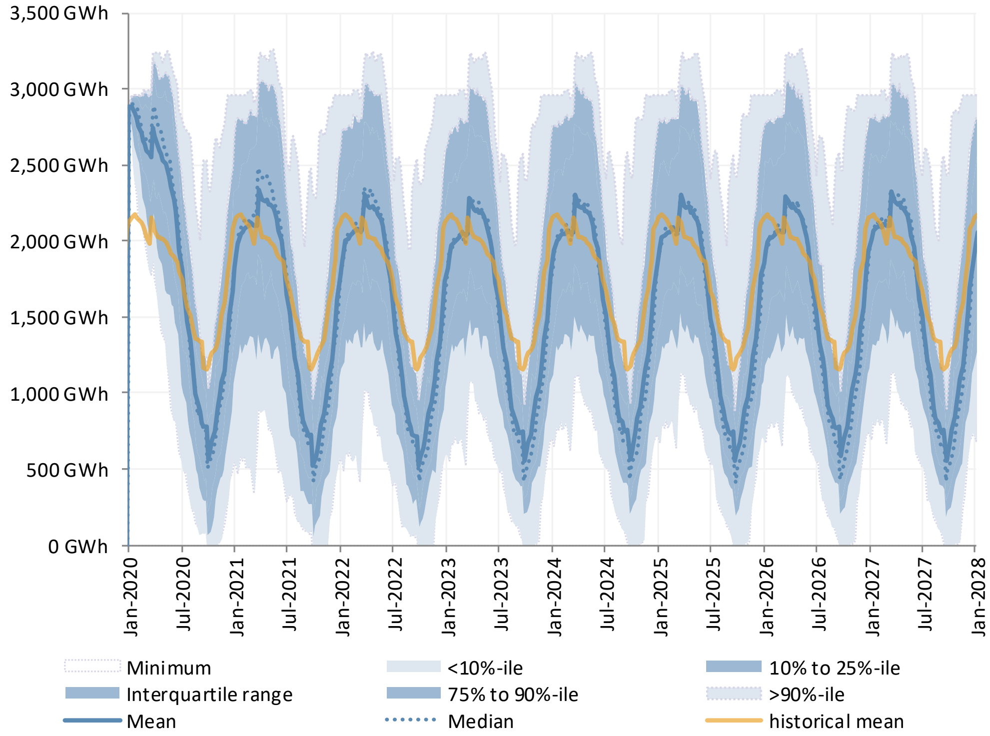
- Only indicative: running a much lowered VOLL when reservoir empty makes only a ~$5/MWh impact on average electricity prices, but has a large impact on optimised lake operation – strategic reserve much more likely to be used

Modelled Pukaki+Tekapo+Hawea storage (VOLL=$10,000/MWh)



Source: Jarden estimates

Modelled Pukaki+Tekapo+Hawea storage (VOLL=$500/MWh)



Source: Jarden estimates

Limitations & Disclaimer - Sales & Research

This publication has been prepared by Jarden Securities Limited ("Jarden") for distribution to clients of Jarden on the basis that no part of it will be reproduced, altered in any way, transmitted to, copied to or distributed to any other person without the prior express permission of Jarden.

The information, investment views and recommendations in this publication are provided for general information purposes only. To the extent that any such information, views, and recommendations constitute advice, they do not take into account any person's particular financial situation or goals and, accordingly, do not constitute personalised financial advice under the Financial Advisers Act 2008, nor do they constitute advice of a legal, tax, accounting or other nature to any person. We recommend that recipients seek advice specific to their circumstances from their adviser before making any investment decision or taking any action.

This publication does not, and does not attempt to, contain all material or relevant information about the subject companies or other matters herein. The information is published in good faith and has been obtained from sources believed to be reliable, accurate and complete at the time of preparation, but its accuracy and completeness is not guaranteed (and no warranties or representations, express or implied, are given as to its accuracy or completeness). To the fullest extent permitted by law, no liability or responsibility is accepted for any loss or damage arising out of the use of or reliance on the information provided including without limitation, any loss of profit or any other damage, direct or consequential. Information, opinions and estimates contained herein reflect a judgement at the date of publication by Jarden and are subject to change without notice. Jarden is under no obligation to update or keep current any of the information on this publication.

Research may include material sourced from Credit Suisse Group. To the fullest extent permitted by law, Credit Suisse Group shall have no liability to Jarden or clients or prospective clients of Jarden or any other person in relation to such research material.

All investment involves risk. The bond market is volatile. Bonds carry interest rate risk (as interest rates rise, bond prices usually fall, and vice versa), inflation risk and issuer and credit default risks. Lower quality and unrated debt securities involve a greater risk of default and/or price changes due to potential changes in the credit quality of the issuer. The price, value and income derived from investments may fluctuate in that values can go down as well as up and investors may get back less than originally invested. Past performance is not indicative of future results, and no representation or warranty, express or implied, is made regarding future performance or investment returns. Reference to taxation or the impact of taxation does not constitute tax advice. The levels and bases of taxation may change. The value of any tax reliefs will depend on investors' circumstances. Investors should consult their tax adviser in order to understand the impact of investment decisions on their tax position. Where an investment is denominated in a foreign currency, changes in rates of exchange may have adverse effect on the value, price or income of the investment. The market in certain investments may be unavailable and/or illiquid meaning that investors may be unable to purchase, sell or realise their investments at their preferred volume and/or price, or at all.

Jarden, its employees and persons associated with Jarden may (i) have held or hold securities mentioned in this publication (or related securities) as principal for their own account, (ii) have provided investment advice or other investment services in relation to such securities within the last twelve months, and (iii) have other financial interests, including as a shareholder of the Jarden group of companies, in the matters mentioned herein. Investors should assume that Jarden, its related companies and affiliated persons and Credit Suisse Group, with whom Jarden Group has a strategic alliance, do and seeks to do investment banking business with companies covered in its research reports. Specific additional disclosures will be made in relation to companies where Jarden Group has a transaction role and publishes research.

This publication is intended for distribution only to market professional, institutional investor and retail investor clients in New Zealand and other jurisdictions to whom, under relevant law, this publication lawfully may be distributed. It may not be distributed in any other jurisdiction or to any other persons. Jarden Securities Limited is a NZX Firm.

A Disclosure Statement is available on request, free of charge.