NZ utilities and energy companies

Speaker notes: NZ Wind Energy Association

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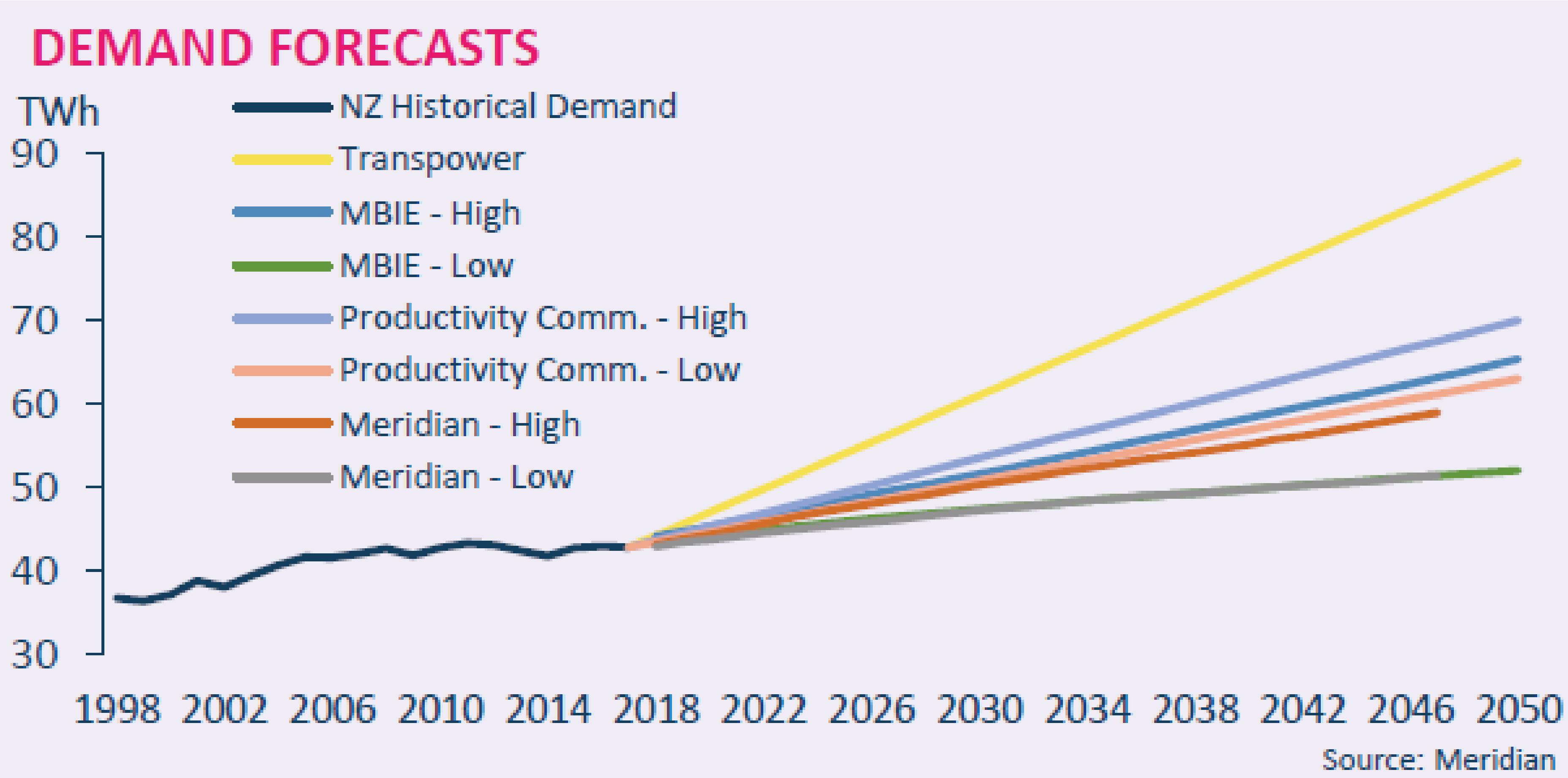
On cusp of change

Government's zero carbon ambition holds promise for electricity demand growth

Forecast electricity demand



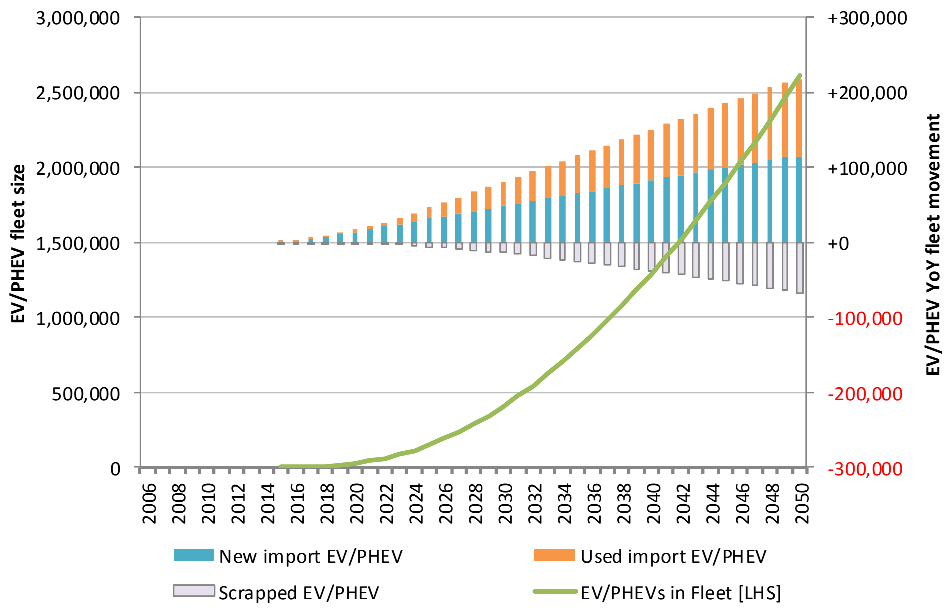
Source: Meridian Energy

- **Demand mostly flat since 2010. Last few years suggest back on maybe 1% track (~400GWhpa)**
- **Anticipation among some forecasters for decarbonisation to drive growth up to >1,000GWhpa**

Change in light vehicle fuel market

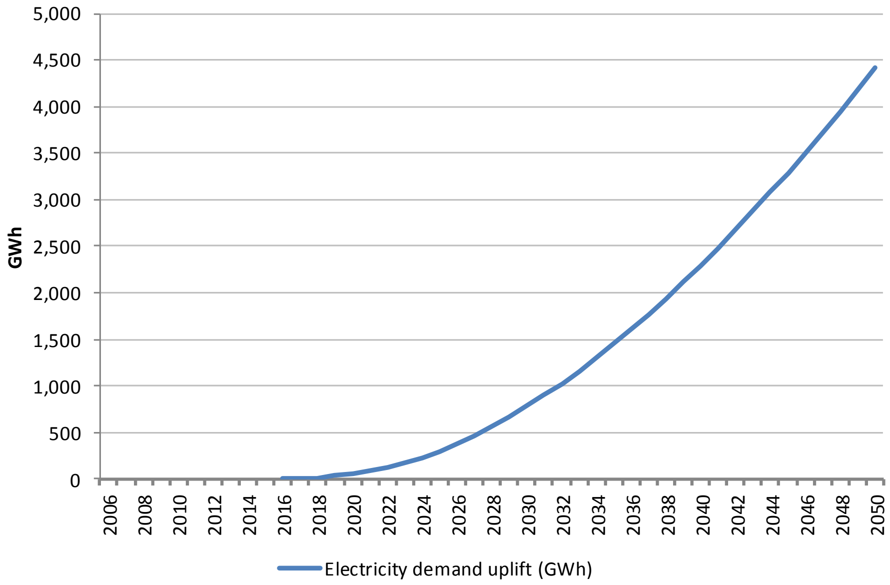
Electric vehicle penetration forms one leg of the decarbonisation story

FNZC Electric Vehicle uptake assumptions



Source: FNZC estimates

FNZC Electric Vehicle electricity demand



Source: FNZC estimates

- **Everyone's forecasts are guesses**
- **Our main views are: 1) a transition to EVs for light vehicle fleet seems certain, 2) Apart (perhaps) from early incentives, NZ uptake will generally mirror rest of developed world uptake, and 3) even our relatively benign scenario above requires a massive increase for rate of global EV manufacture**
- **Maybe the main point from an electricity generator perspective: light vehicle EV fleet represents just one part of the demand growth mix. What will power the heavy fleet and commercial diesel users in the future?**

Change in industrial heat market

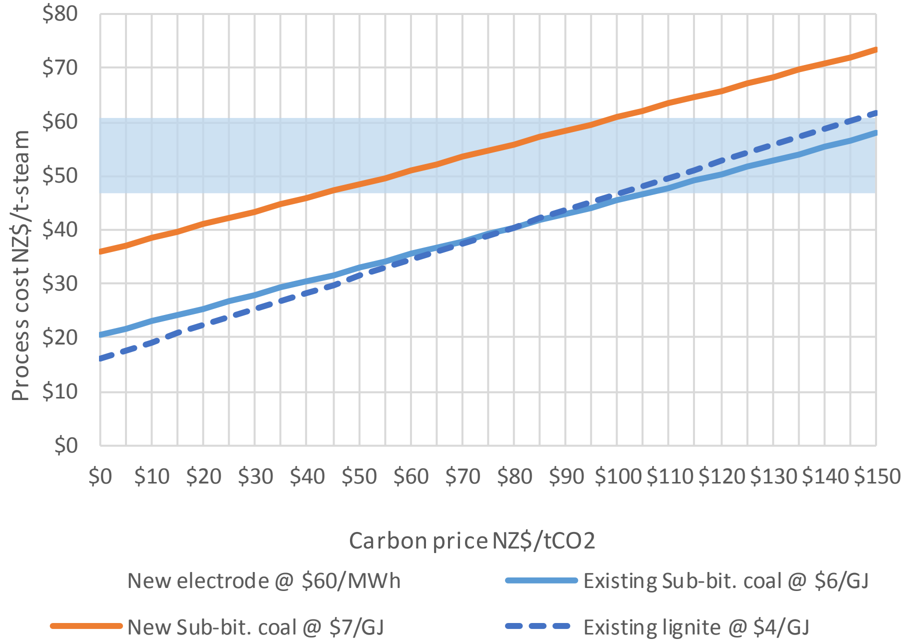
in the short term, industrial heat load conversion possibly presents the larger opportunity

New boiler cost metrics

	Electric	SB coal	Lignite
Capital cost ($000/Mwe)	$350-$700	$650-$950	
Steam production (tonnes p.a. per MWe)	7,583	7,583	7,583
Capital 10-yr recovery $/t-steam	**$4.6-$9.2**	**$8.6-$12.5**	
Other opex cost ($/t-steam)	**$0.3**	**$2.5**	**$2.5**
Annual fuel consumption per MWe (GWh, TJ)	5.2	22.6	25.8
Fuel cost ($/MWh, $/GJ)	$60-$85	$6-$8	$2-$4
Fuel cost ($/t-steam)	**$41-$58**	**$18-$24**	**$7-$14**
Emission rate (tCO2/TJ)	nil	83.3	89.5
Emission cost of steam at $23/tCO2 ($/t-steam)	**$0.0**	**$5.7**	**$7.0**
Total steam cost ($/t-steam)	**$46-$68**	**$35-$45**	**$25-$36**

Source: Synlait data, FNZC estimates

Range of future petrol demand forecasts (mlpa)



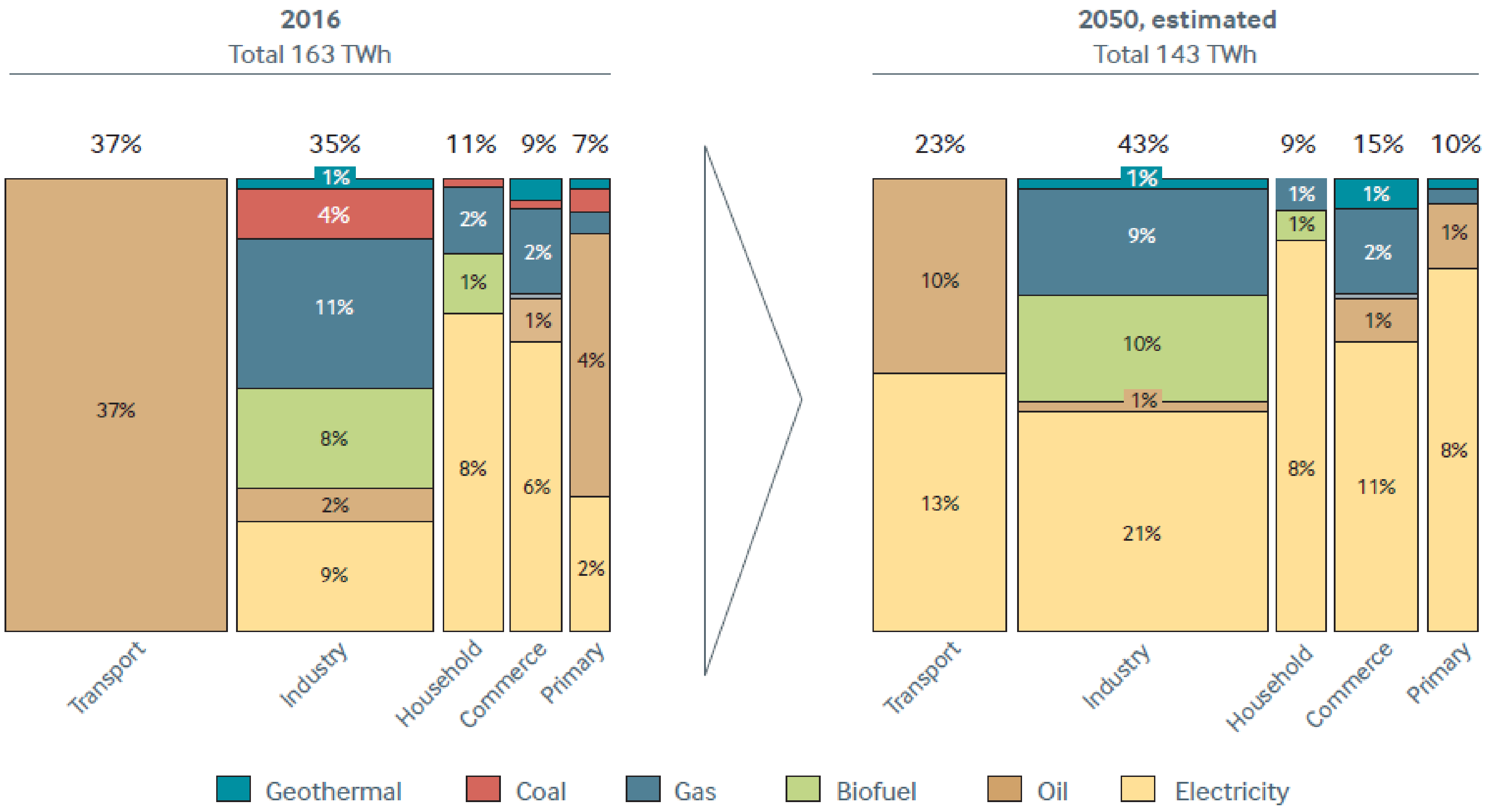
Source: Synlait data, FNZC estimates

- **~55% of dairy boiler energy use was coal-fired in 2016**
- **Our finding from Synlait's figures: NZ$75/tCO2 can just make new electrode boiler decision economic, but a much higher carbon price is required to justify early conversion of the existing boiler fleet**
- **Synlait appears to be a company embracing the potential change**
- **Its larger cousin likely needs a harder push – so electricity sector eyes will all be focussed on iCCC conclusions April/May next year. Either higher carbon price or direct measures are needed to achieve the level of electricity growth factored into the optimistic forecasts**

A wider pool of changes possible

What is the size of the electrification pie?

Estimated delivered energy demand share by type and sector

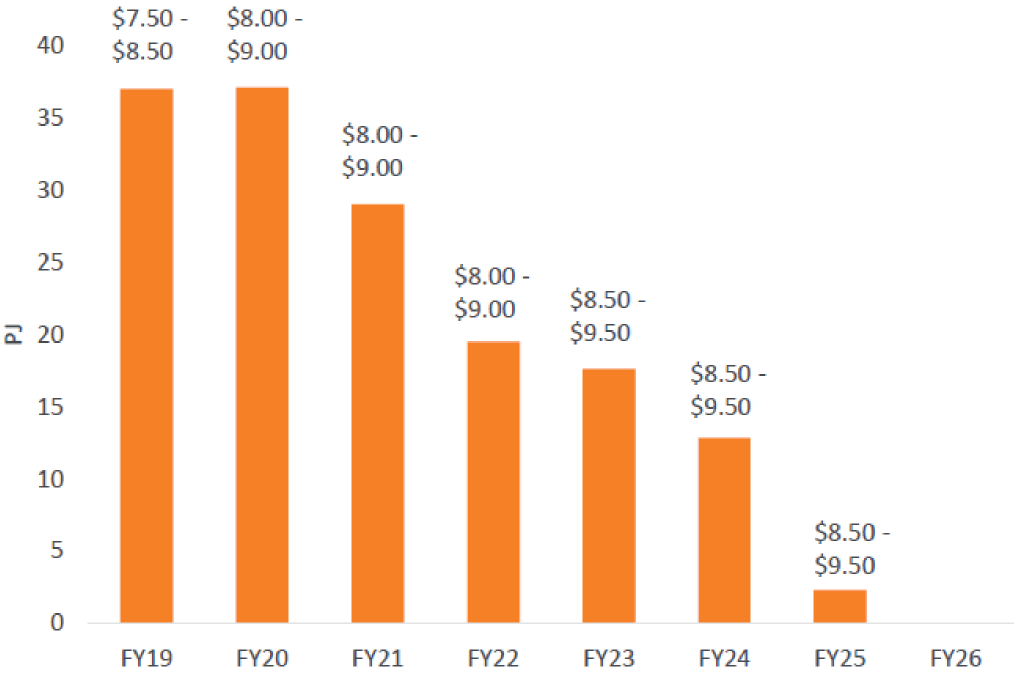


Source: Transpower Electricity Futures (Te Mauri Hiko)

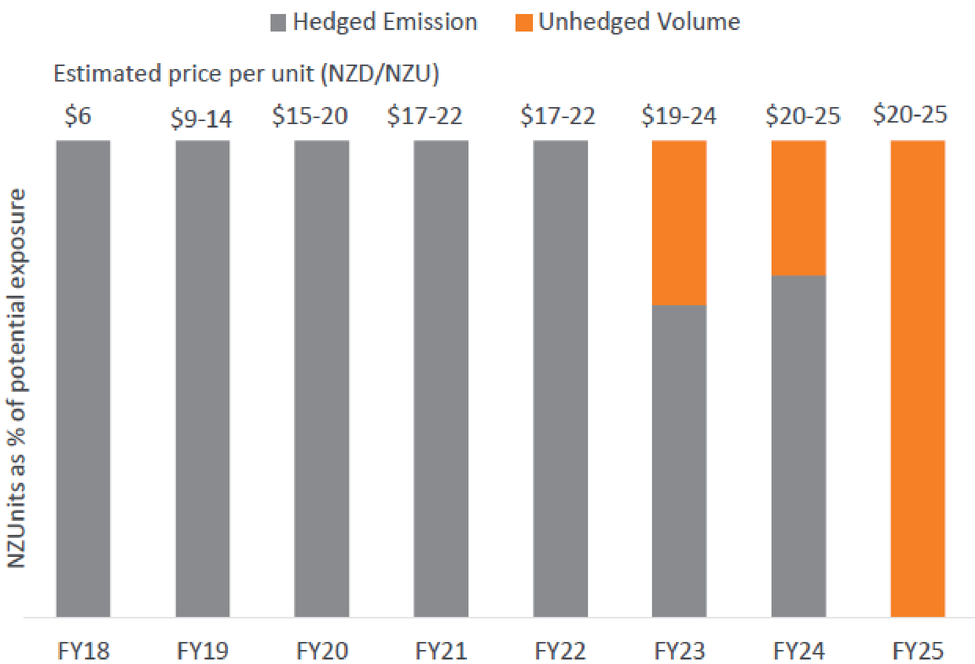
- **While promoting the Zero Carbon Bill, James Shaw described the ultimate goal of the bill would be the eventual conversion of all forms of energy use in NZ down to one fuel: renewable electricity**
- **Other, older ideas are competing though: renewable hydrogen (/ammonia) and biomass**

Thermal generation will reduce, but not close completely

Huntly unit 5 400MW CCGT will be relived of take-or-pay fuel soon, and GNE has forward carbon cover



Source: Genesis Energy



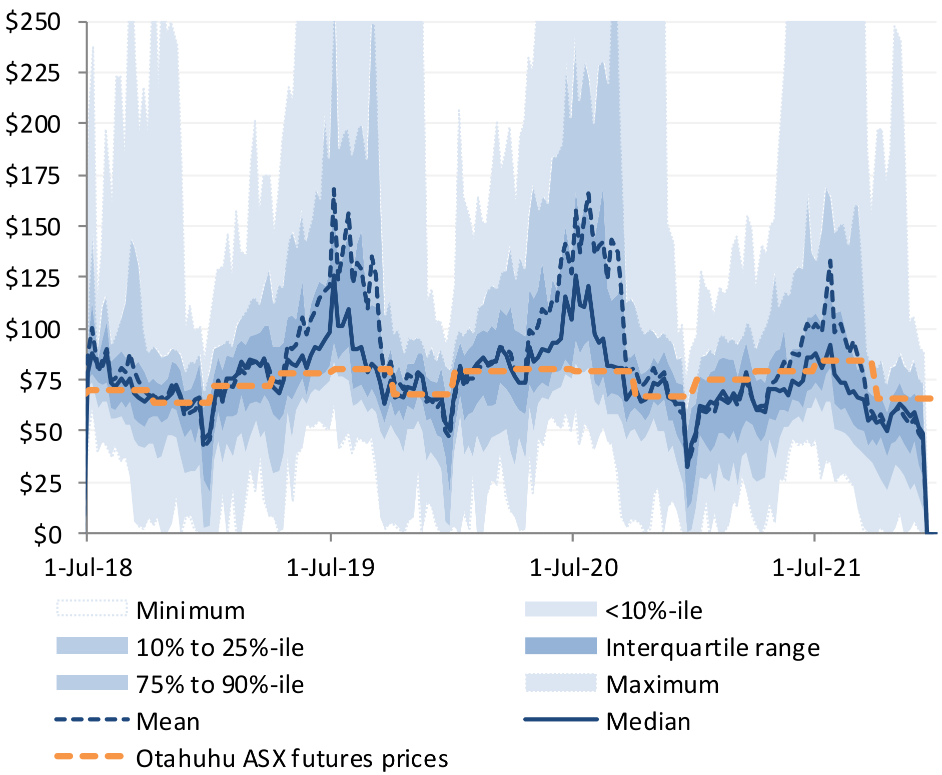
Source: Genesis Energy

- **GNE's 20PJpa legacy take-or-pay contracts from Pohokura will end around FY21**
- **Roughly 10PJpa currently onsold via loss-making wholesale gas sales**
- **10PJpa remainder equates to circa 1,300GWh reduction of Unit 5 generation, and it seems likely to continue shifting to load-following and hydro-swing operation modes**
- **Not the only plant to reduce output – note old Wairakei discharge consents expire 2026 (950GWhpa)**

Huntly Rankines remain a critical part of supply

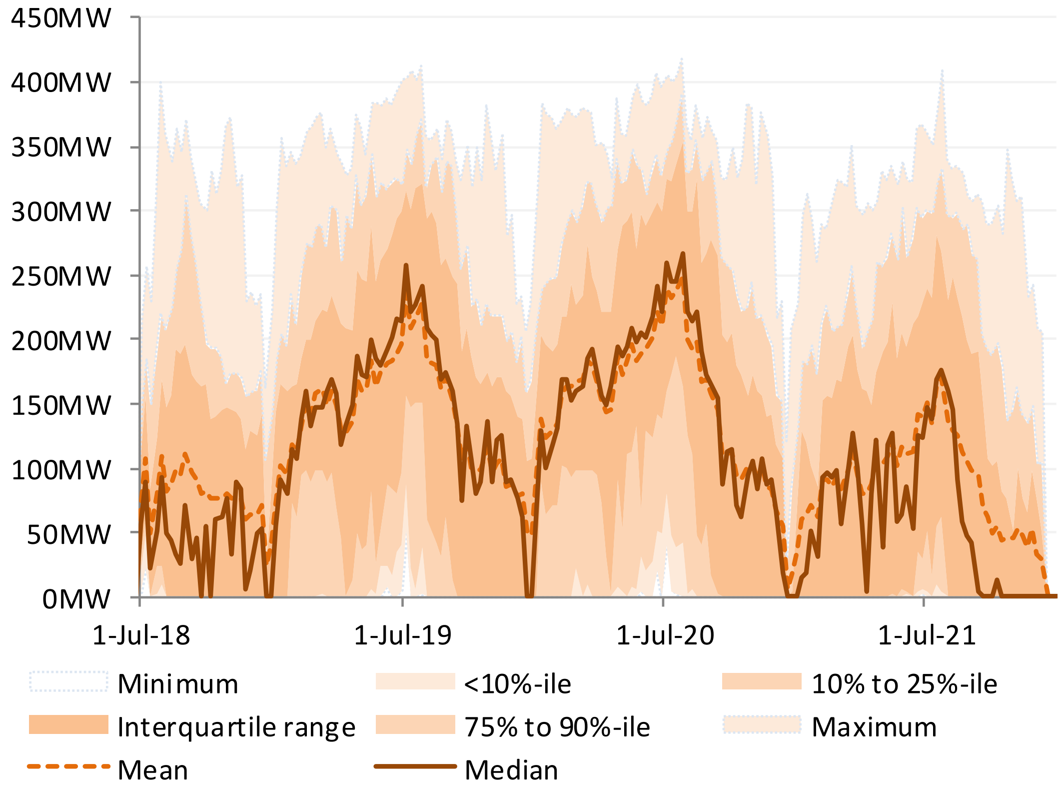
Station stopped being a baseload plant many years ago. Due to swing role can remain resilient to high costs

Otahuhu price path modelled with 300MW baseload renewable added FY21



Source: FNZC estimates

Simulated Rankine output ranges across all hydro sequences



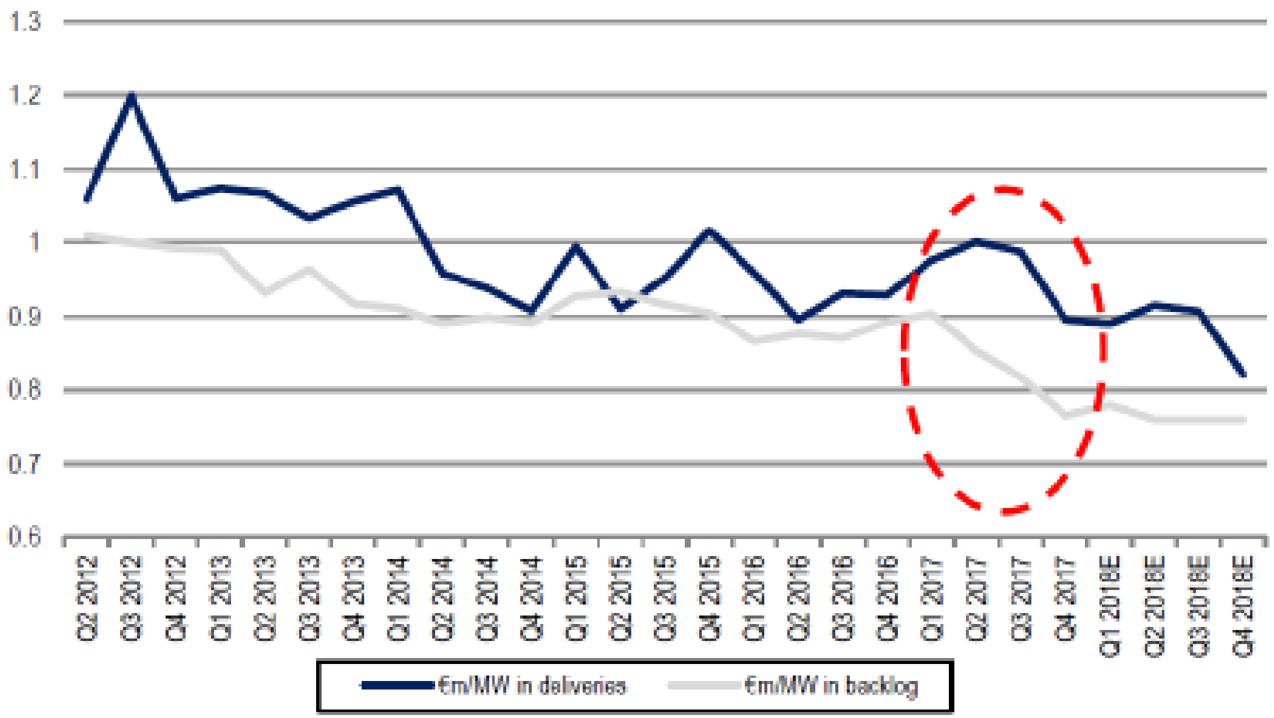
Source: FNZC estimates

- **Scenario above illustrates modelled impact of 300MW geo build in 2021 – prices drop to $70/MWh, but Rankines remain economic ($115/MWh average GWAP in a $70/MWh market)**
- **Media coverage sometimes portray Rankines as important target for electricity decarbonisation**
- **But we think Rankines are an important enabler for decarbonisation of industrial loads and greater renewable penetration, at least in the medium term (GNE says something similar, no surprise perhaps)**

Wind breakeven costs look to sit below the current forward curve

But it may still be too soon to build – forward curve doesn't seem to reflect lower long run cost?

Credit Suisse: Vestas pricing in the backlog and average selling price (EURmn/MW)



Source: Credit-Suisse estimates, Company data

- Our unit cost (LCOE) estimates for wind now sit circa \$60-\$65/MWh (assuming 30-year life, 8.25% WACC for major gentailer, \$37.5k/MW O&M, 42% CF, \$1.9mn/MW)
- Even allowing for an 85% participation rate, still suggests NPV positive at \$70-\$75/MWh
- Sits below the long run ASX, and older ~\$85/MWh benchmark (Tauhara II)

- Look for low LCOE on geothermal updates at next week's CEN investor day, say ~\$65-\$70/MWh
- Lower cost of capital reduces cost on all renewables significantly – if we see independents push projects with cheap capital, then suspect a good chance that price path will also decline
- Tilt's deals with TPW and now GNE suggest wind-following PPA contracts are viable
- Investors reluctant to see listed generators move too early (before demand growth actually arrives)

Electricity Price Review

First report remarkably comfortable with wholesale market function? But hedge market must deepen.

- Promising signs that EPR is giving politicians confidence that decarbonisation agenda can be served by existing electricity market design, without massive price increases for consumers
- Measure to improve forward market depth and liquidity seems certain – likely to help both smaller players with variable generation
- Apparent comfort on first pass over functioning of wholesale market (we happen to agree it has generally worked well) but door left open for a “fairness” driven reallocation of transmission costs to existing generation?
- Will watch submissions on first report – expect many may encourage greater change – likely to argue larger players at an advantage, and recommend measures to support smaller renewable developers?

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