The background features a dark blue field with glowing yellow and white circuit traces. Several cylindrical battery icons with a lightning bolt symbol are scattered across the scene, some appearing to glow or be part of the circuitry.

Distributed Energy Storage Batteries as a Pathway to a More Robust and Lower-Cost NZ Electricity System

James Joyce – Triskelion Partnership

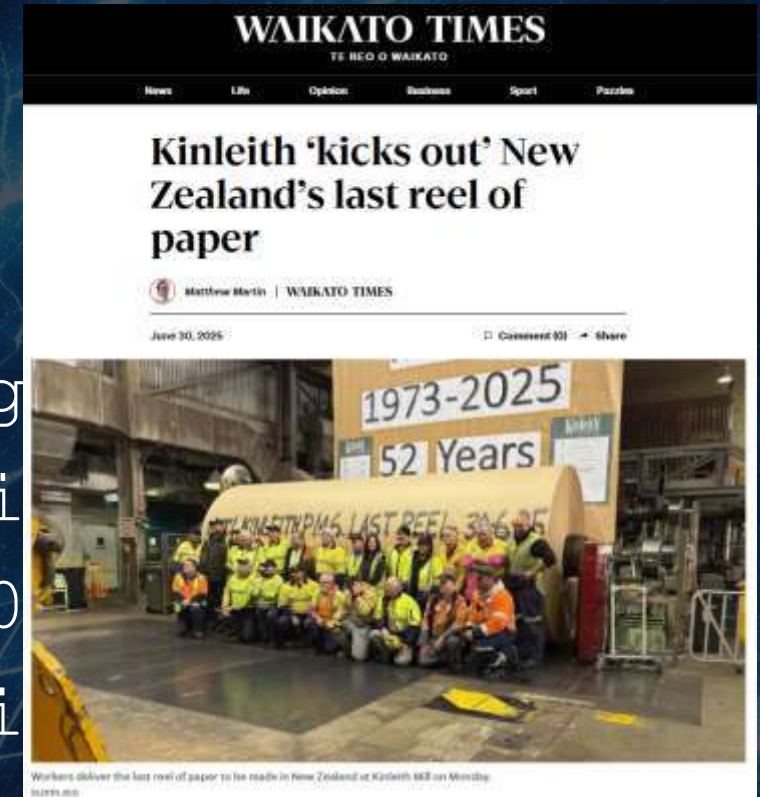
Bill Heaps – Energy for Good

CEP Conference 2026, Hamilton



The Why

- Domestic gas supply declining
- Electrification accelerating
- Solar + wind uptake accelerating
- Hydro inflow volatility increasing
- 2024 winter price spikes (> \$800)
- Energy sovereignty concerns rising



**Can distributed storage deliver a cheaper,
more resilient electricity system than LNG
peakers and/or pumped hydro?**

Variable Renewable Energy: The 100-Hour Problem

- VRE droughts (Dunkelflaute) can last up to 100 hours
- Hydro cannot always cover these gaps in dry years
- Short-duration Li-ion (2-hour) is insufficient
- NZ needs firming across 2-100 hours

Can distributed storage fill the gap fast and economically?

NZ's 2031 Peak Demand Challenge

- Winter peak: 9 GW
- Twice-daily peak, morning and evening
 - 7 GW x 1 hour → 9 GW x 2 hours → 7 GW x 1 hour
= 32 GWh twice/day
- Dry-year hydro inflow deficit: 5 TWh
 - Around 12.5% of annual electricity consumption
 - Equivalent to avoiding 27.4 GWh per day of hydro use for 6 months

Supplying peak demand with DES solves the 100-hour & dry low VRE events year problems

What Happens If We Don't Act?

- The energy transition will march on, but not fast enough to minimise serious economic pain
Dry year risks remain
- Natural dependence and supply chain risk stays
- Power prices continue to spike in winter
- Industrial curtailment and business closures
- Higher emissions making GHG reduction commitment too hard
- Reduced competitiveness and reputation loss

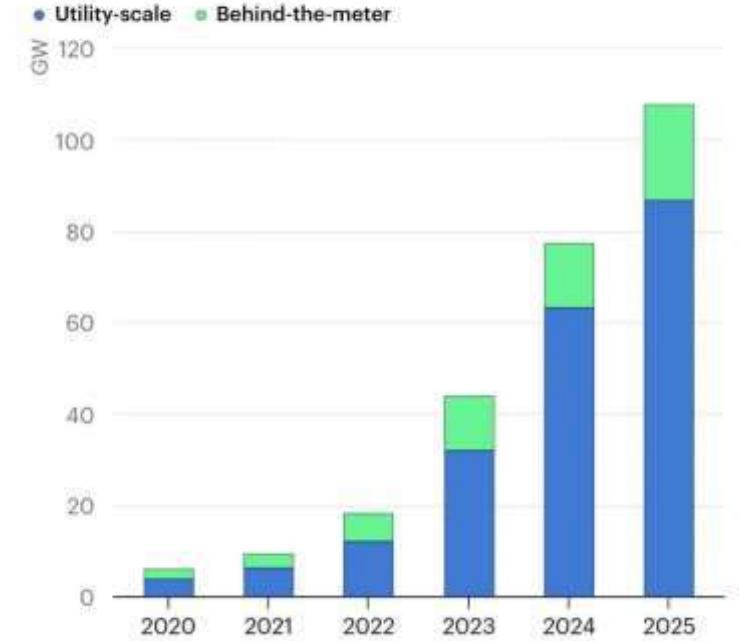
Technology Landscape

- Solar PV: The lowest cost electricity tech
- BESS: costs will continue to decline
 - Necessary to firm solar (and wind)
 - Can be deployed as rapidly as solar PV
- Grid-forming inverters now provide:
 - Ancillary services (frequency and voltage)
 - Fault ride-through
 - Facilitating islanding to maintain supply
 - Black start capability
 - Conventional inertia no longer mandatory

VRE + BESS is now a credible backbone for grid stability.

Battery storage is the fastest growing power technology today

Global battery storage capacity additions, 2020-2025



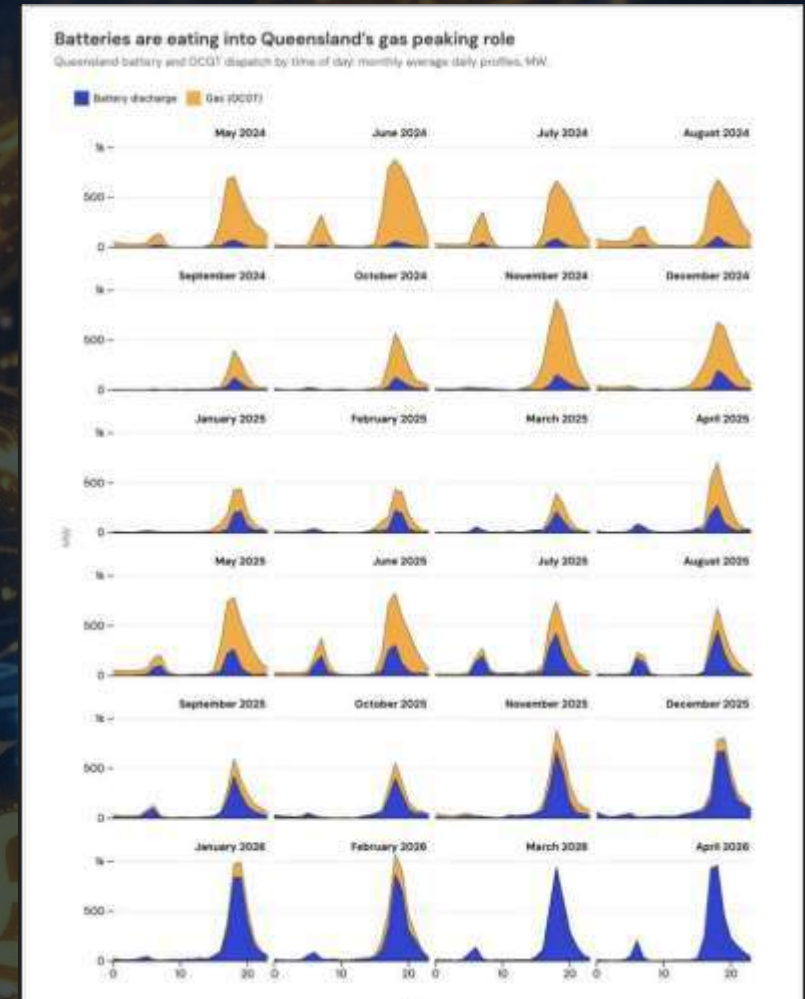
Source: Global Energy Review 2026

iea

Commercial Landscape

- Fossil fuels set winter peak prices
- BESS increasingly out-competing gas Australia
- Distributed storage unlocks:
 - Behind-the-meter investment
 - Virtual power plants
 - Demand flexibility markets
 - Price hedging for households and SMEs
 - Ancillary services

Key to unlocking benefits is real-time price pass through for supply and ancillary services



Levelised cost of technology options

- Lowest-cost options for peak support:
 - Demand flexibility: 10–15 c/kWh
 - Grid-scale BESS: 16–24 c/kWh
 - Home batteries: ~21 c/kWh
- LNG alternative:
 - Retail price impact: +3–8 c/kWh on average price
 - +15–20 c/kWh on peaks



The Winning Combination

- 5-year deployment target (2026 to 2031):
 - 1.5 GW / 6 GWh demand flexibility
 - 4 GW / 16 GWh grid-scale BESS
 - 1.5 GW / 3 GWh EV V2X
 - 2 GW / 8 GWh home & commercial batteries
- Total: 9 GW / 33 GWh
 - Enough to fully eliminate the dry-year problem
 - Releases hydro-lake & network capacity to deal with the 100 hour problem
 - Average retail prices 3-8 c/kWh (\$1-2.4B/year) lower than the LNG option

Why Distributed Storage Wins

- Fastest deployment
 - E.g. Australia has installed 10.7 GWh of DES in less than 12 months
- Leverages private capital
- Enhances resilience and energy sovereignty
- Reduces VRE curtailment
- Enables VPPs and flexible demand
- Reduces grid infrastructure demands
- Adds diversity providing system security benefits

Policy & Industry Recommendations

- Enable real-time price signals at distribution level
- Standardise flexible demand contracts
- Support V2X-ready chargers
- Streamline battery connection and operation processes
- Expand grid-scale BESS at strategic nodes
- Open up ancillary services markets to DER
- Support VPPs and community energy models

Conclusion

Distributed storage is the only solution that can be deployed fast enough, cheaply enough, and at sufficient scale to eliminate dry-year risk by 2031

- DES delivers:
 - Lower system cost
 - Lower retail prices
 - Higher resilience and security
 - Greater energy sovereignty
 - A more flexible, modern electricity system

