

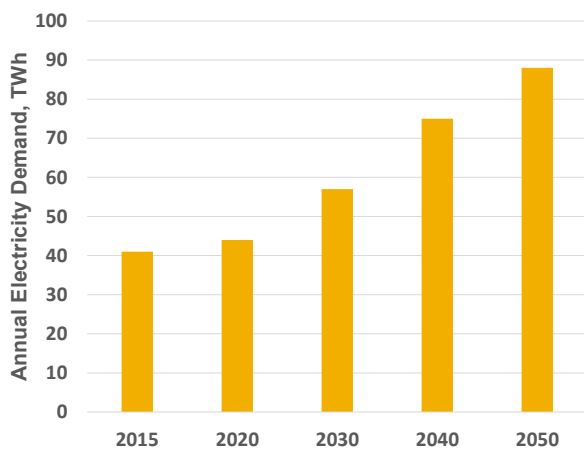


# BESSt mates? Opportunities and challenges for battery storage technology in New Zealand

APEX Summit 2022  
Emilie Feasey

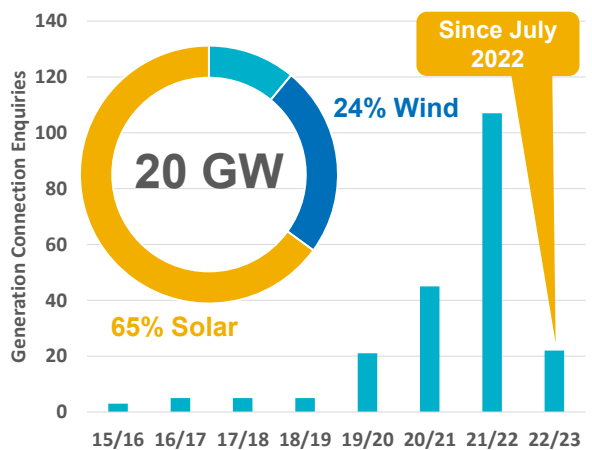


Estimated Delivered Electricity Demand



Source: Transpower

Generation Connection Enquiries



100m solar farm pitch for north Waikato

New Kōwhai Park at Christchurch Airport to generate renewable energy

\$300m plan for five solar energy farms, providing 1pc of country's supply

Puketoi wind farm gets final go-ahead

Janine Rankin · 12:35, Jun 05 2013



Thursday, 22 April 2021

Construction of South Island's largest wind farm to start soon in Nth Canterbury

NORTH CANTERBURY News

By Robyn Bristow

Mercury NZ commits to \$115m wind farm near Gore

(TWh, Acc)



NZ Herald 13 Sep, 2022 09:20 AM · 2 mins to read

Auckland-based Lodestone Energy is planning five solar power stations the upper North Island, generating enough power for about 55,000 households - the equivalent of Hamilton.

Otago Daily Times

4 September 2022

Wind farm 'something we have to learn to live with'



Genesis Energy and Tilt Renewables partner in 75MW Northland wind farm



NZ Herald 2 Aug, 2021 05:35 PM · 4 mins to read

Stuff

Mercury marks two years since work began at the Turitea wind farm

Janine Rankin · 14:35, Oct 26 2021

NZ's largest solar farm to be built near Taupō

Top Google exec backs \$1.3 billion investment in NZ solar power

NEW ZEALAND / ENVIRONMENT

New Zealand's largest grid-connected solar power plant up and running

Save Share

7:44 am on 27 June 2021

Share this



VRE

Variable Renewable Energy

IBR

Inverter-Based Resources

# Why is frequency stability important?

entsoe Interconnected Network of ENTSOES 2019

Electric transmission crosses North American borders

Transmission voltage class

- 230-287kV
- 345kV
- 500kV
- 735kV
- DC line

SUPPLY

51 50 49 48 52

DEMAND

Mitton ElectroNet

## (Some) factors affecting frequency stability

- System inertia
- Reserve capacity
- What is the effect of increasing IBR penetration?

NE\_G1: Frequency [Hz] - Base Case

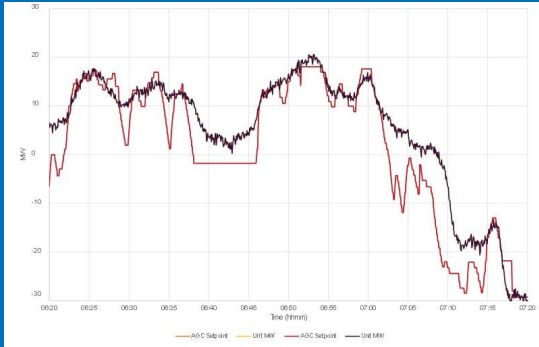
NE\_G1: Frequency [Hz] - Additional Inertia

NE\_G1: Frequency [Hz] - With Sufficient Headroom

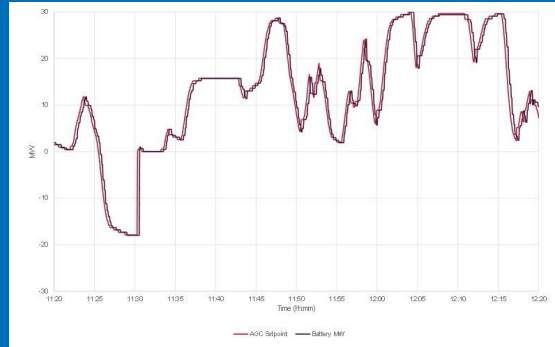
NE\_G1: Frequency [Hz] - With Limited Headroom

Mitton ElectroNet

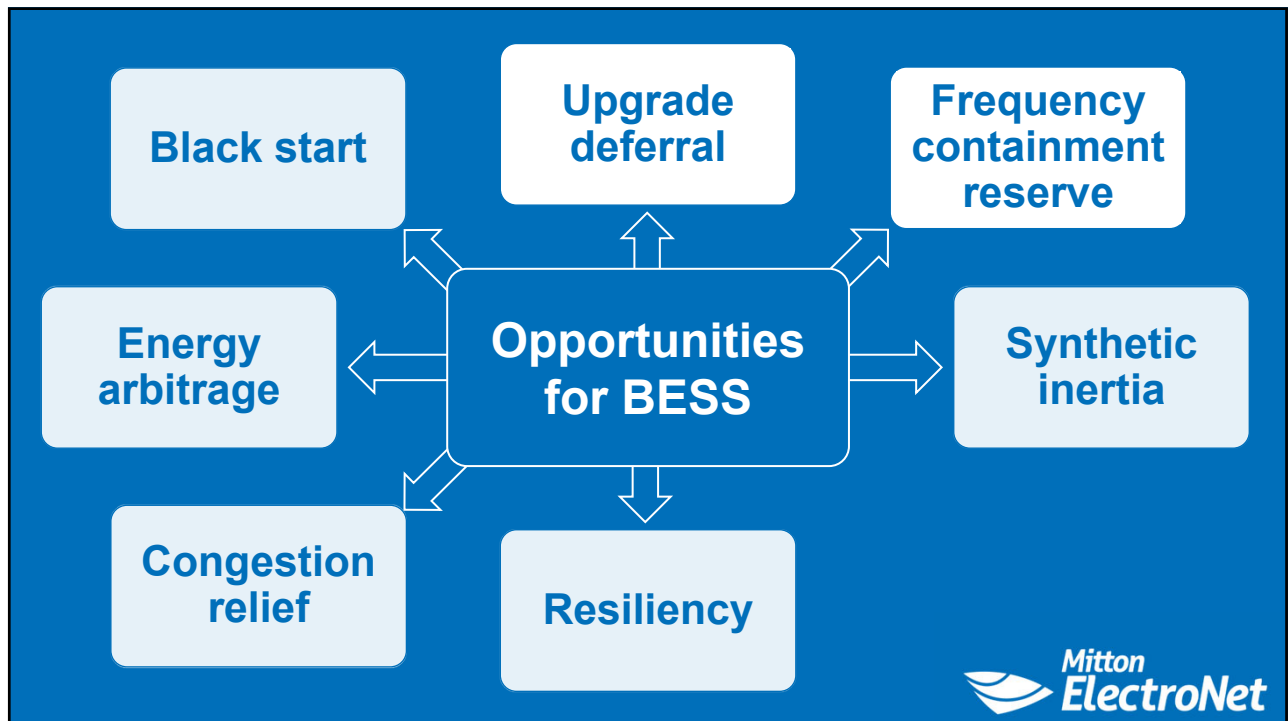
## Frequency response of BESS Systems

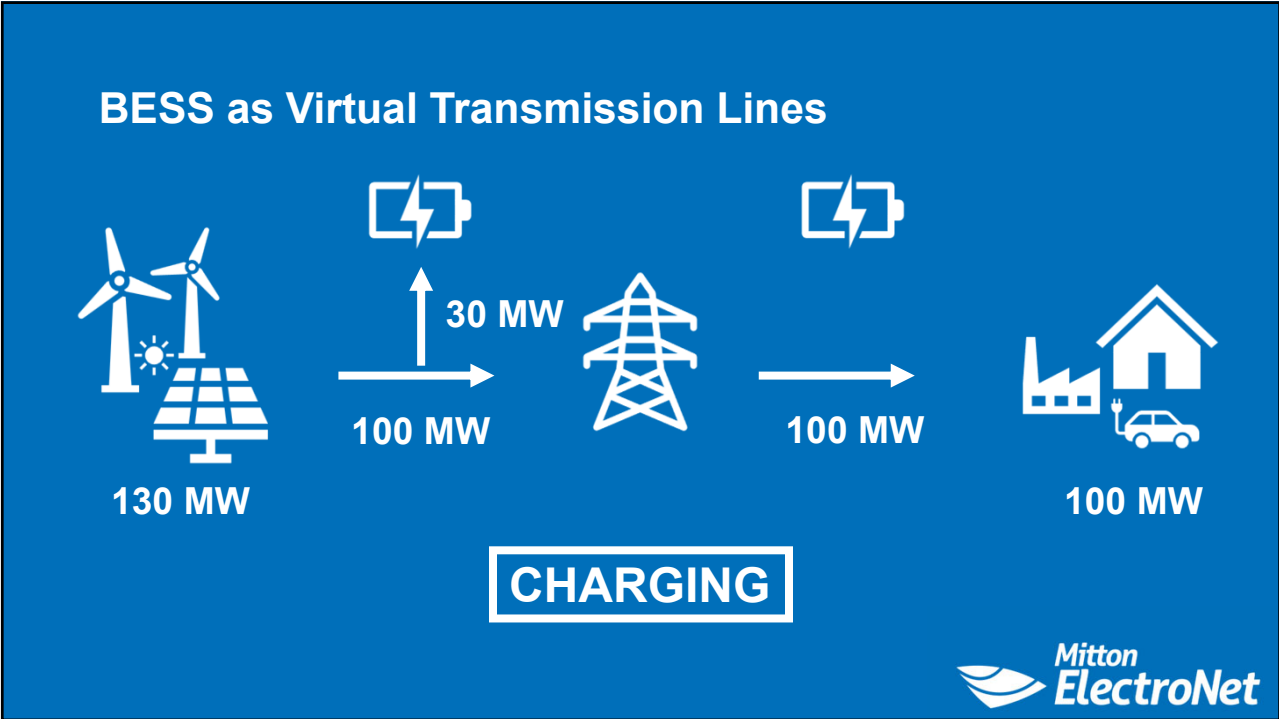
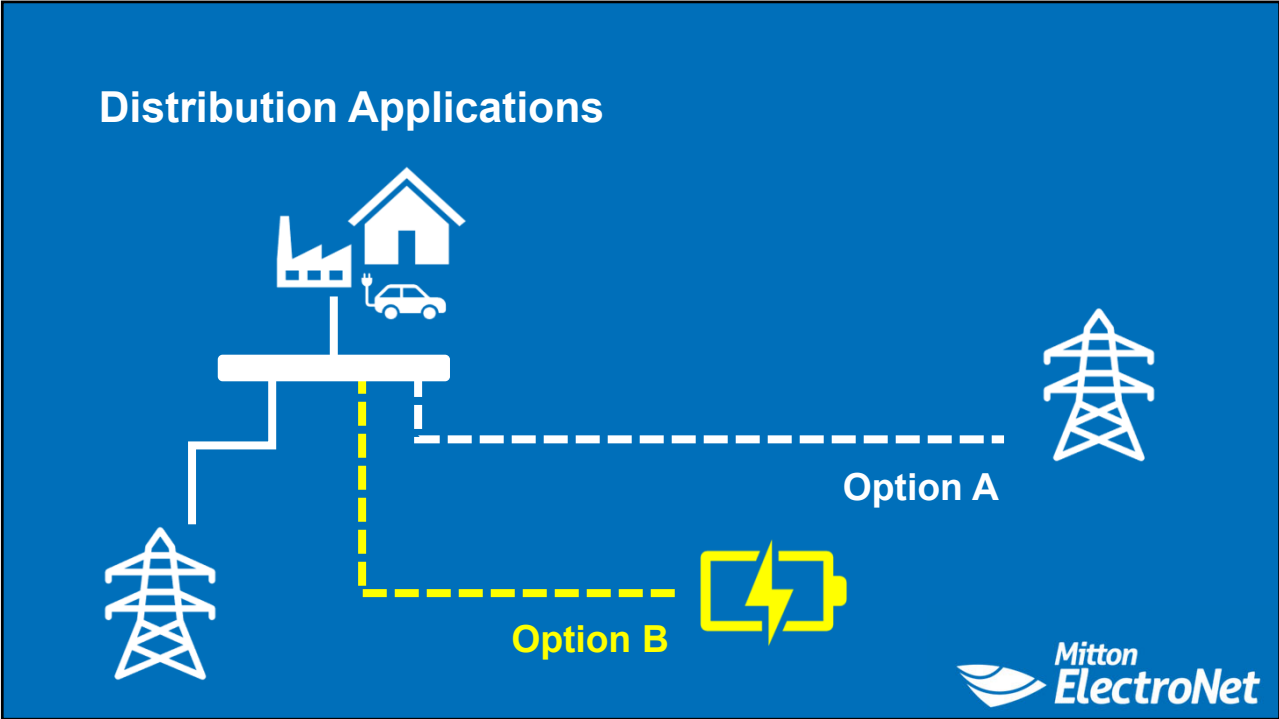


Conventional steam turbine

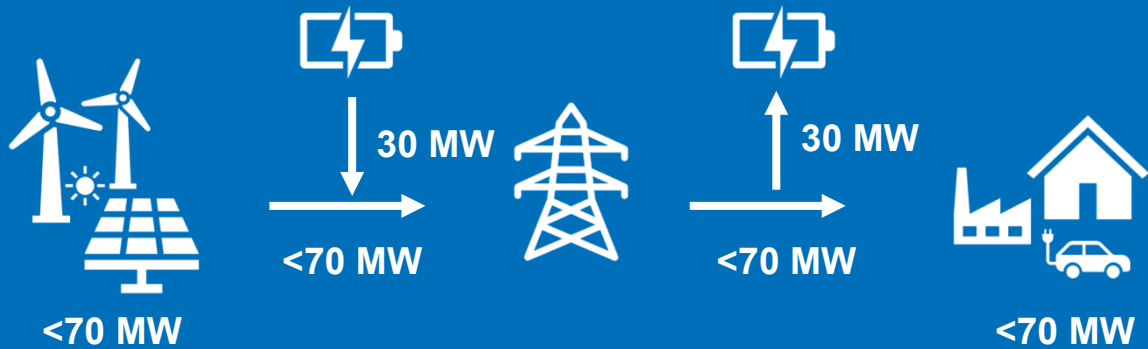


Hornsdale Power Reserve (BESS)





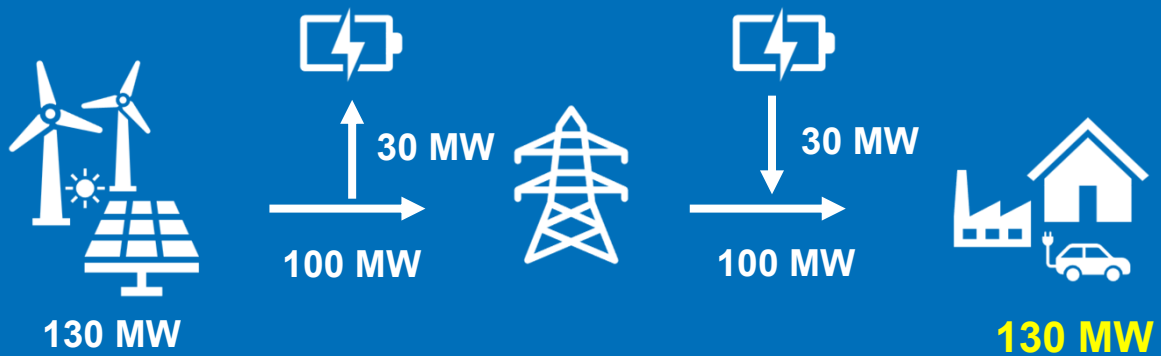
### BESS as Virtual Transmission Lines



**TRANSMITTING**



### BESS as Virtual Transmission Lines



**DISCHARGING**



## Market Design

- New participants providing ancillary services
- New ancillary services
- Incentivizing non-transmission solutions

### Energy storage systems as instantaneous reserve



Enabling energy storage systems to participate and compete in the national reserve market.

#### 3 The amendment promotes our statutory objective

3.1 The Authority's statutory objective is to promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.

#### The amendment promotes competition and reliability

3.2 After considering all submissions on the Code amendment proposal, the Authority believes the final Code amendment will deliver long-term benefits to consumers, as set out below.

3.3 The Code amendment:

- will promote competition in the electricity industry by enabling new types of technology to participate in the instantaneous reserve market. This is expected to provide downward pressure on the prices offered by existing technologies.
- will promote the reliable supply of electricity to consumers by broadening the range of technologies able to provide instantaneous reserve. New technologies foreshadow potentially more diverse and capable resources that can provide instantaneous reserve.
- is not expected to materially impact the efficient operation of the electricity industry.



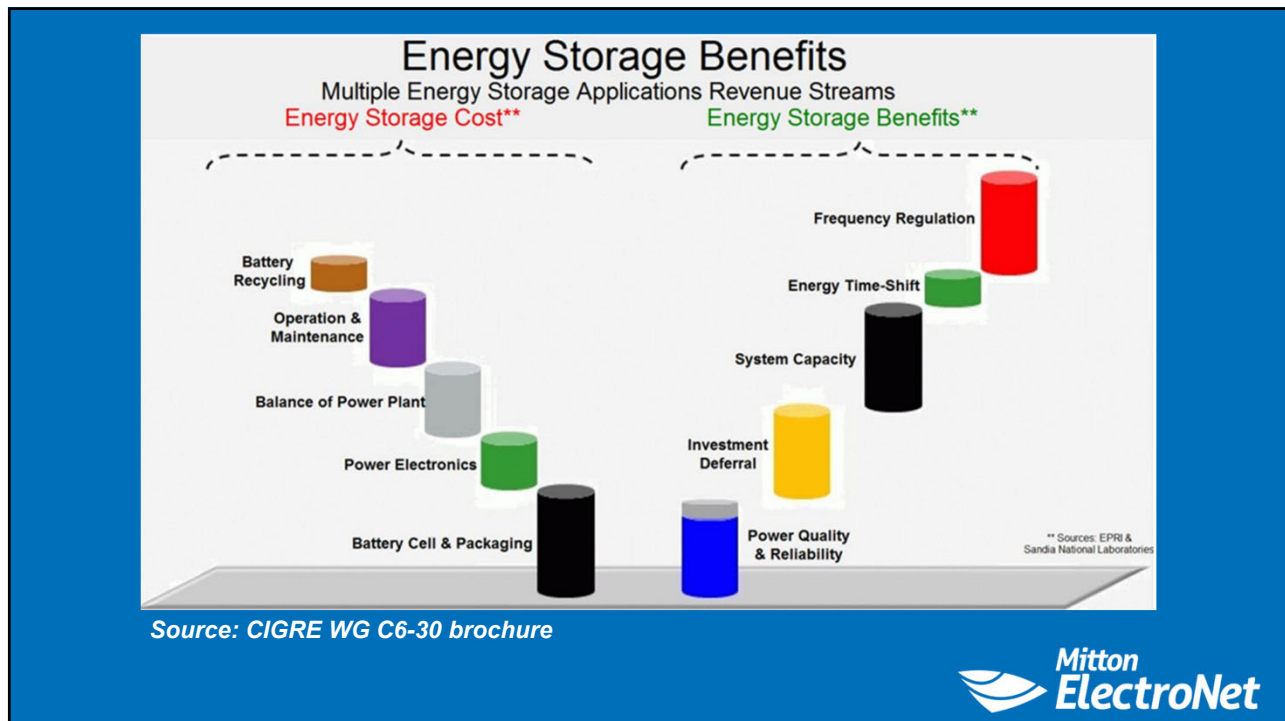
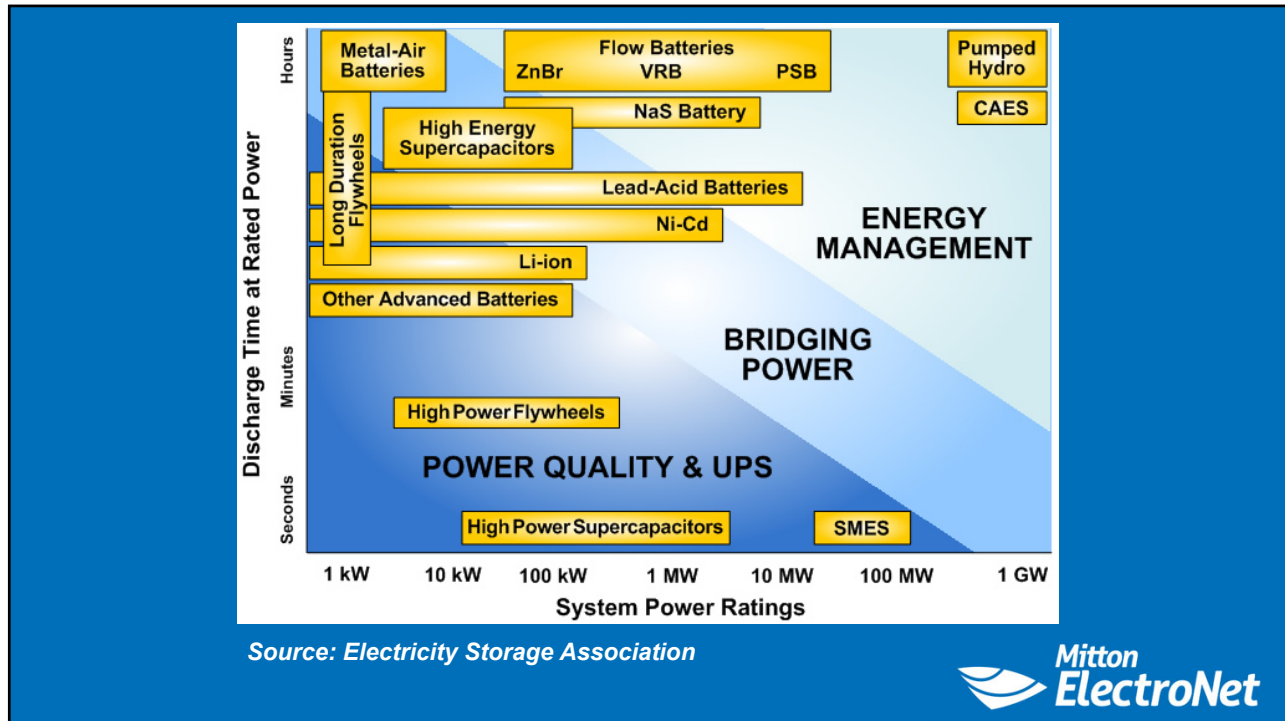
## ...is BESS the best option?

Decarbonisation imperatives introduce new challenges to our power system

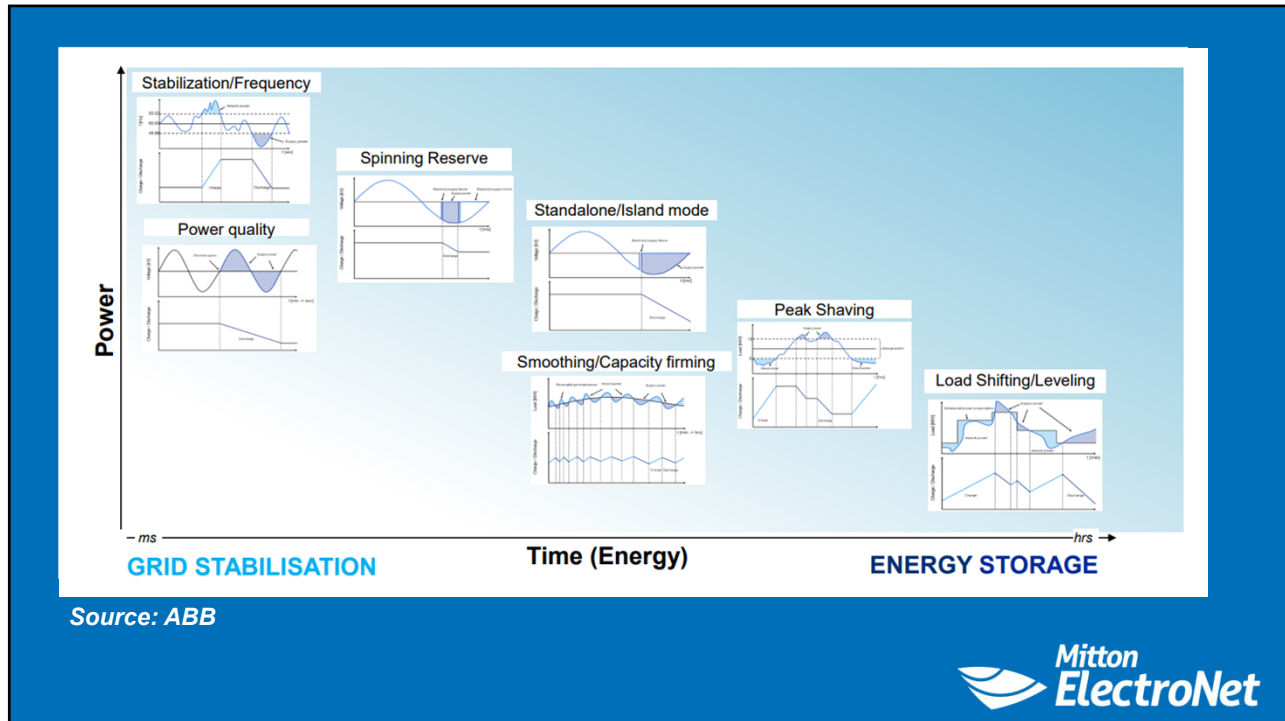
Don't fall into the 'battery perception' trap

Thoughtful planning and collaboration is necessary to facilitate the smoothest possible transition to Net Zero









Source: ABB

