

# NZ Battery Project

---

Electric Power Optimization Centre (EPOC)

10 September 2021



# Today

- Decarbonising electricity – context for the NZ Battery Project
- NZ Battery Project update
- Discussion





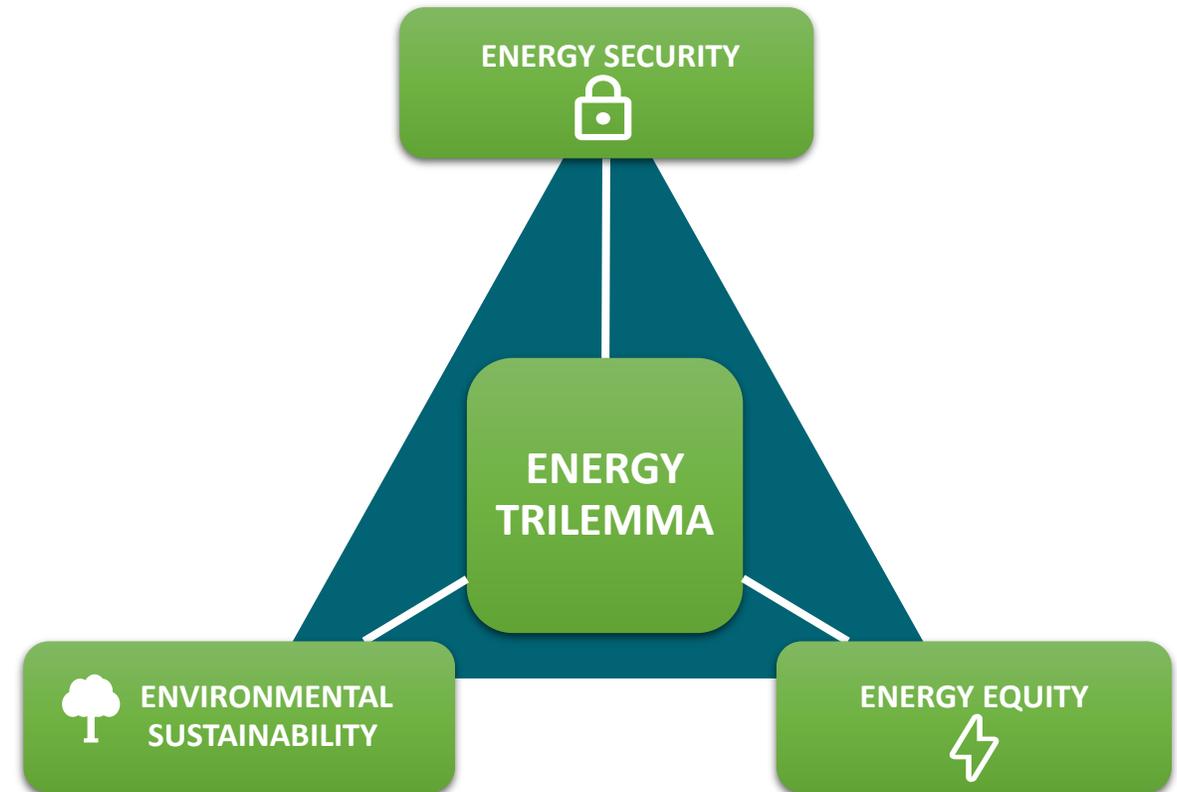
# Electricity transition – a delicate balance

Achieving 100% renewable electricity will require:

- Over a GW of existing fossil fuel-based generation retired or repurposed
- Significant investment and build of new renewable generation
- Enhanced transmission and distribution

While simultaneously:

- Managing security of supply and dry year risk
- Maintaining affordability and prices at levels that encourage fuel switching

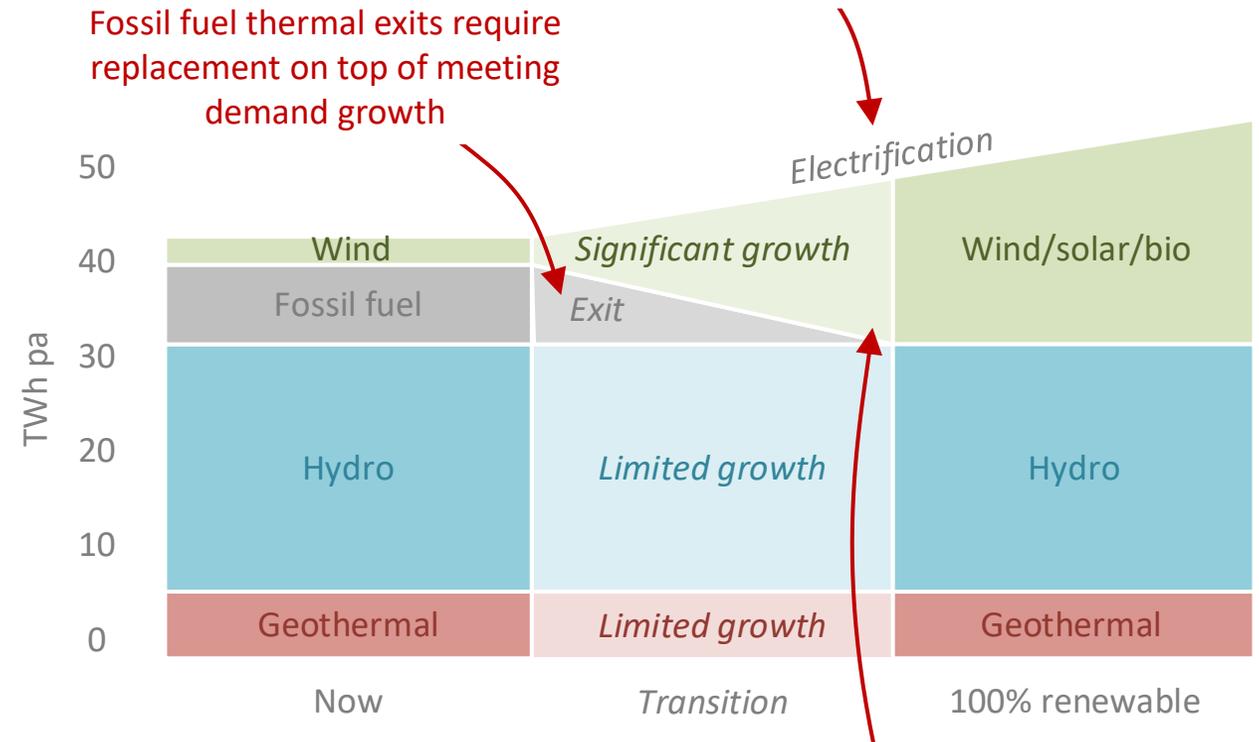


# Electricity transition – a delicate balance



- What will drive fossil fuel thermal retirement, and how will this be organised/sequenced?
- What will replace the ‘services’ that fossil fuel thermal generation provides?
  - Ancillary services
  - Daily/weekly balancing intermittency
  - Seasonal energy storage
  - Dry year security
- How to ensure secure, flexible fuels through the transition?
- How to maintain strong incentives to invest in new generation?
- How can the existing electricity market support the objective?

To meet the challenge of climate change, we need to nearly double the rate of demand growth seen over the last 20 years



In the next 15 years, we need to build as much new generation as we have built in the last 40 years: +15 TWh pa requires +20 large 200MW wind farms



# NZ Battery Project purpose and objective

The Government has initiated the NZ Battery Project to:

Investigate options to resolve New Zealand's 'dry year risk' problem in a highly renewable electricity system, with the aim of identifying the best option, or combination of options, to address this risk and support the move to 100% renewable electricity.

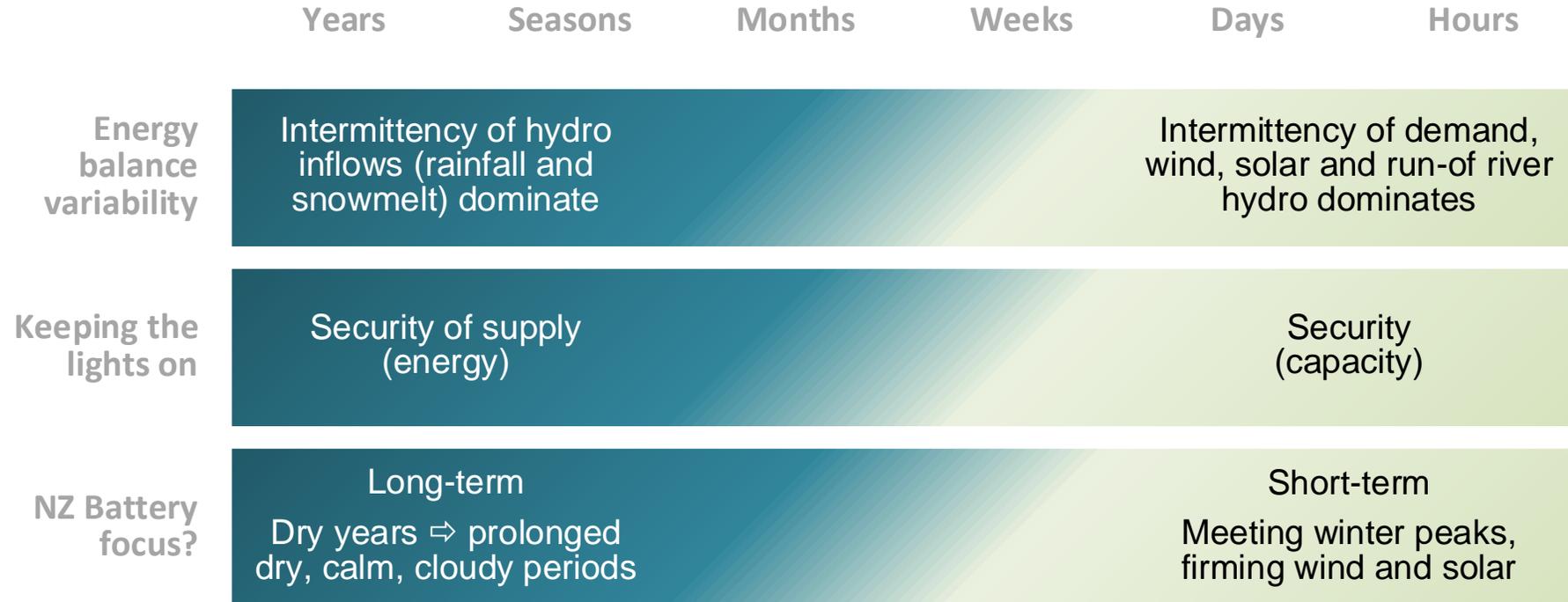
The NZ Battery Project will do this by:

Providing comprehensive advice on the technical, environmental, social and commercial feasibility of a range of dry year risk options management.

These include pumped hydro at Lake Onslow, pumped hydro elsewhere, and other potential energy generation and storage projects.



# Focus for the NZ Battery Project



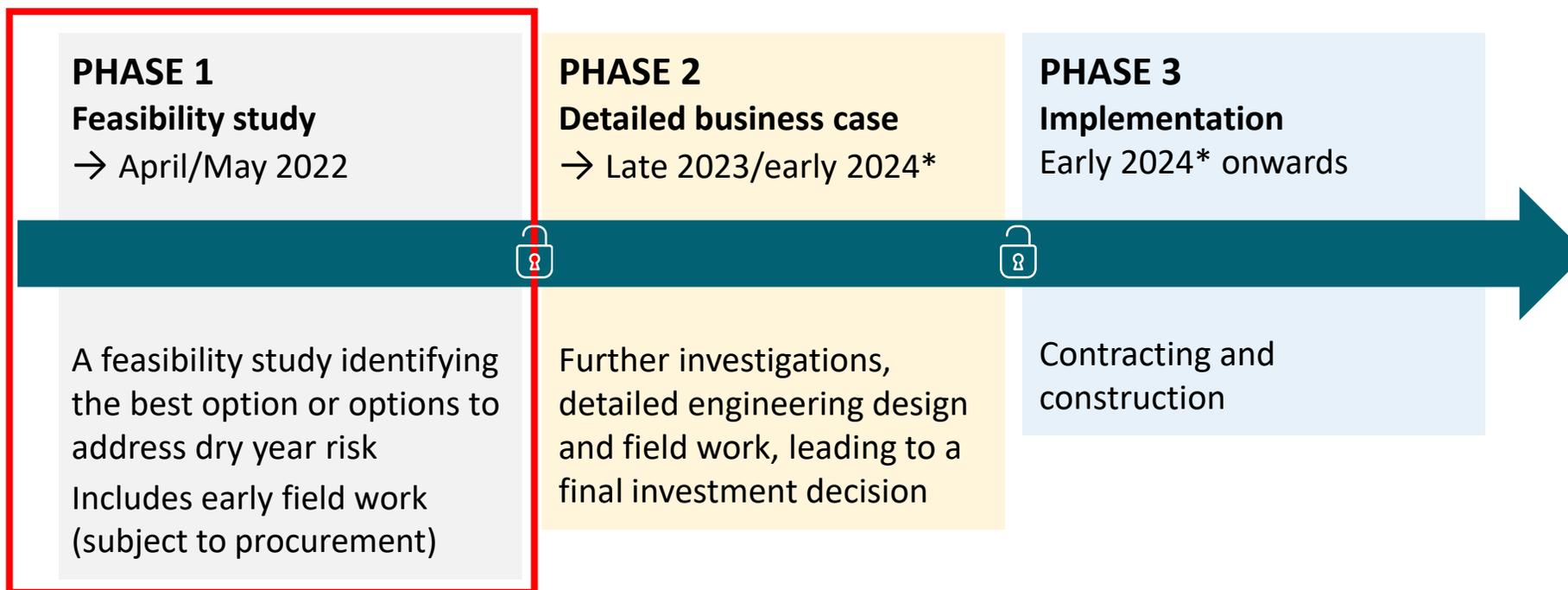
The focus for NZ Battery

Possible 'value adds' for an NZ Battery solution?

# NZ Battery Project - purpose and timing



*Investigating options to resolve New Zealand's 'dry year risk' problem in a highly renewable electricity system, with the aim of identifying the best option, or combination of options, to address this risk and support the move to 100% renewable electricity.*



*\*Depending on chosen option or options*





# Phase 1 – feasibility study objectives

- Outline the extent of dry year risk in the context of 100% renewable electricity
- Identify and describe the range of viable options to address dry year risk, including pumped hydro at Lake Onslow, pumped hydro elsewhere and other technologies
- Assess and compare the feasibility of these options
- Explore the potential implications and impacts on the electricity system of these options
- Make a recommendation about which option or options should proceed to a more detailed business case



# How are we short-listing options?

Options will be assessed against their ability to:

- provide at least [5,000 GWh]\* of energy storage or equivalent energy supply flexibility
- provide significant levels of employment as part of post COVID-19 recovery
- reduce emissions either directly or indirectly through facilitating decarbonisation
- maximise renewable electricity in order to provide a pathway to achieve the goal of 100 per cent renewable electricity
- lower wholesale electricity prices
- be practical and feasible
- take into account wider social, cultural and environmental factors



Security of supply

Social, cultural, environmental

Renewable

Job creating

Affordable

Practical

*\* magnitude to be investigated as part of the project*

# How is the NZ Battery Project organised?



Stakeholder engagement

Pumped hydro at Lake Onslow

Evaluation

Other hydro options

Market impacts and interactions

Non hydro options





# 01

## Pumped hydro at Lake Onslow

### Phase 1 key workstreams



Environmental assessment: desktop work **underway**, fieldwork **planned**

Hydrological and ecological modelling: **underway**

Engineering and geotechnical investigation: desktop and field work **planned**

- Is a pumped hydro scheme at Lake Onslow technically, economically, commercially, and environmentally feasible?
  - Can any adverse impacts or risks be effectively managed or mitigated?
- Environmental assessment
  - Lake ecology assessment
  - Hydrology
  - Local generation and transmission implications
  - LiDAR
  - Cultural values, archaeological and heritage values
  - Engineering, geotechnical and environmental study
  - Social impact assessment



# 02

## Other hydro options

### Phase 1 key workstreams



Identify other pumped hydro options: **underway**

Assessment and evaluation of other pumped hydro options: **planned**

- Are there viable locations for pumped hydro outside of Lake Onslow?
  - What about our existing hydro lakes?
- 
- GIS scan large-scale pumped hydro sites
  - Direct engagement with industry
  - Desktop level assessment for any shortlisted options



# 03

## Non-hydro options Phase 1 key workstreams



Long-listing of comparator technologies:  
**Completed**

Short listing: **underway**

Detailed studies of viable alternatives:  
**planned**

- What is the range of other options?
  - Which options have the potential to effectively manage or mitigate dry year risk?
  - Which options are the most feasible?
- Initial longlist has been developed by the NZ Battery Project team, and being tested with Technical Reference Group and with industry
- We have identified a range of alternatives including: ‘overbuilding’ renewable generation like wind and solar, large-scale load reduction, bioenergy, hydrogen or other green energy-based solutions
- Currently procuring external support to develop a technical scope of work for further detailed investigations



# 04

## Market implications & interactions

### Phase 1 key workstreams



Gross market benefits of NZ Battery options and combinations: **underway**

Electricity market impacts of pumped hydro and other technologies: **underway**

Governance - operations, funding and operator model: **underway**

- What are the economic benefits of different NZ Battery options?
- What impact will an NZ Battery have on the electricity market?
- What are the implications of different governance models on an NZ Battery?
  - NZ Battery options gross benefit
  - Lake Onslow market price implications
  - Further market benefit and transmission analysis



# How can EPOC members and associates help?

- All relevant and insightful academic analysis helps
- All discussions with experts help
  - Hint: NZ Battery team mostly Wellington-based coffee addicts
- If we need to go to a modelling RFP then:
  - We are likely to restrict it to members of 'All of Government' supplier panels
  - So, we'd encourage interested parties who aren't already members to sign up

Thank you