

NZ BATTERY FACTSHEET – July 2020

The Cabinet has approved funding to investigate possible energy storage solutions to New Zealand's dry year electricity problem. The 'dry year problem' is that New Zealand's existing hydro-power catchments sometimes don't receive enough rainfall and the level of the storage lakes runs low. When this occurs some form of back-up is needed, and this is currently provided by fossil fuel generation.

The NZ Battery project will provide comprehensive advice on the technical, environmental and commercial feasibility of potential energy storage projects.

The name NZ Battery refers to the manner in which the intended solution, whether it is pumped storage or otherwise, will provide stored energy for the New Zealand electricity system in an analogous manner to a battery.

The first phase will evaluate the best method to resolve New Zealand's dry year electricity storage problem in order to achieve 100% renewable electricity and help to decarbonise the wider energy system.

It will comprise a detailed investigation of possible dry year solutions, including, but not limited to, the Lake Onslow pumped hydro project which the Interim Climate Change Committee referenced in its [electricity report](#) and recommended for further investigation. Other smaller pumped storage proposals and alternative technology approaches will also be considered.

The study will likely include:

- Initial assessment of Onslow and other potential projects
- A detailed feasibility project design
- Developing plans for consenting and assessing implications on the electricity network
- Investigating environmental impacts and options for project to generate net ecological gains
- Analysing commercial feasibility and designing procurement methodology
- Early engagement with Iwi
- Securing land access for geotechnical investigation and potential project use

Completion of the business case will inform a decision on whether to proceed to a second phase, which would be a final engineering design and preliminary works to provide firmer knowledge of costs and capabilities to inform a Cabinet decision whether to proceed to construction on the chosen solution.

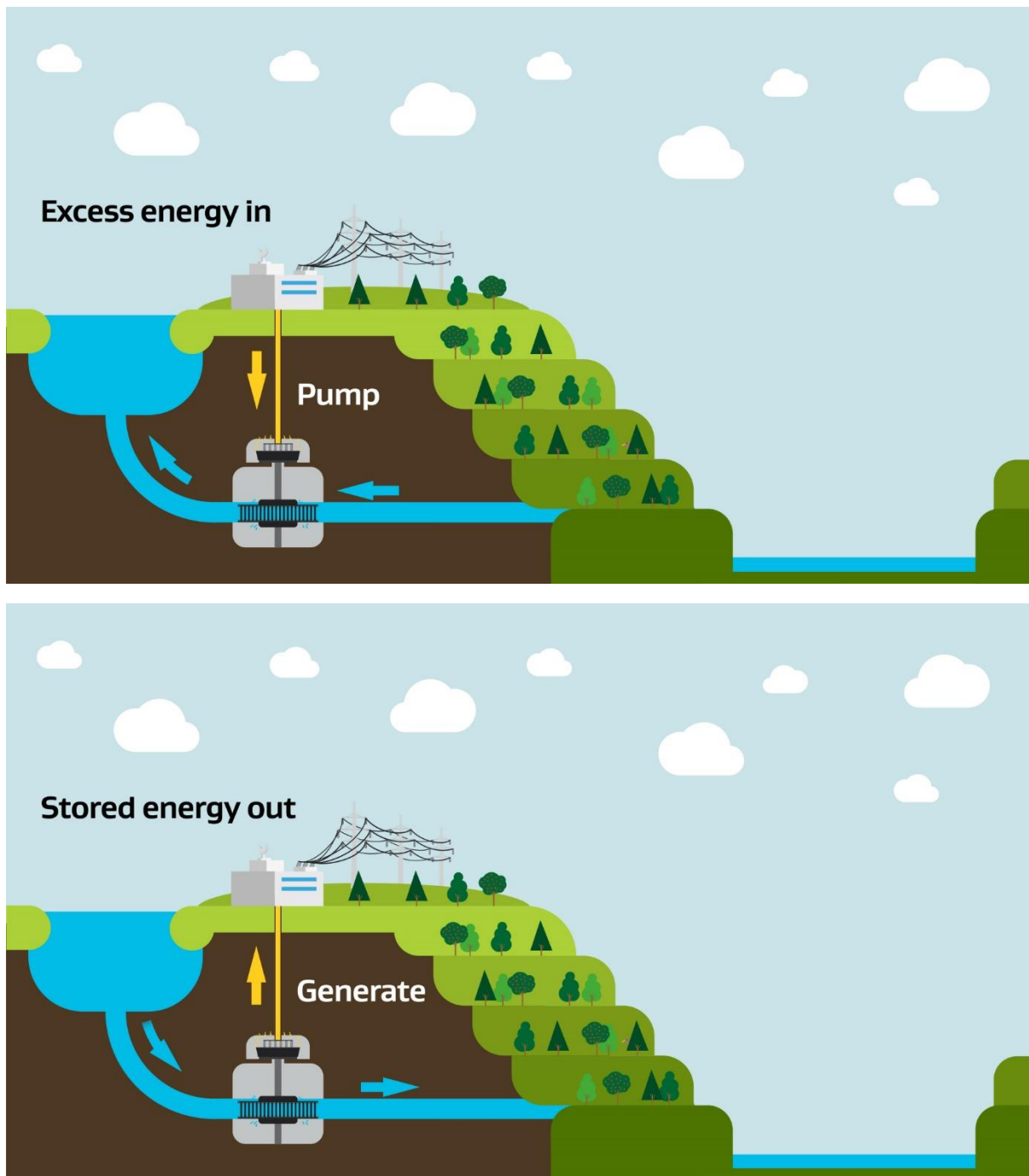
The final phase of the project will, if approved, be the construction of the selected option.

Pumped hydro storage

Pumped hydro schemes are a way of storing and using water independent of natural inflows. They offer flexible generating capacity. They are able to be specifically designed to meet daily demand peaks, and/or store a large amount of energy for a long period to meet dry year energy storage requirements. As such, they are an alternative to the flexibility provided by fossil fuel generation.

Pumped hydro can generate to provide additional energy from stored water in the upper reservoir when there is high electricity demand. Conversely, when there is low electricity demand, water can be pumped up hill for storage and later use.

How pumped storage works



Where is pumped storage used?

Pumped storage is used throughout the world as a stored energy option for hydroelectricity with large schemes in the **US, China and Japan**. **Scotland** has two pumped-storage hydro-electric power stations, which pump water back up to a storage reservoir during periods of off-peak demand. Australia is currently building a pumped storage project, Snowy 2.0. For further information see [the Snowy 2.0 website](#).

Indicative timeline for NZ Battery Project for investigating Lake Onslow, as an example of pumped storage, and other options.

	Scope	Estimated cost	Estimated timeframe	Decision required
Phase 1	Investigation and evaluation of dry year storage solutions. Business case to inform a decision on whether to proceed to the next Phase.	\$30 million	2021	Agreement to proceed to Phase 2
Phase 2 dependent on findings of business case				
Phase 2	Engineering design and preliminary field work to understand any environmental, geotechnical and seismic aspects of dry year solution option agreed at the end of Phase 1.	\$70 million	2022	Decision whether to proceed to construction and agreement for funding mechanism
Phase 3 dependent on design work and securing of funding mechanism				
Phase 3	Construction	Unknown until dry year solution selected	Construction anticipated to be approximately 2022-2026	

Facts and figures for Lake Onslow project

- The Onslow Scheme referenced by the Interim Climate Change Committee could be anticipated to provide at least 5000GWh of annual generation/storage
- Estimated construction timeframe 4-5 years; commissioning and filling a further 2 years
- 3,500-4,500 skilled and semi-skilled jobs expected at peak

What services can a pumped storage project like Lake Onslow provide?

- Fast response reserve—for system stability in the electricity market
- Intermittency back up—for system security--allows more intermittent wind and solar to be developed once existing hydro flexibility is committed under minimum flows on existing water consents
- Dry year storage—5000-7000GWh for Lake Onslow alone

NB: The example outlined above is for a large pumped hydro scheme such as Lake Onslow. The purpose of the NZ Battery projects is to evaluate other potential options, as well as Lake Onslow. Other options may very well have different timelines and costs.

What is the projected cost of a project like Lake Onslow?

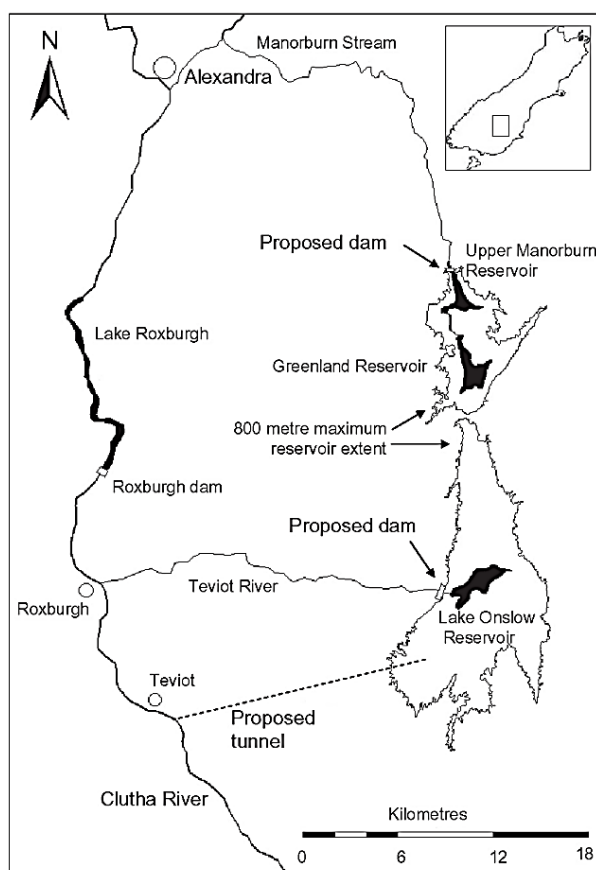
Early estimates of a project like Lake Onslow are that it would cost about \$4 billion. The business case is being done to get certainty about the costs.

How would it be funded?

Funding and financing models along with any potential subsequent levies would be determined through the business case. The use of a levy would need to be justified via a demonstration of significant public good in the business case, including through overall lower prices for consumers in the long term.

Where is the Lake Onslow project located?

The proposed Lake Onslow project is located north east of the Clutha River in Southland. The diagram below is one example of its potential layout from a prior desktop study, but is not the only possible option. Phase 1 of the NZ Battery project will consider projects at a variety of different locations.



Source: Bardsley, W.E. (2005)