STATERA ENERGY

Loch Kemp Hydro Pumped Storage Scheme

About Statera

Statera Energy was founded in 2015. We are a fully integrated developer, owner and operator of flexible infrastructure that assists in the transition to a low carbon economy.

Our Vision

As we continue the transition towards a low carbon economy, renewable energy is ever more prominent as the lowest cost form of electricity generation for consumers. At the same time renewable energy is helping to ensure security of electricity supply for the United Kingdom while providing a cleaner, greener outlook for future generations.

However, with a higher proportion of our energy sourced from renewables, it is becoming increasingly challenging to balance the UK electricity system because of the intermittency of wind and solar output.

Due to the inherently uncertain nature of these power sources, this has led to increased demand for flexible capacity to help meet energy balancing requirements for the national grid system. Electricity storage is now essential if we are to meet Net Zero.

Purpose of Exhibition

This preliminary public exhibition has been arranged to:

- **Introduce the Loch Kemp Hydro Pumped Storage Scheme;**
- **Provide details of the proposed project and explain the rationale;**
- **Explain predicted effects and proposed mitigation;**
- **Explain the timeline of the proposed project; and**
- **Provide contact details and explain how you can keep in touch.**

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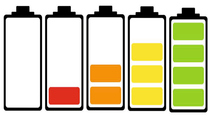
What is energy storage?

Storage technologies are devices that enable energy from renewables, like solar and wind, to be stored and the released when customers need power most. Energy Storage can be grouped into five broad technology categories:

- Batteries;
- Thermal;
- Mechanical;
- Pumped Hydro; and
- Hydrogen



As the UK moves to 'net-zero' it needs to build much more energy storage. Renewables such as wind and solar are intermittent, which means they supply electricity when nature provides the energy, not necessarily when the UK needs that electricity. As the UK transitions to a low carbon economy there will be more and more renewables on the system, and fewer and fewer conventional energy generators such as coal, gas and nuclear. Therefore, it becomes increasingly challenging for the UK to balance the supply and demand of electricity.

Energy storage helps with this challenge by absorbing excess energy at times of surplus (typically when it is very windy), and releasing energy at times of deficit (typically when it is dark, calm and cold, such as a cold, windless winter's evening). So in order to achieve our net zero targets, much more energy storage is required in the UK, in order to allow more and more wind and solar capacity to be built, and function efficiently.

Energy storage is an essential component to a modern grid system:

- allowing surplus energy generated at off peak times to be stored for later use – increasing efficiency;
- facilitating the integration of distributed and renewable generation; and
- rapidly responding to power fluctuation within networks to maintain system stability and integrity.

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Introduction to Pumped Hydro

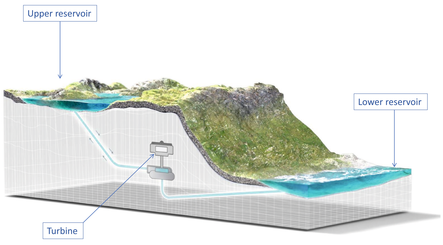

Image courtesy of Voith

Pumped Storage Hydro, or 'PSH', storage is the oldest kind of large-scale energy storage and works on a very simple principle. Two reservoirs at different heights are required and when the water is released from the upper reservoir to the lower reservoir, energy is created by the downflow, which is directed through a turbine and generator to create electricity. The water is then pumped back to the upper reservoir and stored until times of high demand. Therefore, in simple terms, a PSH project is effectively a big battery, connected to the electricity grid.

Pumped storage is also a net user of power. Used in conjunction with the excess amount of renewables being built out (in particular offshore wind), the water will be pumped back up to the top reservoir at times of peak generation when there is not the demand there to meet it. Increasing the reliability and flexibility of the grid and ensuring no energy goes to waste.

PSH is one of the lowest cost types of energy storage for the role of storing large quantities of energy over days, weeks and months. Other technologies such as batteries have much shorter durations and are better for providing much shorter, quicker responses, to stabilize voltage and frequency for example. One of the challenges of PSH projects is finding suitable sites. There are only four PSH projects in existence in the UK right now, two in Wales (Ffestiniog and Dinorwig) and two in Scotland (Cruachan and Foyers). The large bodies of water, and the hills and mountains of Scotland mean that it is an ideal location for new PSH projects.

Advantages of pumped storage

- **Flexible and reliable :** Pumped storage plants are able to react to network fluctuations in the shortest possible time by generating the required electricity or by absorbing any excess
- **"Green battery":** With the current stage of technology, pumped storage is the only possibility to store energy in an economically viable, large scale way.
- **High economical value:** Pumped storage plants work at an efficiency level of up to 82 percent.
- **Water Management:** Water resource management and flood control
- **Life Expectancy:** Exceptional lifetime of more than 80 years
- **Hybrid concepts:** Combining pumped storage and wind or solar

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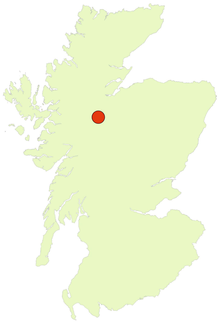
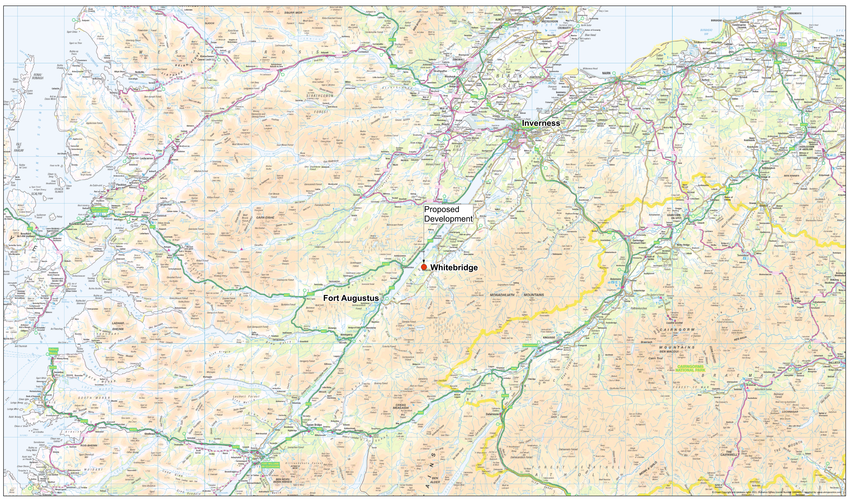
Location of Loch Kemp Storage

The Proposed Development is situated within the Dell Estate to the south of Loch Ness, approximately 13 km to the north-east of Fort Augustus. Access into the site would be via the B862 at Whitebridge, using existing estate and forestry tracks (to be upgraded and extended). A new access track would be required to the powerhouse site on the shore of Loch Ness.






Loch Kemp sits in a natural bowl


View down towards Loch Ness from the Dell Estate

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The Project

Key Details of the Project

- Pumps water from Loch Ness up into Loch Kemp, a vertical distance of approx. 175m;
- Using an underground tunnel approx. 1km long;
- Has a generating capacity of 300MW;
- Has an energy storage capacity of 9,000MWh meaning 30hrs storage;

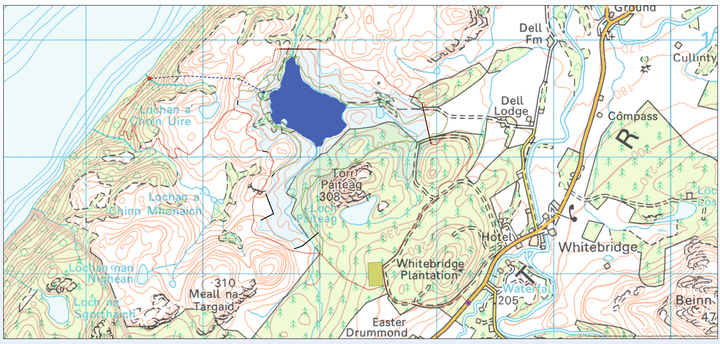
View west, over Loch Kemp

Project Function

The primary function of Loch Kemp Storage would be to extract, store and release energy to or from the electricity transmission system as required, to help balance supply and demand for power at a national scale. It would operate by transferring water between Loch Ness and the enlarged Loch Kemp through the tailrace tunnel, powerhouse, high pressure tunnel and headrace tunnel. The Proposed Development would either be operated in the 'generating' mode, when electricity would be generated by releasing water from the upper reservoir at Loch Kemp through the turbines and into Loch Ness, or in the 'pumping' mode, when electricity is used to drive water through the turbines in the other direction from Loch Ness to the upper reservoir

Indicative tailrace location on the shore of Loch Ness

View from track west of Dell Lodge towards one of the proposed dam locations



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Why this site?

The Kemp site is a good location for a PSH development for a number of reasons:

- The large body of water provided by Loch Ness means good availability of water all year round;
- The natural 'bowl' provided by the ground around Loch Kemp means some storage is provided by nature, and increasing this storage requires the addition of a small number of modest dam structures with minimal visual impact;
- The horizontal distance between Loch Ness and Loch Kemp means a relatively short (1km) tunnel.
- The point of connection (POC) to the grid is nearby at Foyers substation;
- The general location in Scotland close to wind generation means the site can provide 'locational balancing services' to National Grid, which helps alleviate constraints from the capacity in the transmission network.

Community Benefits

The project would be a substantial investment in the local area and would deliver economic benefits for the lifetime of the project, including:-

- Apprenticeship schemes;
- Potential for the creation of a number of full time jobs during the construction phase;
- Potential for the creation of a number of permanent skilled jobs for ongoing operation and/or maintenance;
- Potential business opportunities for local suppliers particularly during the construction phase;
- Business rates; and
- Local network improvements.

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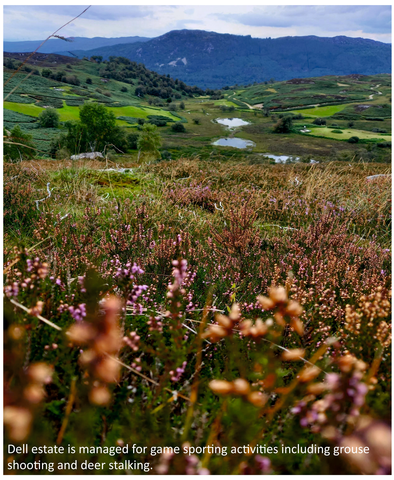
Environmental Impacts

An Environmental Impact Assessment (EIA) will be undertaken to understand the potential impacts the Proposed Development could have on the environment and to identify appropriate mitigation measures to avoid, reduce or offset any adverse effects identified.

The EIA will comprise a series of targeted specialist environmental studies. Initial walkover surveys commenced in 2021 for cultural heritage, geology, protected species, habitats and birds, as well as a specialist bryophyte and lichen survey. The findings of the EIA will be reported in an EIA Report, which will be submitted as part of the Section 36 Application.

As a small part of the Proposed Development falls within the Ness Woods Special Area of Conservation (SAC) and Easter Ness Forest SSSI, specialist surveys have already started, to understand the extent and condition of the habitats (and species) that exist within the designated area. Early consultation with NatureScot is considered to be key to ensure that the scope of the ecological surveys fully cover all that is required. Ongoing liaison with NatureScot during the design development stage will ensure the design and any mitigation measures minimise any adverse effects and maximise the opportunities to benefit this designated site.

At this stage it is anticipated that the rock excavated during construction could be reused on-site to build the dam structures, leading to a reduction in the amount of construction traffic travelling to and from the site via public roads. A Transport Assessment will also be undertaken.



Dell estate is managed for game sporting activities including grouse shooting and deer stalking.

Topics to be considered within the EIA

- Water Management and Hydrological Considerations
- Landscape and Visual
- Land Use and Recreation
- Terrestrial Ecology
- Ornithology
- Aquatic Ecology
- Fish
- Geology, Soils and Water
- Cultural Heritage
- Traffic, Access and Transport
- Noise and Vibration
- Air Quality
- Forestry

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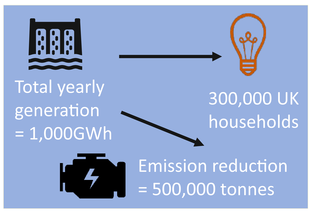
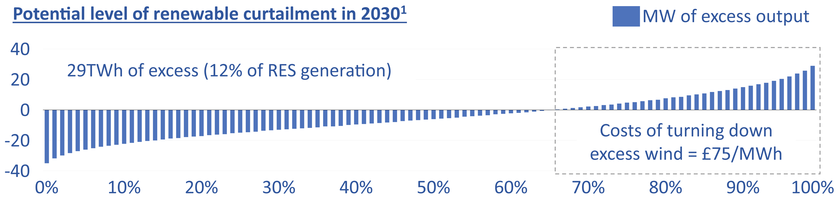
The Bigger Picture

1 Pumped storage is essential to help GB progress through its journey towards a net zero economy. Loch Kemp Storage could potentially save up to 500,000 tonnes of CO2 by displacing fossil fuel generation.

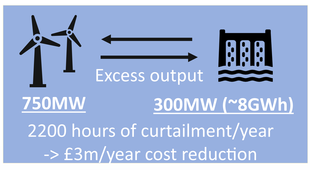
- The 300MW (7.5-9GWh) Loch Kemp project cycling ~125 times per year would produce yearly generation of over 1,000 GWh. This would cover the annual needs of about 300,000 UK households, assuming an average electricity usage of 10 kWh/day.
- The project would displace some marginal fossil fuel plants[2] and therefore reduce system emissions by ~500,000 tonnes of CO2.



2 Pumped storage reduces wind curtailment in the GB electricity system. Loch Kemp Storage could reduce curtailment costs by ~£3million/year by storing excess wind output.

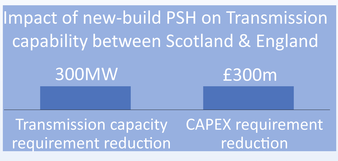


- By 2030, By 2030, with ~40 GW of offshore wind on the system, renewable generation is expected to exceeds demand >33% of hours, leading to significant level of curtailment.
- Situated close to 750MW of wind capacity, Loch Kemp Storage would be able to import from these sites during periods of high wind output to reduce curtailment.



3 Pumped storage helps with network constraints management. Loch Kemp Storage could help reduce the need for up to 2GW of transmission between England and Scotland.

- The system will require a total interconnection capacity of ~11GW between Scotland and England by 2050 due to increasing renewable penetration.
- Up to 4.5GW of new-build PSH would be needed to reduce the transmission requirement by 2GW, saving up to £2bn avoided CAPEX[3].



1) Capacity assumption based on National Grid FES 2020 CT Scenario, source: LCP 2) assumes 40% efficiency, 3,500 annual run hours and standard gas carbon intensity of 0.1835 tCO2/MWh therm 3) Research published by Imperial College London Consultants

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Proposed Timeline

Throughout the process, Statera will continuously engage with the local community and stakeholders about the emerging proposals.

Site Selection and Feasibility
(12 months)
Extensive research has been carried out to identify a well located and viable site for the development of a pumped storage scheme with minimal environmental and technical constraints.

Pre-Planning
(12 to 18 months)
Public Exhibitions & Community Engagement / Scoping / Environmental Surveys / Design Freeze / Environmental Impact Assessment (EIA).

Submit Application and await decision
(12 months)
An application is submitted to the Scottish Government accompanied by a comprehensive EIA Report showing the results of studies undertaken. This is publicly available information. Interested parties and statutory consultees such as the Local Authority and residents can formally comment on the application.

Construction
(36-48 months)
If approved, construction would typically take three to four years.

Operation
Whilst it is anticipated that the consented life of the scheme would be 80 years, with proper maintenance, the scheme could run indefinitely, like other pumped storage scheme in the UK.

We are here

November – Early December 2021
Public Exhibitions and community engagement

Late November 2021
Scoping request to Scottish Government

Early February 2022
Scoping opinion from Scottish Government

February – May 2022
Additional consultation with key stakeholders

Spring – Winter 2022
EIA Survey and assessment work

May 2022
Design Freeze

Mid August 2022
Pre-Application Consultation with THC, ECU, SEPA and NatureScot

End of November 2022
Gate Check Report Submission/Gate Check meeting

January 2023
Section 36 Application