



KEY STATS

Customer: Knoydart Renewables Ltd
Number of Turbines: 1
Turbine Type: Pelton
Total Installed Power: 280kW

ORIGINAL INSTALLATION / MODERNISATION

Original Install: 1977
Initial Upgrade Work: 2000
Recent Modernisation: 2023

Green Community Power

Knoydart is a peninsula in the Lochaber district on the West coast of the Scottish Highlands. Situated between Loch Nevis and Loch Hourn, the peninsula comprises approximately 55,000 acres which today is divided up amongst several landowners, with the largest area managed by the Knoydart Foundation.

Knoydart is cut off from the UK mainland road network, meaning access can only be made either by boat or by foot and is not connected to the National Grid, generating all its own electricity. Other than some small run-of-burn micro-schemes in outlying hamlets, by far the main producer and distributor of electricity on Knoydart is Knoydart Renewables Ltd hydro scheme. The Hydro scheme is managed by the Knoydart foundation, which is a local community owned & managed foundation.

Increased Generation

The single jet, 280kW Pelton turbine, with a cast iron case was originally installed by Gilkes in 1977. In 2000 Local investment allowed the foundation to conduct work to increase the plants' energy generation, with an aim secure Knoydart's energy future. At the time, the turbine was only generating 50 or 60kW of power, intermittently with frequent outages. Replacement of the original penstock with an overground penstock and removal of restriction flow at the dam increased the output to 235kW.

CASE STUDY

Knoydart Hydro Modernisation

In 2020 Gilkes were approached to conduct the next phase of modernisation work to further modernise the mechanical & electrical equipment and improve the frequency stability. The existing machine was also suffering from breakdowns and bearing issues. As with most modernisation projects there was an initial site visit conducted by Gilkes engineers to carry out a site survey and condition assessment. The resulting scope of work was:

- Mechanical refurbishment of the turbine.
- Re-governing of the system including new deflector control cylinder, hydraulic control module and digital speed governor.
- New generator.
- New control and switchgear panel with remote monitoring and future ability to run in parallel with a diesel generator.
- New DC battery panel to provide easy black start capability.

The new system also has an HMI that can be remotely accessed for diagnostics when the customer connects to internet, allowing less frequent visits. It also allows remote access for Gilkes engineers, providing turbine data for more informed fault diagnostics and condition monitoring. The work has resulted in improved reliability and serviceability into the future.

In addition to the Gilkes scope of work, further civils work was carried out by the foundation, with a new underground penstock to replace the above ground penstock which was susceptible to degradation from the elements. The new penstock of larger diameter maximises the available head for the turbine, with the option to add a second turbine in the future.

Energy Security

As a result of the continuous upgrade work carried out on Knoydart Hydro scheme, the machine is now able to achieve its maximum capacity of 280kW, with the added ability to synchronise with the new back up diesel generator during times of maintenance on the hydro equipment.

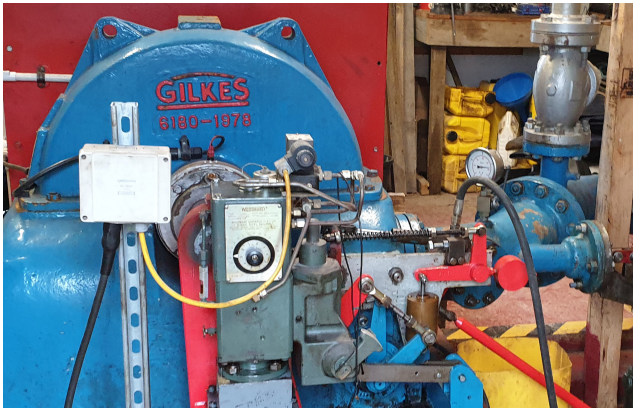
The hydro generates power according to community demand. While demand is currently relatively small, the hydro is not generating to its full potential, but in the future, with new settlements and a new brewery the load demand will increase, and the community are well prepared to secure enough renewable energy to manage that demand.

Knoydart's energy security project guarantees a clean, affordable, dependable, entirely green, and renewable supply of electricity to drive the economic regeneration of Knoydart. Adding new domestic and business connections to the network will ensure sufficient income is generated to support the long-term operations of the system.

This three-year Energy Security Project has been funded by Local Energy Scotland through their CARES programme of support, the SSE Community Fund and the Knoydart Foundation. The project has been managed by Energy Mutual with the new penstock and access route design by Green Highland Renewables and installed by Wyvis Plant. The High Voltage network improvements were undertaken by Enerveo which required close collaboration with the Gilkes team.

CASE STUDY

Knoydart Hydro Modernisation



Original Gilkes Turbine



Refurbished equipment



Intake



Knoydart community



Commissioning of refurbished turbine