



The James
Hutton
Institute

HydroGlen (The James Hutton Institute)

HydroGlen is a research and demonstrator project led by the James Hutton Institute that explores how farming communities can become self-reliant, green-hydrogen energy producers. Situated at the Institute's research farm and community at Glensaugh, the project aims to generate more than 100% of the site's energy requirements across electricity, heating, and transport. The project entered full design and construction after securing £6.2 million from the Just Transition Fund in October 2022. HydroGlen is conceived as a realistic, replicable model for rural energy transition, designed to show how hydrogen can support net-zero objectives, create energy independence, and reduce emissions in one of the hardest-to-decarbonise sectors: agriculture.

Key Capabilities / Centres

Descriptions

HydroGlen's demonstrator

HydroGlen's principal capability is its function as a living demonstrator of an integrated hydrogen energy system. The site combines renewable energy production from wind and solar PV with water treatment, electrolysis, hydrogen storage, refuelling infrastructure, and an internal private micro-grid that interacts with the national grid. This system enables real-world testing of hydrogen's application in vehicles, heavy farming machinery, heating systems, and electricity supply. Its modular and scalable architecture makes it suitable for both on-grid and off-grid contexts.

HydroGlen's emission modelling programme

HydroGlen also operates an emissions modelling programme that assesses the environmental impact of different technology configurations. A web-based modelling tool has been created to support scenario testing and policy alignment, ensuring that the project does not simply demonstrate technology, but actively informs future design, regulatory frameworks, and national hydrogen strategies.

Value Chain Areas	Testing & validation	Pilot manufacturing	Digital tools & simulation	Open innovation spaces	Skills development
Production	✓	✓	✓	○	✓
Networks	X	X	X	○	X
Storage	✓	✓	✓	○	✓
Transport	○	○	○	○	○
Industry	X	X	X	X	X
Power	✓	✓	✓	○	✓
Heat	○	○	○	○	○

*Tick = yes, ○ = potential, X = no

Collaboration opportunities

- **HydroGlen** operates within a broad partnership ecosystem spanning local councils, supply-chain organisations, technical consultants, hydrogen specialists, farming unions, universities and the Scottish Government. This network underpins the project's design, construction, research activity, skills development and knowledge sharing.
- **The demonstrator** provides collaboration opportunities across technology testing, emissions and energy-systems research, and agricultural applications, while also supporting joint innovation programmes and contributing to policy and regulatory development for rural hydrogen. It additionally offers a platform for skills development, helping ensure the rural workforce is prepared for Scotland's emerging hydrogen economy.

Centre location



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Hydrogen case studies

- HydroGlen demonstrates how hydrogen can decarbonise rural energy systems by showing the value of green hydrogen in farming, where heavy machinery, transport demands and dispersed heat loads make full electrification difficult. By producing, storing and using hydrogen on-site, it showcases the full value chain in a real agricultural setting, illustrating the benefits of local energy generation, lower emissions and greater energy security.
- Looking ahead, HydroGlen will contribute to the TH2ISTLE Hydrogen Valley project, a €9 million programme launching in 2026. The James Hutton Institute will support this work, including the testing of a hydrogen-powered tractor, reinforcing HydroGlen's role in advancing rural decarbonisation and innovation.

