

GO(H₂)ME



ORKNEY ISLANDS



“The project has the potential to significantly reduce air pollutants, both locally in Orkney and in the mainland events switching from portable diesel generators to green hydrogen”



This project is supported by the EU Islands Facility NESOI. NESOI has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°864266

The European Islands Facility NESOI aims to unlock the potential of EU islands to become the locomotives of European Energy Transition. To do so, NESOI aims to mobilize more than €100 Million of investment in sustainable energy projects to give EU islands the opportunity to implement energy technologies and innovative approaches, in a cost-competitive way. NESOI has selected 56 such projects across the European Union and provide them with financial resources and technical support.



Green Orkney Hydrogen Market Expansion

ABOUT THE PROJECT

**Project
Promoter**

PlusZero

PlusZero Limited



Stakeholders

Orkney Islands Council Scottish
Hydrogen and Fuel Cell Association

European Marine Energy Centre
Abbot Risk Consulting

Edinburgh University
Festivals Edinburgh



Country UK



Sector Hydrogen



PROJECT VALUE 5,500,000 €

DESCRIPTION

The Orkney archipelago has abundant wind and marine resources. But the future expansion of local renewables and hydrogen production on Orkney is limited by electricity interconnector constraints and the lack of transport mechanisms for moving hydrogen from the Island to the mainland.

AIM OF THE PROJECT

The idea is to produce H₂ and transport it onshore or to other islands. The project is aiming to identify a safe and viable transport logistic solutions with the aim of replacing diesel fueled generators with a zero carbon and zero pollution alternative.

FUTURE STEPS

Hydrogen production is increasing, therefore transport of hydrogen is an emergency. As soon as the most cost-effective way to transport hydrogen is identified, transporters will start moving hydrogen from Orkney to customers on the mainland.

HOW THE EU ISLANDS FACILITY NESOI SUPPORTS THE PROJECT

- 1 Assessment of local green hydrogen production potential
- 2 Identification of suitable technological options for green hydrogen storage in Orkney and transportation
- 3 Cost Benefit analysis; socio-economic and environmental impact evaluation
- 4 Health, Safety and Risk analysis for the identified solutions
- 5 Business modelling and identification of target stakeholders to kick-off a green hydrogen value chain in Orkney
- 6 Identification of financing/funding options
- 7 Action plan for the roll-out of a green hydrogen value chain in Orkney



Green Orkney Hydrogen Market Expansion - Interview



INTERVIEW WITH

David Amos, Managing Director at PlusZero Ltd

Q: How was the project initially designed? Why choosing this specific sector?

A: Orkney islands have abundant renewable energy resources that are currently partially wasted since the electricity system of the archipelago is weakly connected to the main grid. Implementing power-to-hydrogen solutions allows storing and transporting hydrogen as a clean energy vector, for the benefit of other islands and the mainland.

Q: What were the challenges? How did NESOI help overcome them?

A: The regulatory framework applying to hydrogen transport and storage is quite complex. It is also complex to understand at what point the production capacity unlocks the pipe option (compared to shipping). NESOI has provided support with regards to the regulatory and safety environment, as well as a high-level framework model of different technical options for hydrogen production, transport and storage for different scenarios.

Q: How are local stakeholders and citizens involved in the project?

A: Thanks to the Orkney-based European Marine Energy Centre (EMEC) and the Orkney Renewable Energy Forum (OREF), contacts have been established with all relevant stakeholders in Orkney: local councils, local businesses, citizens. Local stakeholders are very supportive to avoid wasting electricity. They are also keen that Orkney's are considered as pioneer islands in the EU. They appreciate job opportunities, and the ownership of wind turbines by communities. Festival users are also very positive about greening the festivals' portable energy sources.

Q: What are the next steps of the project?

A: A new electrolyser is currently being commissioned, so more hydrogen will be produced, and transport of hydrogen is an emergency. We hope to start moving H₂ from Orkney to the mainland very soon, after having identified the most cost-effective way to move the hydrogen and established communication with transporters. PlusZero will supervise the transport to the customers.

THE IMPACT

ON LOCAL COMMUNITY



1 Local Economy

Further hydrogen development in Orkney can be subject to chicken and egg concerns around where the demand would come from to make use of additional supply, but this means that it is difficult for local businesses (and residents) to consider in investing in switching to hydrogen without the guarantee of supply. This project could address these concerns by providing a substantial off taker for future supply and unlock estimated €6m new investment & generate €320k/pa new revenue from H₂ sales.

2 Social Acceptance

The Orkney community and local businesses are highly engaged in Orkney's transition to net zero and regularly participate in surveys and workshops on energy developments, facilitated by Orkney Islands Council, Orkney Renewable Energy Forum, the work of EMEC, and more recently by the REFLEX initiative.

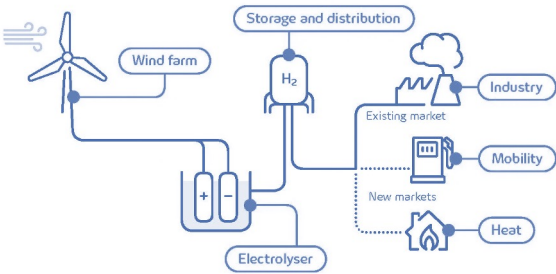
Green Orkney Hydrogen Market Expansion – Technical Data

FOCUS ON WIND ENERGY AND GREEN HYDROGEN

Orkney already generates 120% of its energy needs from renewable sources, but the additional renewable energy capacity created could enable some local diesel use to be replaced with renewable electricity-based heating and transportation options.

This project aims to identify a safe and viable transport logistic solution for the transportation of green hydrogen gas produced on Orkney to new markets on the mainland and to calculate the positive impact of such a development on Orkney's energy system: increased economic output from existing assets, opening new investment opportunities, local economic growth and community savings and overall GHG emission reduction.

This action would benefit the entire Orkney archipelago due to the widespread distribution of wind turbine assets and the potential benefits of being able to sell electricity that would otherwise be curtailed.



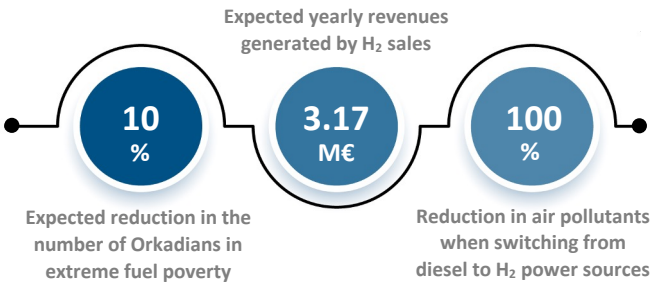
Schematic representation of wind to green hydrogen production and consumption

(Source: <https://www.en-former.com/en/using-wind-power-to-produce-green-hydrogen/>)

EXPECTED ENERGY SAVINGS

The project will not create primary energy savings as it seeks to increase demand for green hydrogen produced from islands renewable energy sources, with the aim of replacing diesel fueled generators with a zero carbon and zero pollution alternative. It will however save 3,929 tons of CO₂ emissions per year on the mainland (CO₂ impact calculated from reduction in diesel consumption arising from replacing diesel generators with green hydrogen fuel cell power solutions at identified outdoor events: 1l diesel = 2.63kg CO₂).

KEY NUMBERS OF THE PROJECT



REPLICABILITY IN OTHER ISLANDS

The project could be replicated in the Scottish Western Islands, and in any islands where there is potential to over-produce electricity. Scandinavian and Danish islands are starting similar projects. Electrolysers are expensive and islands' markets are usually too small to cover that cost. H₂ economy needs revenue stream from the mainland market.