

BIG HIT Creates Exemplar 'Hydrogen Islands' Energy System for Orkney

Building Innovative Green Hydrogen systems in an Isolated Territory: a pilot for Europe (BIG HIT)

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Today the official opening of BIG HIT took place in Kirkwall, the Orkney Islands, bringing together communities, industry, and politicians who are all working together to deploy one of Europe's leading energy systems. This will enable more renewable energy to be produced and used locally in the Orkney Islands of Scotland and also support similar deployments more widely.

Energy Minister Paul Wheelhouse said: *"We are very supportive of the BIG HIT initiative because it will help alleviate grid constraints in the Orkney Islands by enabling excess renewable energy generated locally, but what cannot be transmitted to the mainland to be stored and used to produce hydrogen. As a versatile and low carbon energy solution, hydrogen therefore has the great potential to play an important role in transport, heating, and industry. "This innovative project will add to our growing understanding of the potential role of hydrogen in Scotland's future energy system, as identified in Scotland's Energy Strategy which I published in December. "The Scottish Government has already supported a number of world-leading hydrogen demonstration projects, such as; the Orkney Surf'n'Turf project; and the introduction of zero emission hydrogen buses and hydrogen refuelling stations in Aberdeen."*

This 'Building Innovative Green Hydrogen Systems in an Isolated Territory' (BIG HIT) project is a major first step towards creating a genuine hydrogen territory in the Orkney Islands. BIG HIT has been widely recognised as the leading project of its kind in Europe. BIG HIT is a five-year project, involving 12 participants based across six EU countries, funded by the EU FCH JU. The Orkney Islands of Scotland were chosen for this development because of the need to store excess renewable energy and utilise the stored energy locally for transport and heat.



Hydrogen & Fuel Cell Deployments in the Orkney Islands of Scotland

The BIG HIT project provides a blue print for renewable hydrogen deployment for island systems and new hydrogen territories. This will benefit communities and businesses who want to use more locally generated renewable energy.

Orkney Islands Council Leader James Stockan said: *"Orkney is at the heart of the BIG HIT project, which aims to demonstrate how hydrogen produced locally using renewable energy can be used sustainably in ways which benefit islands and other remote communities. Our community is the ideal test bed for this important initiative. The Council has ambitions to become carbon neutral and so it was great to see the*

Council's new zero-emission vans - the first vehicles to have a 'fill-up' of Orkney-produced hydrogen – at the launch event, providing clear evidence that BIG HIT is up and running."

Mark Hull, Head of Innovation for Community Energy Scotland, added: *"The launch of this project is the hard earned result of a truly unique partnership of technical, public and local community partners coming together. We are looking forward to seeing it not only lead the way internationally, but also create real benefit to the local community, especially in Shapinsay and Eday."*

Neil Kermode, Managing Director of the European Marine Energy Centre said: *"By piloting the generation of hydrogen from renewable energy sources, BIG HIT is helping avoid grid shortcomings, while supporting further development of renewable energy projects in Orkney. It is breaking through the barriers to delivering renewable transport and heat, opening up new markets around the world."*

Clive Brookes, the Chair of Eday Renewable Energy added *"Eday Renewable Energy are proud and pleased to be part of BIG HIT and the emerging Hydrogen economy here in Orkney. This is an exciting time for the community of Eday and will create new opportunities for making better use of renewable energy generated from wind and tidal sources on Eday"*.

The Orkney Islands have over 50 MW of installed wind, wave and tidal capacity generating over 46 GWhr per year of renewable power and has been a net exporter of electricity since 2013. Energy used to produce the hydrogen for BIG HIT is provided by the community-owned wind turbines on the islands of Shapinsay and Eday, two of the islands in the Orkney archipelago.

At present the Shapinsay and Eday wind turbines are often 'curtailed', losing on average more than 30% of their annual output, limited by grid capacity restrictions in Orkney. This wasted energy from the locally owned Shapinsay wind turbine will be used by the BIG HIT project to produce renewable hydrogen using a 1 MW PEM electrolyser supplied by ITM Power. Storing excess renewable energy as renewable hydrogen in this way increases the utilisation of the installed wind capacity without the need to reinforce the grid connection.

Prof Roger Putnam CBE, Chairman of ITM Power, added: *"BIG HIT is an important blue-print for the design of hydrogen energy systems utilising intermittent renewable energy. The project perfectly illustrates the use of electrolysis for energy storage and its subsequent use as a clean fuel and for renewable heat. ITM Power are delighted to be part of such an important project"*

BIG HIT builds on foundations laid by the Orkney Surf 'n' Turf initiative, which has established production of hydrogen on the island of Eday using wind and tidal energy. BIG HIT and Surf 'n' Turf are both recognised as world leading pilot and demonstration projects, which put in place a fully integrated model of hydrogen production, storage, transportation and utilisation for low carbon heat, power and transport. These projects address a number of operational and development challenges including the logistical and regulatory aspects for transport of hydrogen fuel between islands, and the orientation and familiarisation with new hydrogen building and transport technologies.

Fernando Palacin, the Managing Director of The Foundation for the Development of New Hydrogen Technologies in Aragon, coordinators of the BIG HIT project, said: *"Hydrogen technologies provide solutions to some of the most important challenges that humankind has to face in terms of sustainability, environmental concerns, and a better use of local renewable resources for improvement the socio-economic structure of the region or territory where they are deployed. They also offer public & private entities business opportunities, allowing them to increase competitiveness and social cohesion. The BIG HIT European project is a pioneer project and the first step worldwide towards establishing a real locally-integrated hydrogen economy, The Foundation is delighted to join and lead this consortium to demonstrate and make visible & tangible the benefits of hydrogen technologies in Orkney"*.

The local authority partner in BIG HIT is Orkney Islands Council, providing local input together with the Shapinsay Development Trust (SDT), Community Energy Scotland (CES), and the European Marine Energy Centre (EMEC). Calvera, Giacomini, ITM Power, and Symbio are the industry partners providing equipment and technical expertise. Technical University of Denmark (DTU) is the technical partner and the Scottish Hydrogen & Fuel Cell Association (SHFCA) is dissemination partner. The Ministry for Transport and

Infrastructure (MTI) represents Malta as the lead follower territory for project replication. The overall BIG HIT project coordinator is Fundación Hidrógeno Aragón (FHA, The Foundation for the Development of New Hydrogen Technologies in Aragón).

Orkney Islands Council has taken a leading role in the BIG HIT project, by purchasing 5 electric vans which have each been fitted with a hydrogen fuel cell by Symbio to provide twice the normal operational range. These adapted Renault Kangoo vans are part of the Council's operational fleet, and the hydrogen fuel cells give these them a wider range than their battery-powered electric counterparts.

Shapinsay Development Trust works to secure the future of the resilient island community of about 300 people in Shapinsay, one of the many inhabited islands in the Orkney archipelago. Shapinsay islanders are empowered and resourced by the efforts of the Trust in whose work many of them are intimately involved as trustees, volunteers or employees.

Community Energy Scotland (CES) is a registered Scottish charity and has been at the forefront of community energy developments in Scotland. CES has been leading the Surf 'n' Turf project which is work closely with BIG HIT on areas such as hydrogen logistics.

European Marine Energy Centre (EMEC) is the first and only centre in the world to provide developers of both wave and tidal energy converters with purpose-built open-sea testing facilities, and also is host to the Surf 'n' Turf project funded by the Scottish Government's Local Energy Challenge Fund.

Calvera specialises in the manufacture of storage and transport systems for compressed gas, and particularly Hydrogen for high pressure. The company has provided bespoke systems for 30 years to industrial and medical gas companies, and provides turnkey solutions including European approvals. In addition, the company maintains and refurbishes gas transport systems.

Giacomini is a leader in the field of components for heating and cooling, and has been involved for more than 10 years in the field of hydrogen as renewable energy source using an innovative condensing boiler based on a hydrogen catalytic burner.

ITM Power is an energy storage and clean fuel company, committed to clean sustainable energy solutions based on water electrolysis using Polymer-Electrolyte-Membrane (PEM) technologies. ITM Power will be providing the project's electrolysis, the hydrogen refuelling station and will be conducting much of the safety analysis.

Symbio is a European leading parts manufacturer, specialized in hydrogen fuel cell kits that can be incorporated into various types of electric vehicles and are associated with a range of digital services.

Danmarks Tekniske Universitet (Technical University of Denmark, DTU) is one of Europe's foremost technical universities with world class expertise in fuel cells, electrolysis, hydrogen storage and related technologies.

Scottish Hydrogen & Fuel Cell Association (SHFCA) is the sector body for the development and deployment of hydrogen and fuel cell technologies in Scotland.

The Ministry for Transport and Infrastructure (MTI) promotes and develops the transport sector in Malta by means of proper regulation and by the promotion and development of related services, businesses and other interests, both locally and internationally.

The Foundation for the Development of New Hydrogen Technologies in Aragón (FHa) is a non-profit private entity founded in 2003 to carry out the organization, management and deployment of a wide range of actions with the purpose of promoting the use of the hydrogen as an energy vector. Based in Huesca, Spain, its team of experienced professionals performs R&D as well as consultancy projects, in cooperation or assisting local, national and international companies, contributing to their industrial modernization and to improve their competitiveness.

About the FCH JU. The Fuel Cells and Hydrogen Joint Undertaking is a unique public-private partnership supporting research, technological development and demonstration activities in fuel cell and hydrogen

energy technologies in Europe. Its aim is to accelerate the market introduction of these technologies, realising their potential as an instrument in achieving a carbon-lean energy system. The three members of the FCH JU are the European commission; the fuel cell and hydrogen industries, represented by Hydrogen Europe; and the research community, represented by research grouping Hydrogen Europe Research.

The BIG HIT project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No. 700092. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe research. The FCH 2 JU selected BIG HIT as the only hydrogen project of its kind to receive funding in 2016, and €5 million has been allocated to the project, which has total estimated costs of €10.9 million. For more information about BIG HIT see <https://www.bighit.eu/>

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For further information about BIG HIT and interviews please contact Nigel Holmes

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