







GenComm EST to help bus fleets decarbonise globally goes live

The GenComm Enabling Support Tool, (EST) to help bus fleets decarbonise has went live online for the first time globally.

This key output of the Belfast Met led Interreg North West Europe hydrogen project GenComm is a tool that allows stakeholders to identify the ideal bus routes that are suitable for the use of hydrogen buses. In addition possible variants for economically valid mixed bus fleets (Hydrogen, Electric and Diesel) are identified.

This step to decarbonising your bus fleet will let you know how much it will cost to decarbonise your bus fleet, the Total Cost of Ownership, (TCO) and Total Carbon Abatement, (TCA) for transitioning to a hydrogen based fleet.

The EST is an easy-to-use graphical tool enabling community stakeholders to take full commercial and environmental advantage of renewable data analytics to develop their own energy solutions. It is powering community driven transitions to a zero-carbon footprint. and enabling communities to plan

their H₂-based energy solutions, decarbonise energy needs and plan their pathway to net zero.

The model gives you an estimate of how valid it is for your bus fleet to switch to hydrogen. To complete the EST you are required to input some general information about your bus fleet such as fleet size and operational time. At the conclusion of your information entries on the online tool you will be presented with charts that display the TCO and TCA of the bus fleet for the information provided. This compares the fuel types of hydrogen, battery, electric and traditional diesel drive mobility types as well as a mixed fleet approach.

Key information required for the online entry in the tool includes how many busses are in your fleet, what are the average operational times for busses in the fleet, steepness of routes, whether single deck, double decker or articulated busses are involved, and price of fuel in your area.

Cost effective decarbonisation and energy security are the drivers of the EST. Finding the right role for







→ hydrogen is very much a part of the EST and GenComm itself. You can view the EST here.

GenComm Programme Manager Paul Mc Cormack welcomed the tool going live globally today saying: "Hydrogen is a growing commodity. This platform allows

"Hydrogen is a growing commodity. This platform allows users to make informed decisions based on real data analysis to optimise their renewable energy use in order to achieve maximum impact in decarbonising their communities. The EST allows communities to plot their transition journey to net zero."

Tim Williamson from the GenComm Partner Hy
Energy Consultancy added: "The model, Developed by
Tadgh Cummins of the GenComm Partner University of
Galway, has been integrated into an easy-to-use online
form, and is the perfect opportunity for bus operators
to get a sense of where they should aim their efforts in
their decarbonisation processes. The outputs compare
between traditional diesel, battery electric, fuel cell and a
mixed fleet approach which uses both battery electric and
fuel cell and can give a launching point from where bus
operators can begin their decarbonisation journey."

By Eugene McCusker GenComm Communications Officer

THE ENABLING SUPPORT TOOL THE FIRST STEP TO DECARBONISING YOUR BUS FLEET Interreg North-West Europe **COMMUNITYH2.EU** GenComm





Europe makes hydrogen central to its future energy plans

The Fit-for-55 package, released in two parts across July and December 2021, was a statement of the intent from the European Commission that hydrogen would be part of its future energy landscape.

Since its release, the hydrogen sector has seen acceleration at a pace that few could have even imagined and given further impetus by the Russian invasion of Ukraine. The drive to solve Europe's dependency on Russian gas whilst reducing emissions of the continent's energy mix led to the release of REPowerEU and, with it, confirmation of the increased role for hydrogen, particularly within industry, heating, and mobility.

One element of which is to be enshrined in legislation with the passing of the Alternative Fuels Infrastructure Regulation (AFIR) which will necessitate the deployment of hydrogen refuelling stations at regular intervals along the TEN-T Core Network – a designated network of Europe's most important multimodal transport corridors and nodes that is expected to be fully linked by 2030.

Whether being consumed by industry, heating, or mobility, it is imperative that hydrogen is made via a low-carbon method. Conventional grey hydrogen – produced via Steam Methane Reformation (SMR) – emits around $10 \text{kg}_{\text{CO2}}$ per kg_{H2} obtained.



Blue hydrogen – made by utilising SMR in conjunction with Carbon Capture and Storage (CCS) technologies – and **green hydrogen** – hydrogen produced from renewable sources, most typically featuring electrolysis – can significantly reduce process emissions to between 0.3 – $3.9~{\rm kg_{co2}/kg_{H2}}^1$ depending on the mix and maturities of technologies used. These solutions have received considerable support in the form of capital funding to encourage innovation and economies of scale, but are yet to significantly penetrate the market. The lack of clarity surrounding definitions of and subsidy schemes for 'low-carbon' and 'renewable' hydrogen from the European Commission (EC) has left investors without a sufficient level of long-term bankability. Until now.

¹ Hydrogen Council. Hydrogen decarbonisation pathways. (2021).





■ At the start of February 2023, the EC released its much anticipated Delegated Act relating to the definition of renewable hydrogen. This was released under the Renewable Energy Directive and focuses on three key areas, additionality, geography, and time.

ADDITIONALITY
Concerns regarding the use of renewable electricity to produce hydrogen that could have been used to directly decarbonise the electrical grid, otherwise known as the 'additionality' principle, has been a long-term issue for the hydrogen sector. European energy stakeholders, as a whole, understand the need for renewable energy connected to hydrogen production to be new, and not subverting existing grid renewable electricity. The EC has recognised this requirement and stated, under its new act, that 'a period of 36 months' between new renewable energy installations and the installation infrastructure to produce 'renewable liquid and gaseous transport fuel of non-biological origin' (i.e. hydrogen and other hydrogen-derived fuels) will be applied.

GEOGRAPHY As part of the act Europe will be split into "bidding zones" which will largely follow national borders. Green hydrogen projects must source renewable energy from the zone they are based in order to be compliant. This can occur via direct linking to renewable sites or Power-Purchase Agreements (PPAs), but projects will also be able to use grid electricity should it meet certain standards. Any bidding zone which has provided >90% of its electricity from renewable energy in the last calendar year, or has an average power production carbon intensity of <64.8 CO_{2eq}/kWh, will be able to class grid-powered hydrogen production as renewable whilst also being considered exempt from additionality

requirements. This will enable high load factors in a short timescale to be achieved, lowering the levelized cost of hydrogen produced and instigating a more competitive European hydrogen product.

TIME Following backlash from initial plans to utilise an hourly renewable energy correlation for any renewable hydrogen projects in September 2021, the EC have chosen to apply a middle-ground approach as part of this act. Projects will be required to implement a monthly correlation up until 2029, at which point an hourly approach will takeover, following a successful review in 2028. The decision has been criticised by organisations such as Global Witness as dirty grid electricity will be used to supplement renewables when the sun doesn't shine or the wind doesn't blow and has even been referred to as 'a gold standard for greenwashing'.

The long-awaited delegate act is a much-needed step in the right direction for the European hydrogen sector. Despite the rigidity of requirements to become 'renewable' certified, the EU will have successfully eased investors anxiety and unlocked the next phase of renewable hydrogen deployment across the continent by setting intent clearly across these three key areas. This, coupled with recent announcements that the EU will offer a 'fixed premium' to renewable hydrogen producers, will help cement European investment attractiveness vs lucrative foreign markets such as the US with its Inflation Reduction Act. Further delegated legislation regarding the definition of 'low-carbon' hydrogen is expected by the end of 2024, including blue and pink – hydrogen nuclear sources – production pathways.







Green Economy - Northern Ireland's potential

Rachel Sankannawar, Invest Northern Ireland's Head of Green Economy Development, asks: 'what is the Green Economy' and how Northern Ireland can tap into the business opportunities?

The are several definitions of a 'Green Economy' – the United Nations describes it as a "low carbon, resource efficient, and socially inclusive economy"; the European Environment Agency defines it as "one which generates increasing prosperity while maintaining the natural systems that sustain us". Regardless of its official definition, it places sustainability at the core of economic development and is a global megatrend which offers a wealth of opportunity for business.

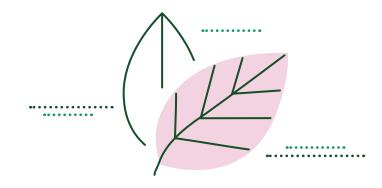
In simple terms, a Green Economy delivers products or services that drive decarbonisation, resource circularity, and energy efficiency. Its impact is across the full supply chain, as well influencing end customer usage, and ultimately contributes to the delivery of green targets around the globe.

There are clear commercial opportunities on a global scale. Oxford Economics projects new green activities could create \$10.3 trillion to 2050 Global GDP, and the International Labour Organisation (ILO) has indicated that a shift to a greener economy could create 24 million new jobs globally by 2030.

With our excellent advanced manufacturing and engineering capabilities, world leading academia and strong innovation, research, and development ethos, Northern Ireland is well positioned to take advantage of the emerging green opportunities. Businesses here have the potential to be an important player in the development of low carbon enabling technologies to assist key industry sectors such as heat, energy, and transport.

We aim to help Northern Ireland businesses tap into these opportunities. Our Green Economy Development team is made up of experts in the areas of trade, cluster development and collaboration, renewables, cleantech and business development. Together we have identified new market opportunities in the green economy and are supporting NI companies to compete for global opportunities. Alongside this, our Energy and Resource Efficiency team is actively working with and supporting companies to go greener, focus on green efficiencies, decarbonise, and instil circular economy principles in their business.

If we collaborate, partner and innovate to capitalise on the global opportunities within the green economy agenda it could deliver real growth and prosperity to our local economy. Our Green Economy Development Team is here to support businesses to fully optimise the opportunities emerging in the Green Economy, and to support business decarbonisation in the drive towards net zero.







■ Interested to find out more about green opportunities? We are hosting NI delegations at some exciting trade and sector missions across Europe over the coming months:

Offshore Wind Marseille, France

Understand the economic benefits of offshore wind, the skills needed to pump prime this opportunity, and to identify and compete for new business opportunities in offshore wind projects in Europe.

World Sustainable Energy DaysWels, Austria

A showcase of green products and solutions, whilst engaging in collaborative opportunities with Austrian based companies and clusters to explore future commercial activity across a range of low carbon technologies.

Global Offshore Wind London

A great opportunity for NI businesses to optimise sales and exports at the UK's largest meeting place for the offshore wind industry.

All-Energy Glasgow

An opportunity to meet, network and make connections with the renewable energy community at the UK's largest low carbon energy and full supply chain renewables event.

Businesses will also benefit from the co-located 'Dcarbonise' event which is aimed at private and public sector energy end users.

If you would like to explore selling your sustainable product or service outside Northern Ireland then please reach out to our team greeneconomydevelopment@investni.com



By Rachel Sankannawar Invest Northern Ireland, Head of Green Economy Development







Clean hydrogen from dirty waters: Galway leads ANEMEL project to tackle the challenge

Green hydrogen is, currently, one of the biggest bets of the European Union to ensure energy independence. Additionally, this technology could contribute to decarbonising our economy, transforming several sectors, from transportation to the chemical industry.

Nevertheless, hydrogen generation still faces challenges, and the EU-funded project ANEMEL, led by the University of Galway in Ireland, tackles them, thanks to a collaboration between academic and industrial partners in seven countries. In particular, ANEMEL will design innovative components such as catalysts and membranes for electrolysers, ready to convert low-grade water into hydrogen.

Green hydrogen could become the future of energy without fossil fuels. However, hydrogen generation still relies on valuable limited resources – especially fresh water. ANEMEL, a project funded by the European Innovation Council (EIC) as part of the Green Hydrogen Challenge, will develop devices to diversify the possibilities of hydrogen generation, expanding the scope of sources to low-quality waters, such as wastewater and seawater.

The ANEMEL project counts on a total budget of almost €5 million – of which €2.96 million comes from the EIC– to develop efficient electrolysers and expedite the design of prototypes during the next four years.







■ Altogether, the project will catalyse the commercialisation and exploitation of the technology, as part of the EIC's strategy to accelerate the development of breakthrough technology.

Researchers in ANEMEL will focus in innovations within the field of membranes and electrolysers. Beyond the reliance on low-grade water sources, the project will address additional aspects to make hydrogen generation even greener. For example, the membranes designed by ANEMEL partners will avoid using persistent and pollutant products like poly-fluorinated materials, as well as critical raw materials – favouring the use of abundant metals like nickel and iron. On top of making electrolysers more sustainable, these strategies will reduce the cost of the components and improve their recyclability, reducing waste and provide a clear competitive advantage.

Kickstarted in September 2022 during an online meeting, ANEMEL will count on four full years to complete its ambitious goals. Beyond technology tests, the project will develop an eco-design process supported by environmental and life-cycle analysis, to ensure low impact in ecosystems and circularity – all while maximising socio-economic benefits in the European community. The plan will reach TRL 3, taking laboratory scale single-cell into prototype multi-stack electrolysers, which will ensure a fast-track to commercialisation.

ANEMEL gathers experts from academic institutions, research facilities, technological centres, SMEs and industries. While academic researchers represent the forefront of European innovation in the field of green hydrogen and catalysis,

the industrial partners are world leaders in the development and assembly of membranes and electrode manufacturing, with vast expertise in large-scale electrolyser technologies. Together, the ANEMEL consortium will surely stimulate technology transfer and exploitation.

More widely, ANEMEL will contribute to the objectives and activities of the European Hydrogen Innovation Challenge, tasked with identifying and overcoming key technology barriers to the production, distribution, storage, and use of hydrogen at gigawatt scales. In this sense, the project will collaborate with eight other multidisciplinary initiatives, funded within the same EIC scheme, to catalyse cross-collaborations and maximise the positive outcomes for the European economy. As part of these efforts, ANEMEL will also connect with key hydrogen valleys and hydrogen initiatives in the EU, with aims to facilitate the growth of membrane technologies for the generation of green hydrogen from low-grade water sources.

Dr Pau Farràs Costa, coordinator of ANEMEL and researcher at the University of Galway, Ireland, concludes: "I'm convinced the project reunites the perfect team to design efficient electrolysers to produce green hydrogen from low-quality waters, offering unique opportunities to reshape the European energy landscape, ensuring economic independence as well as stimulating sustainable solutions to reduce our reliance on fossil fuels."

By Dr Pau Farràs Costa

Director Chemlight Research Group, University of Galway





New Hydrogen Taskforce in Luxembourg

Following the National Hydrogen Strategy, the Ministry of Energy and Spatial Planning launched a Hydrogen Task Force in Luxembourg during a meeting in November 2022.

This group will bring together many actors from different sectors to discuss updates on production, demand, transport, distribution and supply of green hydrogen. The Taskforce Hydrogen Luxembourg is composed of a steering committee and subdivided into three working groups: (I) Identification of potentials in Luxembourg, (II) Cross-border and EU aspects and (III) Research and Innovation. During the meeting, the steering committee with representatives from 8 ministries was presented: Energy, Economy, Environment, Climate and Sustainable Development, Finance, Foreign Affairs, Higher Education and Research, Mobility and Public works.

At this occasion ongoing studies were presented and the audience was updated on the hydrogen economy in the different domains. The demand, transport and distribution are being analyzed in a regional approach. It was underlined that hydrogen will play a key role to decarbonize industry, e.g. steel, cement or chemical industries, as well as of the hard-to-electrify transport sector with high loads and long distances, for instance buses, trucks or ships. In Luxembourg, the first hydrogen refueling station will start operation in spring 2023.

Though it is planned to initially have a local H₂-production in pilot plants, the increasing demand will require imports and foreign production. H₂ will be produced at sites with low solar- and wind electricity cost and subsequently transported by multimodal container solutions and by cross-border pipelines. This infrastructure is actually being defined and ramped up by new or repurposed pipelines (e.g. the MosaHYc project) and by European Hydrogen Backbone.

On February 8, we had the second Taskforce meeting gathering around 100 people to discuss demand and infrastructure in a regional approach, and a subsidy instrument to support the hydrogen supply chain in Luxembourg. Considering the importance of a European approach, efforts are



being made to create a cooperative working group in the Greater Region, with players from France, Belgium, Germany and Luxembourg, to work on all aspects of the hydrogen transport, economy, including legal, technical, safety and educational aspects.

"It is good to see stakeholders having the opportunity to meet and have productive discussions about hydrogen to bring it forward", said Branca Delmonte, from the University of Luxembourg. "I'm pleased to see this initiative to rump up the hydrogen economy. It's time to start." said, Stefan Maas, Professor, Department of Engineering, University of Luxembourg.

By Branca Delmonte

Doctoral researcher, Faculty of Science, Technology and Medicine, University of Luxembourg



Consultation on a UK low carbon hydrogen carbon hydrogen certification scheme certification scheme The new Hydrogen consultation paper

UK takes first step to introducing a Low Carbon Hydrogen Certification Scheme

A consultation on the minded-to position for a Low Carbon Hydrogen Certification Scheme has launched in the UK, giving industry stakeholders the opportunity to feed into the design of the scheme before it is set to be formally launched in 2025.

Since the publication of the UK Hydrogen Strategy in 2021 there has been a rapid increase in global interest and investment in the development of an international market for low carbon hydrogen. It is thought that introducing a UK certification scheme for low-carbon hydrogen would create benefits for the whole hydrogen value chain, from producers to end users, promoting economic growth, job creation, and greener businesses.

In the British Energy Security Strategy (BESS), published in April 2022, the UK government renewed its commitment to hydrogen by doubling its ambition to up to 10GW of new low carbon hydrogen production capacity by 2030, with at least half of this coming from green hydrogen.

The BESS also committed to launching a hydrogen certification scheme by 2025. The UK government is now consulting on the design of this scheme to demonstrate high grade British hydrogen for export and ensure any imported hydrogen meets the same high standards that UK companies expect. Having a scheme to verify the sustainability of low carbon hydrogen is expected to build transparency and confidence across the sector both domestically and internationally.

This consultation follows on from the development of the UK Low Carbon Hydrogen Standard (LCHS), which was set in 2022. The methodology proposed for the certification scheme is intended to be based on the LCHS.

As well as providing benefits domestically across the UK supply chain, the scheme aims to enable both the hydrogen and the low carbon attributes of hydrogen to be exported, through compatibility with a range of international certification schemes, allowing UK-based exporters to demonstrate their emissions credentials

internationally. Similarly, the certification scheme aims to provide the opportunity to certify the emissions of imported hydrogen seeking to demonstrate its compliance with the Low Carbon Hydrogen Standard.

The UK government is inviting feedback and views from industry on various design elements of the certification scheme, including scheme fundamentals like units and scope, the information contained on a certificate, its chain of custody approach and delivery and administration of the scheme. The entire supply chain from producers, to end users of hydrogen (including transport and storage) are expected to take interest in its contents.

The consultation closes on Friday 28th April, after which the responses to the consultation will be analysed and the Government response will be published.

By BEIS Press Office





GenComm Partners research into transport decarbonisation

Pedro Aguilar and Dr Bodo Groß, the two authors of a new White Paper on 'Alternative Powertrains and the challenges to decarbonise the Transport Sector' are calling for more action from governments regarding the introduction of alternative powertrains to fight CO₂ emissions.

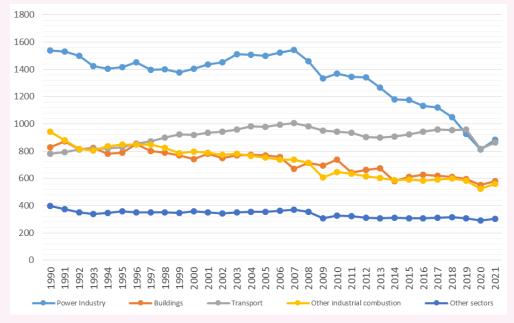
The authors from IZES gGmbH, a German based partner on the Belfast Met led Interreg hydrogen project GenComm, have pointed out that efforts and investments on alternative powertrains so far have been focused almost exclusively on the passenger car sector, leaving aside sub sectors of the transport economy such as heavy duty vehicles, maritime cargo ships and aviation that together represent almost the same amount of emissions that passenger cars release worldwide.

In their new white paper the authors warn that the transportation sector may become the most polluting economy sector worldwide unless more action is taken to foster transition to alternative powertrains for battery or fuel cell electric vehicles and clean synthetic fuels for internal combustion engines.

Looking to the future the authors say: "The decarbonising approaches for the maritime shipping and aviation sectors are still in a very early stage of development, therefore, it is necessary that governments worldwide embark on the task of

boosting innovation, research and development in these sectors."

Turning the electricity generation sector away from fossil fuels is paramount to achieve the full potential reduction on emissions that BEVs and green hydrogen have."



Annual CO₃ emissions from the EU27 plus Switzerland, Norway, United Kingdom and Iceland.





■ While there is no doubt that hydrogen can help decarbonise the heavy duty transport sector in Europe decarbonising the aviation sector and maritime shipping has its challenges.

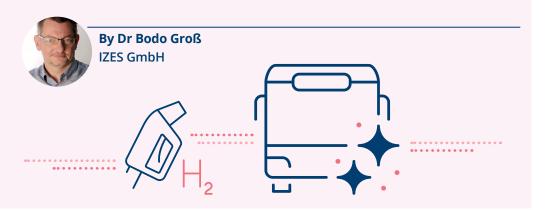
In terms of decarbonising aviation the authors point out: "The potential reduction in emissions in this area can be further improved if other vehicles directly tied to the airports like shuttle busses and taxis are taken into consideration. Another path holding significant contributions to the decarbonisation of the sector is that carried out by the programme IRIS from the European Space Agency. This programme aims to replace the traditional checkpoint based navigation of modern commercial aviation for a satellite based approach that allows for improved routing and reduced flight congestions carrying a potential reduction in fuel consumption of up to 10% for typical European journeys."

Another potential alternative for curbing emissions from aeroplanes is the use of Sustainable Aviation Fuels such as synthetic kerosene, but the authors admit that aviation is itself a heavy regulated industry.

The authors also looked at the area of decarbonising maritime shipping. They stressed: "Maritime cargo ships are considered to be the transportation sub sector that consumes the largest amounts of fuels worldwide, therefore the International Maritime Organisation is aiming to set more restrictive rules to reduce CO, emissions from this type of vehicle."

Reaching the conclusion that the transport sector is lagging behind other sectors of the economy regarding reductions of ${\rm CO_2}$ emissions and may soon become the most polluting sector of the EU group the authors argue that government policies need to change. New initiatives and clean fuels such as hydrogen can help in the long run.

GenComm Programme Manager Paul McCormack has welcomed the new research by the GenComm Partner saying: "We are at the global threshold of a clean energy future. Whilst there are many opportunities there are many short-term challenges that need addressed. Clean Hydrogen will play an important role in the energy transition journey away from fossil fuels especially in mobility solutions, long-haul transport and maritime use. We need innovators delivering competitive hydrogen supply chains especially among end-users, delivering secure, resilient and sustainable clean energy solutions".







Valentia Island project H₂ORIZON selected for European hydrogen project

A leading European organisation has selected Valentia Island in Co Kerry as one of 15 regions that will receive support to explore clean energy solutions that will help Ireland on its path to net zero.

The Brussels-based Clean Hydrogen Partnership will fund the $\rm H_2ORIZON$ study by leading hydrogen consultants to explore the role of hydrogen in decarbonising energy on Valentia Island, especially around maritime use cases. The study will also examine the potential for business and other modes of transport to use hydrogen.

Valentia Island, and the surrounding areas, is already leading the way as a pioneering sustainable community with the recent completion of an energy masterplan and feasibility study into renewable and green technologies. This work was supported by GenComm, a research project which addresses the energy sustainability challenges of European communities through the implementation of smart hydrogen-based energy.

Leading hydrogen consultants, appointed by the Clean Hydrogen Partnership will explore various opportunities where hydrogen produced from renewable energy can complement the role of electrification in decarbonising Valentia Island, for example, offering green hydrogen infrastructure for tourism and marine mobility and powering industry such as the local distillery.

In January 2020, the Valentia Energy Co-Operative was established with the aim of ensuring that the wider community works with stakeholders to find and develop clean energy solutions.

Welcoming the announcement, Colum O Connell, Chairman of the Valentia Island Energy Group, said: "What we are looking to introduce is a fundamental shift in how we think about decarbonisation. Other governments around the world recognise the opportunities hydrogen can bring and are developing strategies to develop green hydrogen. The recently published Climate Action Plan 2023 included specific actions to enable the use of hydrogen across industry, enterprise and transport. However, we need more clarity at national level on what our strategy is. Valentia Island has been campaigning with our partners, Energy Co-Ops Ireland, to get more visibility for our green hydrogen vision."

As one of the partners of the Clean Hydrogen Partnership, ESB will work closely with the consultants in identifying and planning green energy opportunities.







Aodhan McAleer, Hydrogen Manager at ESB, said:

"At ESB, we are committed to empowering and supporting the communities we serve to achieve net zero. A key part of our Net Zero by 2040 strategy is the production and storage of zero carbon electricity and green hydrogen from our growing portfolio of wind and solar generation. As such, projects such as this in Valentia Island are critical to learning how our future energy system will work and benefit key industries such as marine transport as well as providing back-up generation. We look forward to working with Valentia Island stakeholders and thank them for allowing us to be part of their sustainable journey."

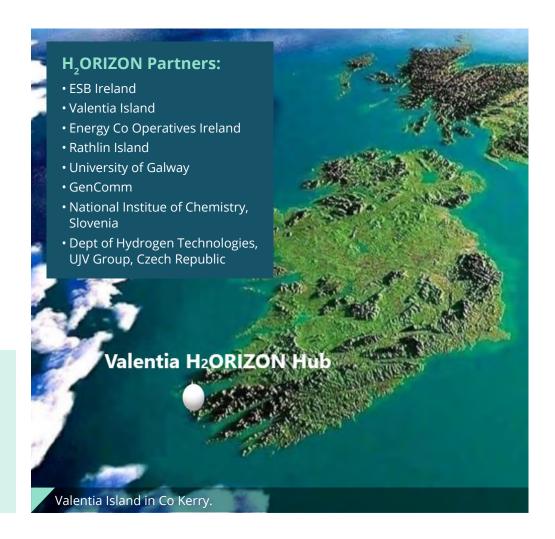
Paul McCormack, GenComm Project Manager stated:

"H₂ORIZON is about utilising green hydrogen to provide an energy catalyst to build stronger, resilient communities and using energy to ensure remote communities are connected. It is part of the work of GenComm-generating energy secure communities stimulating the green hydrogen economy through partnership, communication, wider engagement and promotion."

About The Clean Hydrogen Partnership



15 regions, including Valentia Island, were selected to receive support from the latest Project Development Assistance (PDA) initiative. This involved a two-stage application and evaluation process. The Clean Hydrogen Partnership's main objective is to contribute to the EU Green deal and Hydrogen strategy through financing of research and innovation activities.









For more information

on the GenComm Project and our work in the green hydrogen arena contact

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