

H₂GO NEVVS September 2023

Issue 24







Interreg NWE acknowledge success of GenComm project

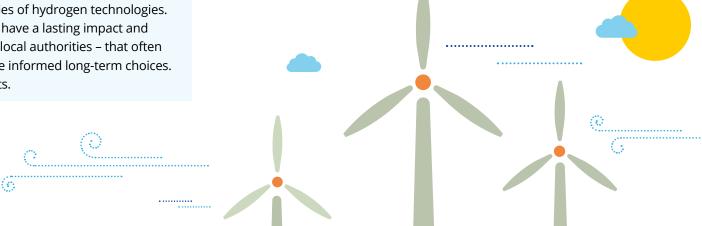
The North-West Europe region is among the highest energyconsuming regions in the EU. Therefore, increasing the use of renewable energy in our region is a crucial challenge to address in the transition towards a low-carbon economy.

The Interreg NWE Programme has always been strongly engaged in supporting frontrunner or complex projects that aim to unlock the potential of hydrogen as part of a bigger solution with clean and secure alternatives to fossil fuels. As a Programme we believe that, due to its territorial features, the NWE area has great potential to further develop hydrogen as vector for energy transition.

The GenComm project has successfully demonstrated how regions can cooperate and lead the way to sustainability by exploring the possibilities of hydrogen technologies. We, as a Programme, place great value on projects that have a lasting impact and operate close to more local stakeholders – for example local authorities – that often lack the technological knowledge and/or means to make informed long-term choices. GenComm qualifies as a prime example for both aspects.

The project benefited from our second capitalisation call, resulting in the development of additional support tools to help policy makers and stakeholders get the optimal green hydrogen solutions based on existing local structures.

The project has also been exemplary in targeting and including citizen audiences in their communication. We need citizen preparedness and acceptance as much as that of other target groups if we want to succeed societal transition. In this regard, GenComm has been rewarded for its communication approach by being showcased at a pan European meeting of EU communication officials working for all Cohesion Funds organised by DG REGIO in 2022.







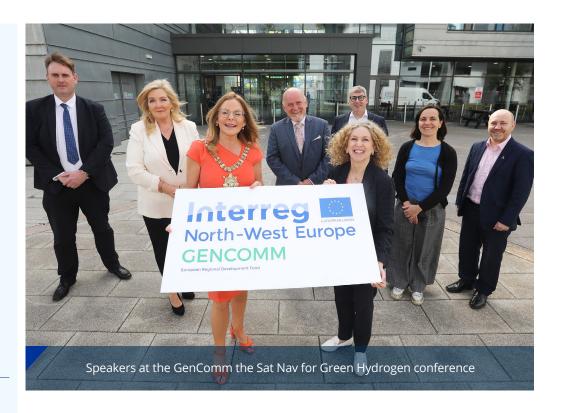
GenComm finally also stood out in our programme with its focus on transport and has been a frontrunner among our projects by also dedicating attention to the aspect of training within the hydrogen sector. An aspect that is present quite strongly in our new 2021-2027 Programme.

We are confident that with the experience gained from its three pilot plants located in Scotland, Northern Ireland, and Germany, GenComm has paved the way for other communities in NWE and beyond to transition to renewable, smart hydrogen-based energy matrices. Over the past five years, GenComm has been the driving force behind many new projects, initiatives and opportunities that have influenced regional, national, and European strategies and has leveraged impressive amounts of additional funding from the private sector.

The GenComm legacy will undoubtedly continue to be successful in the future and we wish the GenComm partnership all the best in their future endeavours.

David G.

David Grzegorzewski Interreg NWE Programme Director







The IZES GenComm Journey

In November 2015, IZES received an email from Belfast Metropolitan College, namely from Paul McCormack, asking if IZES could consider being a partner in the GenComm project.

After a few more emails and phone calls, it was decided that IZES would be involved in the project as a partner with its own investment Work Package - one of three in total. As a result, there was a first meeting of all potential partners in Belfast in April 2016. At this meeting, the content was discussed and the tasks relating to the investment WP were defined for the individual partners.

The planned IZES WP "Planning, construction and operation of a solar-powered hydrogen refuelling station" was discussed very controversially in many respects, especially with the representatives of the Saarland Ministry of Economics, who were approached for co-financing.

The ministry finally agreed to the co-financing, which in retrospect was a very courageous and at the same time very farsighted decision in 2016. Subsequently, IZES was able to subcontract a specialist company to support the planning of the IZES hydrogen refuelling station.

In addition to support in planning, the involvement of this company was also intended to bring the necessary experience in the field of hydrogen technologies to IZES.

The GenComm project started in March 2017 and one of the first project partner meetings took place in December 2017 in Saarbrücken at the Ministry of Economics. The State Secretary at the time, Jürgen Barke, welcomed over 70 external guests to this event. After initial good progress in the development of ideas and the creation of a specification for the IZES pilot plant, the specialist company unfortunately withdrew from the project at the beginning of 2018.

As a result, IZES itself started the search for a suitable system manufacturer. In October 2018, a purchase order for the system was placed with the selected manufacturer. According to the purchase contract, the system was supposed to be delivered and put into operation in 3Q19.







■ By this time, three "GenComm years" had already passed. During this period, the importance of the topic of hydrogen had increased significantly in Europe and worldwide.

On the one hand, this was a good and welcome development for the GenComm hydrogen pioneers, but on the other hand it was also associated with supply bottlenecks for the necessary components needed to build the three planned GenComm pilot plants.

In addition to the delivery bottlenecks, the COVID pandemic caused further delays from March 2020 and made joint and personal meetings more or less impossible. Despite all these obstacles, the plant was delivered at the end of 2020.

Unfortunately, significant frost damage occurred in February 2021, which could not be repaired by the end of the project. At the current stage, the plant serves as a demonstration object and training facility for experts in the field of hydrogen technologies.

For IZES, even though the hydrogen plant cannot be operated as originally planned, GenComm was a very great success.

Why? GenComm was the first project that concretely dealt with the implementation of hydrogen technologies.



During the project period of GenComm, around ten further projects, which were very important for the development of the IZES, were developed, started and partly already completed at IZES. Due to the high importance of hydrogen as an operary carrier of the future, the state of Saarland.

energy carrier of the future, the state of Saarland founded its own hydrogen agency in May 2023. The aim of the agency is to decisively push forward decarbonisation in Saarland and the Greater Region.

Another, almost more important success of GenComm is that the intensive and very collegial cooperation of the GenComm partners has created a resilient European and global network of hydrogen enthusiasts whose goal is to make our planet a little better, to reduce the use of fossil fuels and, in the long term, to end it. According to the motto of the final GenComm conference in May 2023 in Belfast "GenComm - The Sat Nav for Green H2 deployment" we are looking forward to future cooperation within the GenComm family!

Dr. Bodo Groß IZES GmbH









Green Hydrogen and Electrification in City Bus Fleets

The transition to zero emission bus (ZEB) fleets is accelerating, and bus fleet operators are faced with no choice but to plan their decarbonisation approach now. Two prevalent ZEB options are battery electric buses (BEBs) and fuel cell electric buses (FCEBs) fuelled by green hydrogen.

Interest in FCEBs has grown in recent years due to their similarity to conventional diesel internal combustion engine buses (ICEBs) in terms of driving range, refuelling time, and autonomy. This makes them an attractive option for replacing diesel buses cannot be replaced by BEBs.

The main obstacle that is stopping the widespread deployment of FCEBs is their higher cost when compared to both ICEBs and BEBs. On a one-for-one basis, FCEBs are currently more costly than BEBs, but in cases where extra BEBs are required to meet the longer ranges of existing ICEBs, FCEBs can become more cost-competitive on the fleet level.

The range of a BEB is dependent on many factors including local climate conditions, passenger payload, driving speed, road gradient and more. Hence, determining whether FCEBs are suitable for a given bus fleet becomes a complex task.

To enable key decision-makers to make more informed decisions when transitioning to ZEB fleets, the Enabling Support Tool (EST) was created. The EST is an easy-to-use model that can assess the trade-offs between BEBs and FCEBs in terms of their technical performance, required infrastructure, emissions reduction potential, and total cost of ownership (TCO).

TCO is a cost metric with units of €/km that includes all the major costs involved in acquiring and operating a bus fleet and its associated infrastructure. Using the EST model, case studies were performed on existing bus fleets in Galway city (Ireland) and Saarpfalz-Kreis (Germany).

Results for the Galway city fleet (See graph below) consisting of 31 double-deck buses show that 15 additional buses would be required to maintain fleet operations if transitioning to an all-electric bus fleet due to the relatively short range of double-deck BEBs.

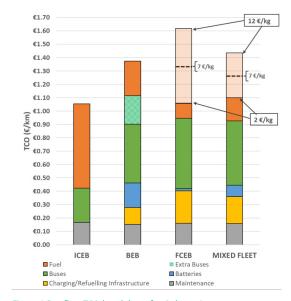


Figure 1 Bus fleet TCO breakdown for Galway city





any additional buses but would be much more expensive due to the high cost of FCEBs and hydrogen. At a green hydrogen price of 7 €/kg, the mixed fleet of BEBs for shorter routes and FCEBs for longer routes has the lowest predicted total cost of ownership. The graph below also shows the significant impact that the price of green hydrogen has on the TCO for the FCEB fleet and the mixed fleet.

For Saarland, results show that BEB fleets are currently more economically attractive than FCEBs in the region due to a lower price of electricity and higher average range of single-deck BEBs which are used in the area. These results indicate that double-deck buses may be more suitable for green hydrogen deployment than single-deck buses in the short term.

The results of the case studies also highlight the impact that the price of green hydrogen has on the TCO of FCEBs. If deployment of FCEBs is to be successful in the short term, government subsidies will be required to reduce the amount that bus fleet operators need to pay to run a fleet on green hydrogen.

An example of such a subsidy can be seen in the United States, where a subsidy of 3 \$/kg can be

granted to projects with a lifecycle greenhouse gas emissions intensity of less than 0.45 kgCO2e/kgH2 under the Inflation Reduction Act.

While electrification and improved energy efficiency will be the main sources of decarbonisation in bus fleets in the short term, eventually the limits of electrification will be reached, and green hydrogen will be required to close the gap to zero-emission public transport.

However, if FCEBs and green hydrogen infrastructure development are ignored in the short term, this will lead to issues and delays in their deployment in the 2030s and beyond.

Therefore, green hydrogen and electrification should be considered as a tandem solution to the global problem of decarbonising of public transport.

As part of the GenComm project, the EST model was implemented online for public use and is accessible via the Community Hydrogen Forum: https://communityh2.eu/.

Tadgh CumminsUniversity of Galway





The Energia Hydrogen Journey

In a groundbreaking series of achievements, Energia has positioned itself as a pioneer in the realm of sustainable energy solutions. The company has recently celebrated two significant milestones that mark its commitment to revolutionising the energy landscape in the UK and Ireland.

In May 2023 Energia was the first organisation to produce green hydrogen at a windfarm site in both the UK and Ireland, funded through the GenComm project. This remarkable achievement showcases the company's dedication to harnessing the power of renewable resources to drive innovative solutions. By utilising wind energy to produce hydrogen, Energia has unlocked a pathway to truly sustainable hydrogen production, significantly reducing carbon emissions and advancing the transition to a cleaner future.

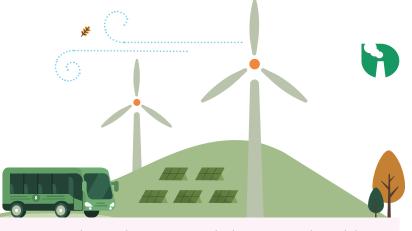
Energia has achieved another historic first by establishing the first Hydrogen Refuelling Station (HRS) on the island of Ireland, with funding support from the Office for Zero Emission Vehicles (OZEV). This accomplishment sets a new standard for

fuelling infrastructure and marks a pivotal step towards a hydrogen-based transportation sector. The establishment of this HRS plays a crucial role in overcoming one of the key hurdles in the adoption of hydrogen-powered vehicles and access to a hydrogen refuelling network.

Furthermore, in partnership with Translink, Energia's efforts have enabled a monumental advancement in the public transportation sector in Northern Ireland.

The successful rollout of the first public sector hydrogen buses on the island of Ireland is a testament to the commitment to driving sustainable mobility solutions. By providing an alternative to conventional fossilfuel-powered buses, these hydrogen buses represent a significant stride towards cleaner air quality and reduced carbon emissions in urban areas.

Energia's accomplishments in achieving the first green hydrogen production at a windfarm site, establishing a hydrogen refuelling station, and enabling hydrogen-powered buses underscore the company's dedication to catalysing positive change in the energy sector.



These milestones not only demonstrate the viability of green hydrogen solutions but also inspire others to pursue innovative avenues for a greener, more sustainable future.

Andrew Morrison Energia

Mark Welsh, GenComm Steering Committee Member





Hydrogen in Luxembourg

Hydrogen has gained attention in Luxembourg during the past years. In this context, the University of Luxembourg developed the NWE-GenComm project as well as other initiatives.

It all started in July 2020 when Professor Stefan Maas and his team launched the **"H2 Think-Tank"**. These open meetings discussed the potential and future role of hydrogen in the country and the Greater Region. It also debated on how to prepare for the hydrogen economy, bringing together key players in Luxembourg.

With the support of Paul Wurth, in April 2022, the new chair of "Chemical Process Engineering" was created and Professor Bradley Ladewig, joined the University of Luxembourg with a special focus on hydrogen. In July 2022, the Department of Engineering, in collaboration with the European Investment Bank, Paul Wurth and EnBW, organized the conference on "Energy Innovations and Issues on Ramping up European H2-Economy", with speakers from industry, research institutes, universities and finance, from Luxembourg and abroad.

Meanwhile, the Luxembourg Hydrogen Strategy was launched in September 2021, announcing a national effort for 2030 to replace the current industrial H2-demand with renewable production sources, followed by applications in the hard to decarbonize sectors.

Following the Hydrogen Strategy, in November 2022, the Ministry of Energy created the "Taskforce H2 Luxembourg", bringing together many actors from different sectors to discuss updates on the production, demand, transport, distribution and supply of renewable hydrogen, as well as to discuss subsidy instruments.

In July 2021, the University of Luxembourg joined the NWE-GenComm project to study the application of hydrogen with focus on public transport. However, other studies have also been carried out in Luxembourg, for instance on the use of hydrogen for combined heat and power plants and industrial boilers. In general, all studies indicate that the introduction of the H2-energy vector is technically feasible, but still faces economic challenges due to the early stage of the technologies and the lack of a performant supply chain.







■ In this regard, the MosaHYc project is currently the closest prospect of a hydrogen pipeline supply to Luxembourg. It consists of a hydrogen island in the Greater Region, connecting producers and consumers via a 100 km long, partially rebuilt and new pipeline.

Additionally, as part of the Connecting Europe Facility program and in line with the Alternative Fuels Infrastructure Regulation (AFIR), Total Energies is in the process of installing a hydrogen refueling station at the Multimodal Centre in the south of Luxembourg. The hydrogen station, with a capacity of 300 kg/day, is expected to be open to the public in the third quarter of 2023, with pressure levels of 350 and 700 bar respectively, for heavy duty and light vehicles.

During the NWE-GenComm project collaboration with Sales-Lentz, a private bus operator and major player in the country's public transport sector, was initiated. This allowed validation of inputs, assumptions and usability of the Enabling Support Tool (EST). The company is investing heavily in decarbonizing its fleets, with a significant battery electric share. This experience has shown that there are still challenges to overcome to achieve full decarbonization. The collaboration with the University of Luxembourg on a techno-economic analysis for different technologies will continue beyond the official end of GenComm.

In 2023, the LuxHyVal project of Professor Ladewig, was granted with funding from Horizon Europe – HydrogenValleys, to bring together producers and users. In the meantime, concerted efforts are being made to strengthen the hydrogen economy in Luxembourg and the Greater Region.

This is underlined by discussions about multiple pilot projects including sector-coupling (H2-electricity-heat) that are making tangible progress.

Branca Delmonte, Doctoral researcher

Faculty of Science, Technology and Medicine University of Luxembourg



Stratégie hydrogène du Luxembourg - View Here





The Hy Energy Input

Since the start of the GenComm project, back in 2017, the momentum surrounding Net-Zero has accelerated at a pace few could have predicted, spurred on by increasingly volatile geopolitical events.

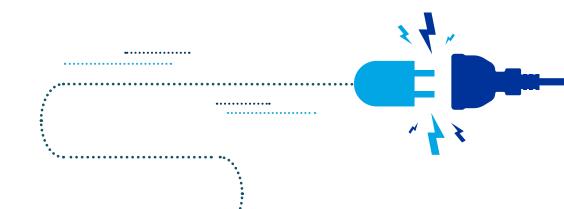
Throughout this timeframe, hydrogen has shifted from a niche energy solution suitable for obscure locations and applications, to a mainstream weapon in Europe's decarbonisation arsenal, solidified by the European Green Deal.

The trailblazing work carried out by demonstration projects has been integral to this shift in mindset across Europe. GenComm has led the way for the European hydrogen sector by showcasing the potential of cutting-edge green hydrogen technologies across the project's three deployment regions.

With this, the project's so-called 'hydrogen hubs' have provided an opportunity to grow knowhow on coupling renewables with hydrogen both for the stakeholders involved and the local policy and regulation makers.

Turning these regions – Northern Ireland, Saarbrucken, and the Western Isles – from novices into first mover European hydrogen players, putting them at the forefront of the hydrogen transformation that is occurring across Europe.

The project, despite the challenges presented by obstacles such as Brexit, Covid-19, and the Russian invasion of Ukraine and the precipitated energy crisis, has managed to develop a domestic and international legacy that has transformed Ireland's energy sector, and helped to enable widespread deployment of hydrogen across Europe.



(H₂)





■ HyEnergy, a leading European hydrogen consultancy, utilised their expertise within GenComm not only to optimise the delivery of the project's infrastructure but also maximise the project's wider impact.

This includes aiding the development of the Decision and Enabling Support Tools (DST/EST), two resources that have directly supported the development of mobility-based business cases across Europe. A key component of the success of the DST/EST has been the Community Hydrogen Forum (C2HF), an online information sharing platform to circulate project deliverables and other hydrogen resources in a publicly accessible location to aid a more co-operative hydrogen landscape – helping both knowledgeable regions and communities taking their first hydrogen steps.

HyEnergy also used their unique multi-project position to found the Hydrogen Triple Alliance, the first cross-Interreg project partnership. Established in 2020, the Triple Alliance is a collaboration of three European Hydrogen Projects across the Interreg North West Europe (GenComm), Atlantic Area (SEAFUEL), and the Northern Periphery and Arctic Programme (HUGE)

areas to increase cross-project information sharing and help further fast track a green hydrogen transition and carbon emission reductions across Europe.

HyEnergy utilised the outcomes from GenComm's initial deployments and the tools it helped develop to become the architects of replication projects across Europe, designing the projects themselves and helping position them for funding. HyEnergy's, and by association Gencomm's, influence can now be seen far and wide through Europe's larger-scale regional hydrogen deployments.

This includes the first hydrogen valley – HEAVENN – in the northern Netherlands, which replicates all of GenComm's core principles - connecting stakeholders across the value chain, green hydrogen production development to realise cross-sector emission savings and engaging with local and national authorities to ensure maximum impact - on a region-wide scale.

HyEnergy then adapted the narrative for the island of Mallorca through the Green Hysland project to ensure that more isolated and remote communities across Europe are not left behind during the energy transition.

Hydrogen projects across Europe have continued to scale whilst those based in Ireland have remained small. To keep up with the quickly changing hydrogen landscape, GenComm launched Hydrogen Ireland (H2IRL) in 2019, set up to bring together stakeholders across the island of Ireland and build links which could be exploited to continue to grow the domestic hydrogen sector.

The interest for such a group has proven to be considerable, with H2IRL's inaugural conference boasting over 300 attendees and speakers from across Europe and Ireland including Eammon Ryan, Minister for Environment, Climate and Communications.

H2IRL's resources and influence has supported the development of Ireland's first hydrogen strategy in 2023, which provided domestic stakeholders with much needed clarity and national backing to scale activities.





▶ This is exemplified in Ireland's recent signing of a Joint Declaration of Intent (JDoI) with Germany for cooperation on green hydrogen and developing future trade opportunities between the two nations. Germany will only be able to produce 20-30% of the green hydrogen it requires indigenously by 2030. The balance will come from imports, which is where Ireland can take its first steps in becoming a long-term hydrogen exporter.

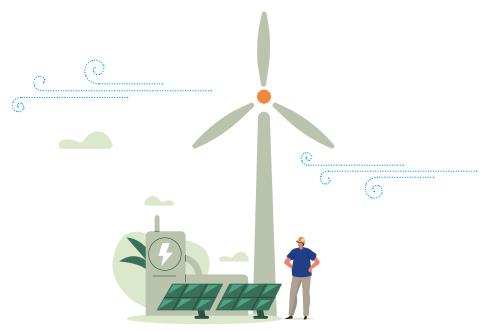
Ireland's hydrogen strategy states that an initial target of 2GW of offshore wind capacity will be dedicated for the production of green hydrogen by 2030 to help develop at-scale production and realise the country's export opportunity.

This capacity will have the potential to produce 138,000 tonnes of green hydrogen a year, which is far more than a predicted Irish demand of 33,000 tonnes in 2030 by Aurora Energy Research. This demand is expected to be realised across 11 sectors, as detailed within Ireland's hydrogen strategy.



So, we have come full circle. From nowhere, Ireland is now in a position to become a European leader in hydrogen production. GenComm has been the catalyst but this was just the beginning. With a strategy now in place, there is direction to help drive new green hydrogen projects and unlock real sector developments. Substantive national funding will be required to cement progress, however, Ireland's hydrogen rebellion is gathering pace...striking fear into fossil based empires across the world... and, of course, the galaxy!

TJ Wells Research Analyst at HyEnergy Consultancy







Bord na Móna investment in green hydrogen as a renewable energy source

Ireland has set out ambitious carbon emission targets to reach by 2030, in addition to the country's longer-term goal of achieving net zero carbon emissions by 2050.

To help Ireland reach this target, and as part of our Brown to Green strategy, Bord na Móna is dedicated to the continued expansion of our climate solutions and renewable energy portfolio.

As we decarbonise industry, transport and electricity production, our consumption of fossil fuel needs to be reduced and replaced by renewable energy as much as possible. This will be best achieved by engaging in a multi-faceted approach that involves investing in and developing several renewable energy sources.

As one of Ireland's leading climate solutions companies, Bord na Móna is developing a large portfolio of renewable energy projects, including offshore and onshore wind farms, solar farm and flexible technology. One of our latest and most fascinating climate solution ventures is in the area of green hydrogen, where we can use large amounts of renewable power, we operate to produce green hydrogen.

Green hydrogen is a renewable energy source that can either be used as a renewable gas to replace fossil fuels such as diesel, oil and gas and when combined with carbon captured from a biogenic source, be used to produce renewable "e-fuels" such as green ammonia, e-methanol or Sustainable Aviation Fuels ("SAF"). These e-fuels are essential to decarbonise parts of the agricultural, industrial and transport sectors that cannot be easily electrified. In the long term, it also offers a potential solution for long-term (inter seasonal) energy storage, crucial for an electricity system that is exposed to the fluctuation of windspeeds, and sun yields like the Irish system as we are heading to 80% of electricity produced from renewable energy sources by 2030. Green hydrogen could be a vital component of our

national energy transition and will ensure a more sustainable future for the country.

The biggest challenge we are currently facing on our journey to a more sustainable future is time – we have ambitious aspirations but the timeframe to achieve those is limited. However, it is important that we take one step at a time and scale production in line with demand for green hydrogen. Bord na Móna is leading in this space, having developed a hydrogen strategy, which is split in three phases, scaling up from pilot to large scale green hydrogen production over the next decade.

In May 2023, as part of Phase 1 of our hydrogen strategy, our first hydrogen project received planning consent from Offally County Council for the development of a 2MW pilot-scale hydrogen electrolysis plant at our Mount Lucas site. Once operational, the new plant will produce over 200,000 kilograms of green hydrogen annually.





■ The green hydrogen produced at the Mount Lucas site will be used for certain "difficult to decarbonise" applications of our national transport sector and, if used to replace diesel, will result in 3000-5000 tonnes of CO2 abatement per year and over 100,000 tonnes of CO2 abatement over the project life.

Bord na Móna is currently working towards construction to commence in 2024 and green hydrogen being produced in 2025. This project is a first of its kind in the Republic of Ireland and is an important step for the green hydrogen industry as it will help to stimulate the growing industry and demand for the renewable gas.

The project will assist in understanding how to use as much curtailed energy as possible as well as providing essential information on operability, increasing public awareness and will aid in the development of health and safety standards.

In Phase 2 of our hydrogen strategy, we are exploring the development of mid-sized green hydrogen projects on our existing landbank. As part of Bord na Móna's Energy Park concept the green gas may be utilised to decarbonise back-up generation and may contribute to the decarbonisation of flexible thermal electricity generation. Heavy industry, such as cement production facilities, are located in close proximity to our landbank and provide an opportunity of using hydrogen to reduce the carbon footprint of those plants.

Bord na Móna is also analyzing the opportunity to produce hydrogen value-added products as described above as part of Phase 2 of our roadmap.

Phase 3, the final stage, of our hydrogen strategy is focused on large-scale, green hydrogen production from both onshore and offshore wind energy. The green hydrogen produced could be injected into dedicated hydrogen pipelines and either used domestically or exported to mainland Europe through the European Hydrogen Backbone.

Hydrogen derived e-fuels are an avenue for both domestic and European offtake that Bord na Móna is assessing.

In Bord na Móna, we believe that green hydrogen will play a key role in Ireland's energy transition and will become part of our energy system as we seek to decarbonise the wider economy and build a more sustainable future for the people of Ireland.

The development of our green hydrogen facility in Mount Lucas is an exciting first step and a significant milestone for Bord na Móna as we continue to develop climate solutions for Ireland's greener future.

Paul Schütze

Senior Project Development Manager Bord na Móna







GenComm Hydrogen Sat Nav continues

As the curtain falls on Phase II of GenComm, a project that started back in 2016 we are implementing plans to sustain and continue the work achieved through the project. Strategies are in place to further enhance ongoing work including The Hydrogen Training Academy, Hydrogen Valley applications, the hydrogen catalyst (H2CAT) and more. The Community Hydrogen Forum (Ch2F), the GenComm website and the quarterly newsletters H2GO News will transfer to Hydrogen Ireland https://hydrogenireland.org/

Can I on behalf of all the partners thank all who assisted and promoted the GenComm project, the relevant government departments, Associate Partners,

auxiliary partners and many more. Your input helped drive the project success and place GenComm at the centre of the EU Green Hydrogen revolution. The journey to net zero continues and we will maintain our drive to position hydrogen as an evolutionary economic process, striving to create and sustain a hydrogen economy and deliver a just transition.

Paul McCormack
GenComm coordinator



For more information

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

Paul McCormack
Belfast Met innovation Manager

T: +44 (0) 28 9026 5076

E: PaulMcCormack@belfastmet.ac.uk



Engage in the hydrogen evolution and join the CH2F





GENCOMM PROJECT PARTNERS



















