





The Hydrogen Triple Alliance

Global awareness of hydrogen benefits as an energy carrier or fuel have grown exponentially. Its potential applications in the industry, transport, and power sectors have been demonstrated in urban areas and rural communities. Moreover, hydrogen as a zero-emissions fuel, is a critical energy carrier to meet the 2050 climate neutrality goal proposed in the European Green Deal.

Several European projects have been developed aiming to increase the awareness of hydrogen in the European communities. However, many obstacles are hindering the full integration of these technologies. One of the main barriers to overcome is how to connect stakeholders, end-users, policymakers, and communities interested in hydrogen technologies.

Therefore, GENCOMM, SEAFUEL, and HUGE projects proudly present a unique Hydrogen Triple Alliance aiming to secure wider reach, extend to other communities, and combine data from these green hydrogen projects.

The alliance will integrate their resources to enlarge the Community Hydrogen Forum (CH2F), share expertise and amplify the different resources developed in the projects, and more importantly, deliver enhanced benefits for the European communities.

The Hydrogen Triple Alliance is a natural step in driving the green hydrogen transition. In order to progress and reach current climate goals, co-operation is a must, the ideas used in projects currently being deployed can be used as inspiration for other local communities.





"Hydrogen enhances a community's energy transition potential. Knowledge and experience sharing is key to creating successful hydrogen communities."



Ian Williamson
 GENCOMM and SEAFUEL project partner
 from HyEnergy Consultancy Ltd

The outputs from this alliance will empower follow-on, and replication projects will increase hydrogen know-how and penetration. The integration of the three projects will lead to regional, national, and international change and fast track sector coupling of renewables allowing expansion of renewables investment. Importantly, this Hydrogen Triple Alliance will further evidence how the integration of hydrogen production and use in the energy value chain is now possible – increasing reduction in carbon emissions.



"We must deliver Hydrogen Equity in order that all of Europe can fully realise the benefits of green hydrogen. This Hydrogen Triple Alliance is the start of a European wide H2 highway, collaborating and sharing research, results and ensuring all can reap the benefits of a zero carbon energy system."

Paul McCormack
 GenComm project coordinator
 from Belfast Met



"Knowledge sharing and best practice examples along the different regions are critical to deploy hydrogen technologies in communities."

Dr. Pau Farràs
 SEAFUEL project coordinator
 from NUIG

GENCOMM designed the CH2F seeking to continuously improve and actualize the tools developed in the project. Thanks to the Hydrogen Triple Alliance, this tool can reach a wider population around Europe.

The objectives of this forum are:

- To raise awareness of the potential of hydrogen in sustainable community development, decarbonisation, and energy security.
- To offer a forum to share information, experience and best practice of how communities and projects are deploying hydrogen across north west Europe.
- To provide an up-to-date, informed resource for hydrogen information.
- To provide access to the unique Decision Support Tool (DST) to assist in evaluating how hydrogen technologies can be deployed in individual scenarios.
- To play a role in developing long term strategies for the advancement in adoption of hydrogen technologies



"We need HUGE solutions even for the tiniest and most remote places if we are to realise net zero carbon future."

Desislava Todorova
HUGE project coordinator from ERI



Projects description

GENerating energy secure **COMM**unities through smart Renewable Hydrogen' (**GENCOMM**) will address the energy sustainability challenges of NWE communities through the implementation of smart hydrogen-based energy matrixes. The project validates the maturity of hydrogen technologies by implementing 3 pilot plants that link the 3 main North West European renewable sources (Solar Power, Wind Power, and Bioenergy) with energy storage and the main forms of energetic demand (Heat, Power and Transportation fuels).

[GenComm Project](#) 

SEAFUEL aims to use the renewable resources across the Atlantic Area to power the local transport fleet and support the shift towards a low-carbon economy. The project will use the expertise and infrastructure of the partners in renewable energy, namely solar, wind and marine, to demonstrate the viability of hydrogen as a fuel to be used by the local transport authorities. Success of the project will promote a sustainable transport system that can be adopted by other Atlantic regions.

[Seafuel Project](#) 

'Hydrogen Utilization & Green Energy' (**HUGE**) project aims to provide communities in the Northern Periphery and Arctic region of Europe with energy security and self-sufficiency, by utilising excess green energy production. The project is developing and delivering tools to assess the hydrogen renewable energy chain, develop the business case, and deliver training for hydrogen development in remote and rural communities. The project will increase community readiness to invest in integrated hydrogen solutions for constructing, maintaining, and running public and housing infrastructure.

[Huge Project](#) 

Summary

The enlarged CH2F platform will be a hydrogen technologies forum for international, national, regional, and local governments, energy agencies, community development groups, energy cooperatives, educational institutions, renewable energy developers, transport sectors, and grid operators, where any query about hydrogen technologies can be discussed. Any stakeholder from these regions is encouraged to participate as a member of CH2F.

[Community Hydrogen Forum](#) 



William Walsh, SEAI Chief Executive looks at the role of hydrogen in Ireland's clean energy future

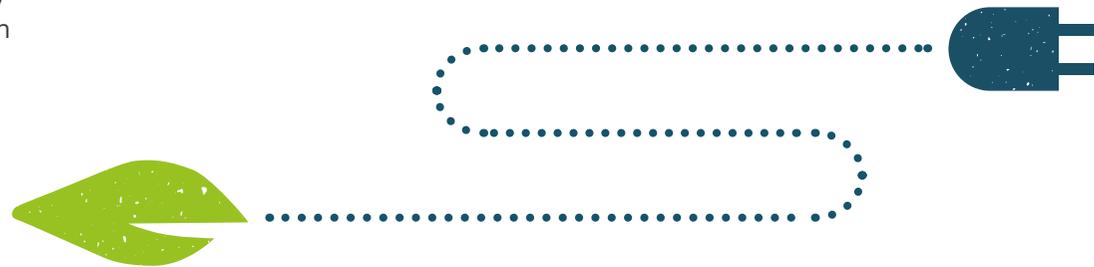
Ireland's energy system continues to evolve in response to global imperatives to reduce greenhouse gas emissions and to transition towards a cleaner, more energy efficient and secure energy future. The Sustainable Energy Authority of Ireland (SEAI), as Ireland's national sustainable energy authority, has a central role to support and enable this transition.

The EU climate and energy targets for 2020 are key metrics to track decarbonisation efforts and progress. Under the EU Renewable Energy Directive (2009/28/EC) Ireland has committed to produce at least 16% of all energy consumed from renewable sources by 2020.

Ireland's new Programme for Government is also aiming to reduce greenhouse gas emissions by 7% each year between 2021 and 2030. Despite making good progress with renewable electricity deployment, Ireland is under performing on decarbonisation efforts, in particular in both the heat and transport sectors. Accelerated levels of innovation will be key to support deep decarbonisation of these sectors.

The European Commission recently published the EU Hydrogen Strategy, 'A hydrogen strategy for a climate-neutral Europe', which sets out ambitions at European level. A key focus of this European strategy is for the development of renewable hydrogen, produced using mainly wind and solar energy. It highlights hydrogen as one of several potential options to replace fossil fuels in carbon intensive industrial processes, as well as for traditionally harder to decarbonise elements of the energy system.

Ireland is recognised as a global leader when it comes to system integration of renewables. With government ambitions for 70% RES-E by 2030 as outlined in the Climate Action Plan, teamed with Ireland's considerable wind energy resource, the potential for renewable hydrogen production merits consideration.





A key focus area for national research and policy development will be investigating the role that hydrogen could play in Ireland's energy system. Questions which need to be answered include: what is the potential, what are the main challenges and opportunities, what are the costs relative to other options, is it suitable for the Irish system?

The Interreg GenComm project will provide useful insights relating to the technical and commercial potential for renewable hydrogen technologies, and importantly includes the development of three pilot plants. The SEAI, through the SEAI National Energy Research, Development and Demonstration Funding Programme, also supports a wide range of energy research projects.

One such project, led by GenComm researcher Dr Rory Monaghan at NUI Galway, aims to develop a roadmap for the deployment of gaseous electrofuels (including hydrogen and synthetic methane) for the decarbonisation of heat and transport in Ireland. The National Energy Research Database provides outline details of all publicly funded energy research projects, and is a useful reference point for further updates of ongoing research in this area.

SEAI has recently commenced work on its National Heat Study. This large-scale project will deliver a comprehensive assessment of the options to decarbonise the heating and cooling sectors in Ireland to 2050, including the potential role for renewable gases.

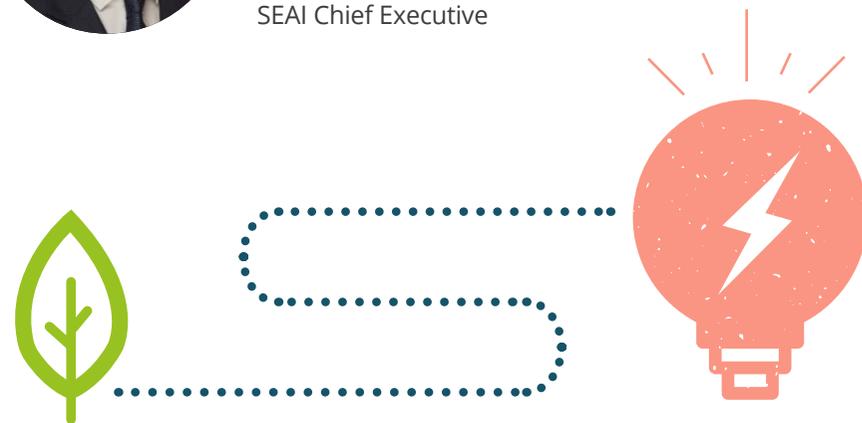
The role of different technologies, deployment timelines and associated costs, will be a central focus of this study. SEAI's upcoming National Energy Research and Policy Conference will also focus on the theme of decarbonisation of the heat sector, with registration due to launch in the coming weeks.

Research and innovation will be vital to investigate new and emerging opportunities for energy system decarbonisation in Ireland, and to accelerate our transition away from fossil fuels. Please refer to the SEAI website to find out more about SEAI energy research and innovation activities.



seai SUSTAINABLE
ENERGY AUTHORITY
OF IRELAND

William Walsh
SEAI Chief Executive





HAZEL webinars put hydrogen centre stage

This Autumn GenComm are hosting a series of five webinars under the acronym of HAZEL- Hydrogen Enabled Zero Emission Supply Chains. The webinars will address the production, sustainability, safety, application, innovation and entrepreneurship within the value chain of hydrogen.

Following on from the success of GenComms July 1 webinar, "Hydrogen getting the green light, driving Europe's green recovery", these upcoming webinars are a bold statement of intent from GenComm in stressing the importance of hydrogen projects across Europe. Indeed as Europe launches its Green Deal to drive growth and recovery post COVID, projects such as GenComm will become ever more relevant.

WEBINAR ONE is being held on **Tuesday 22 September** and is titled, Industrial Sector-Coupling using a Connected eH2 cycle. The speakers will be from the Federal State Ministry, Germany, IZES, BOSCH and DCU.

WEBINAR TWO will be held on **Tuesday 6 October** and is titled, H2 Sustainability H2 DXNET-Hydrogen injection into natural gas distribution networks. The speakers will be from Gas Networks Ireland, USAAR and TU Graz.

WEBINAR THREE is on **Tuesday 20 October** and is titled, H2 Safety-practical and theoretical analysis of H2 loss through polymeric materials and development of a H2 sensor for the measurement of hydrogen concentrations in air in the ppb range and a theoretical model to describe the 3 dimensional transport in hydrogen. The speakers are from Mecadi, European H2 Association, CN-ITM and University South Wales.

WEBINAR FOUR is on **Tuesday 3 November** and is titled, H2 Application and usage, Hydrogen in a net zero energy system and H2 powered hybrid heat pumps. The speakers are from Energia, Ulster University, Energy Systems Catapult and AVL.

WEBINAR FIVE is on **Tuesday 17 November** and is titled, Marketable hydrogen innovations- entrepreneurship of innovation of energy carriers through academia and industry alliances. The speakers are from IECE Macedonia, Belfast Metropolitan College, Pure Energy Centre and NIC.

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for HAZEL webinars,
22 Sept – 17 Nov





Hydrogen regions a reality in Germany

The climate protection goals of the German Federal Government are ambitious: Green House Gas emissions have to be reduced up to 95% by 2050.

To achieve this goal, the share of renewable energies must be further increased in all sectors (power, buildings, industry, transport). Green or regeneratively produced Hydrogen will most likely play a major role in this context. By funding Hydrogen regions in Germany, municipalities and/or regions should be specifically motivated to develop and implement ideas for integrated concepts in the context of Hydrogen technologies or the usage of Hydrogen respectively. The financial support for regions and municipalities in the HyExperts programme includes the development of integrated concepts and in-depth analyses for the respective regions.

The Federal State of Saarland becomes Hydrogen Model Region

The project "H2-Model Region Saarland", which is funded in the above mentioned HyExperts programme, combines the sectors transport/traffic, production,

industrial processes and heat supply, including CHP. The model region covers the entire Saarland. In addition, cooperative projects should be initiated in the extended region including Lorraine, Luxembourg, Wallonia, and Rhineland-Palatinate.

The focus of the project "H2-Model Region Saarland" includes a holistic approach, which does not only cover the transport sector (vehicles and related infrastructure) but also applications in the industrial environment (steel, production) and heat supply including CHP.

About 20 companies and institutions are involved in the project and will try to start their own pilot projects in the region. The overall project with a volume of about £300,000 euros is coordinated by the Federal State Ministry of Economic Affairs, Employment, Energy and Transport.

Dr. Bodo Groß
IZES gGmbH



Fuel Cell Electric Vehicle, Toyota Mirai
Source: IZES gGmbH



HydroHub Fenne – Green hydrogen for the German „Energiewende“

In order to meet global climate protection goals, it is essential that within the next three decades the renewable and volatile energy sources of sun and wind become important pillars of a carbon-free energy supply worldwide, in Europe and especially in the North-West European (NWE) region. Renewable or green Hydrogen is a very important secondary energy carrier and can significantly contribute to the achievement of the global climate protection goals.

Around 45% of these GHG emissions are emitted by Germany.

FIGURE 1 shows the Green House Gas emissions of the North West European countries (Belgium, France, Germany, Ireland and the UK) involved in the Interreg VB project “GenComm” [NWE]. The total GHG emissions of these five countries is about one-half of the EU-28. By 2018, GHG emissions in these countries will have decreased on average by more than 30% or from 2,790 to 1,944 million tonnes of CO2 equivalent.

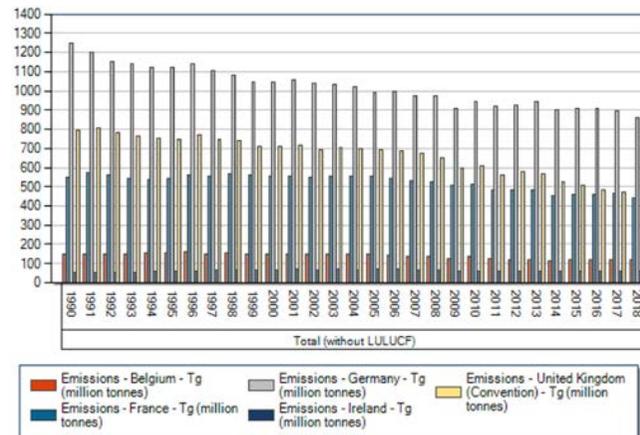


Figure 1
 GHG emissions of the NWE countries involved in the GenComm project [EEA]

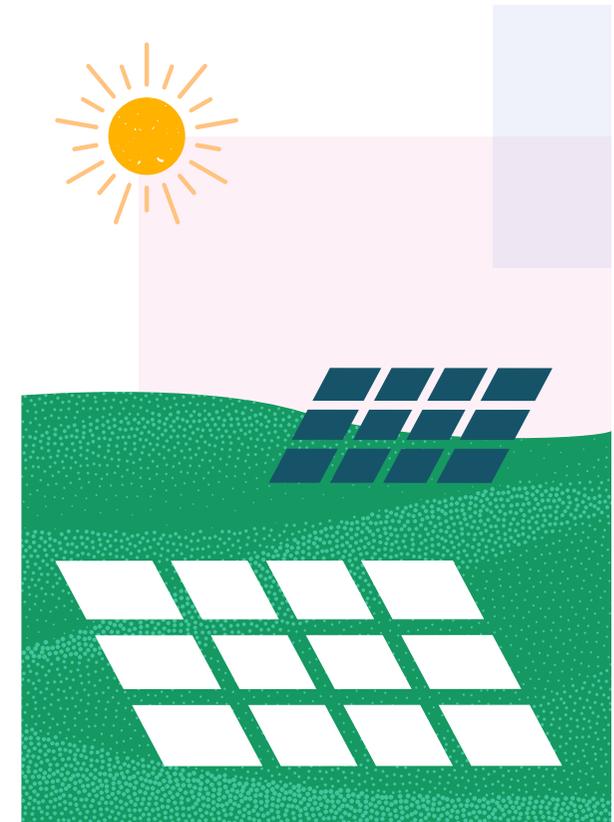




FIGURE 2 shows the emissions per sector in Germany for the years 1990 – 2030. A detailed analysis of the numbers shown in Figure 2 indicates that both, the transport and the industrial sector have more or less not reduced GHG emissions since 2005. In order to achieve the European climate protection goals as well as the goals of the German “Energiewende”, it will be necessary in the future to involve both sectors in particular into the transition process of the Energiewende.

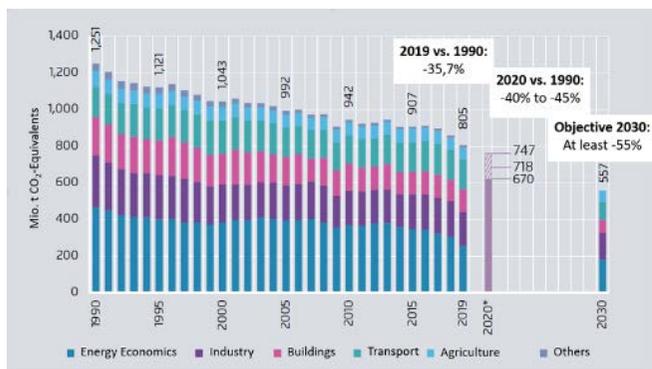


Figure 2
 GHG emissions per sector in Germany for the years 1990 - 2019 as well as estimated values for 2020 and 2030, [AGO] original figure translated into English

The project HydroHub Fenne is an important contribution in this context. A modular designed electrolysis plant with a total capacity of 17.5 megawatts will be implemented at the STEAG power plant site in Fenne near Saarbrücken. This Hydrogen production plant consists of 24 Silyzer 300 modules from Siemens. The Hydrogen produced in Fenne should be used by the Saarland Steel Industry, public Hydrogen Refuelling Stations or fed into the regional natural gas network [SNE].

The project HydroHub Fenne was presented as part of the 7th Energy Research Programme of the German Federal Government within the framework of a two-stage tender "Reallabore". The first stage of the tender was successfully completed as the project was evaluated as eligible for funding by the responsible German Federal Ministry. Subsequently, the consortium was invited to submit a detailed funding application in the second stage of the procedure. The partners involved in the HydroHub Fenne project are STEAG GmbH, Siemens AG, IZES gGmbH (Institute for Future Energy and Material Flow Systems) and DFKI (German Research Center for Artificial Intelligence).

Sources

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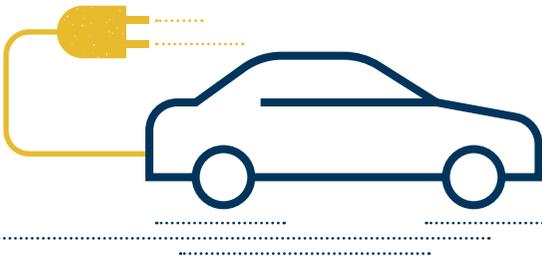
Dr. Bodo Groß
 IZES gGmbH



New co-operation between the Saarland Automobile Association and IZES gGmbH

Dr Bodo Groß, head of the department "Technical Innovations" of the IZES gGmbH, recently visited the training centre of the Saarland Automobile Association in Saarbrücken for an interesting exchange of thoughts and ideas.

Every year, around 2,500 participants attend the vehicle technology training courses there as part of their vocational training as automotive mechatronics technicians. An important part of these training courses is to qualify young people in handling high-voltage systems such as those used in battery and fuel cell powered electric vehicles.



Dr Groß and the head of training and development at the training centre, Dipl. Ing. Dirk Scheidt discussed the Hydrogen strategy of the German government, its implementation in the federal state of Saarland as well as options for co-operation between the IZES and the Saarland Automobile Association.

They also talked about how Hydrogen technologies could be integrated into the primarily practice-orientated training in the future. Both agreed that the young generation of automotive mechatronics technicians are always ambassadors for modern vehicle technology and can therefore currently make an important contribution to inspiring and convincing car drivers to switch to vehicles with alternative drives and alternative fuels such as Hydrogen.

Source: Saarland Automobile Association/IZES

Dr. Bodo Groß
IZES gGmbH



Left: Dr. Bodo Groß
IZES gGmbH

Right: Dipl.-Ing. Dirk Scheidt
Saarland Automobile Association

Innovative analysis equipment and gas filters from HYDAC are setting new standards in the technical purity of hydrogen

In the future, Hydrogen will play an important role in an energy system which is increasingly based on renewable energies, especially including the mobility sector.

While battery electric vehicles can increasingly take over a large part of daily urban and commuter traffic, the use of fuel cell electric vehicles makes sense due to longer ranges and short refuelling times, especially for larger vehicles (busses, trucks and trains) as well as for interurban and long-distance individual traffic. In the last 20 years, solutions have been developed worldwide which enable vehicles to be refuelled at 350 bar or 700 bar.

For Hydrogen powered vehicles, the purity and quality of the Hydrogen is of great importance. When refuelling vehicles, refuelling stations must supply the cleanest possible Hydrogen without any impurities. As an expert in technical purity, HYDAC have developed the world's first analysis equipment with which the detection

and analysis of particulate contamination under SAE standard conditions is possible for the first time - the HYDAC PSA H70.

The purity is measured directly at the dispenser. For this purpose, the filling hose of the refuelling station is directly coupled to the measuring cell. Another high-pressure hose is connected to the fuel cell vehicle. When all connections have been checked for leaks, the refuelling of the vehicle starts.

During this process, particulate impurities are retained by a filter membrane inside the measuring cell, which allows a characterisation of a complete refuelling process. After the refuelling process is completed, the measuring cell is transported to a clean room laboratory and only opened there. Here the measuring equipment is analysed and the purity of the Hydrogen can be evaluated.

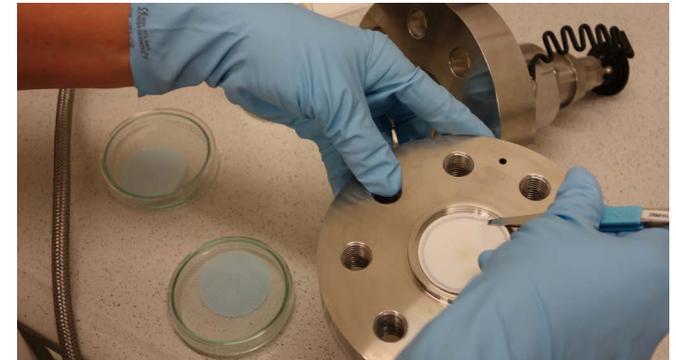


Figure 1
HYDAC PSA H70 (Source: HYDAC)



Experience with the PSA H70 has shown that effective and robust gas filtration, which can satisfy the high demands of Hydrogen refuelling, is essential. Through the combination of an optimised housing design and innovative filter element technology, the HYDAC filter and precipitator solutions meet the highest requirements for all applications up to 1,050 bar and therefore make a significant contribution to the technical purity of Hydrogen refuelling stations.

With the GF and GCF filter series, HYDAC offers the leading technology for gas filtration in Hydrogen applications up to 1,050 bar. The design of the filters offers maximum filtration area in the smallest installation space and is characterised by maximum process stability, best permeate quality and minimum pressure losses. The Chemicron® filter material developed by HYDAC provides defined separation rates with maximum filter efficiency.

The stainless steel filter elements are manufactured without the use of sealing compounds, which allows them to be used under extreme temperatures. The extremely robust and resistant technology provides excellent differential pressure resistance and stability against pressure surges.

HYDAC and IZES are currently considering how the two companies can work together in the future in the field of Hydrogen technologies, particularly in the area of high-pressure filtration.

HYDAC INTERNATIONAL

Christof Granitz
 HYDAC International GmbH





For more information on the GenComm Project contact

Anne Artt

Operations & Communications Manager

T: +44 (0) 28 9026 5276

E: aartt@belfastmet.ac.uk

Eugene McCusker

Communications Officer

T: +44 (0) 28 9026 5277

E: emccusker@belfastmet.ac.uk

nweurope.eu/gencomm

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