Interreg
North-West Europe
GenComm
European Regional Development Fund

EUROPEAN UNION

H2go News

February 2018

Project Summary

Project GenComm will address the energy sustainability challenges of North West Europe (NWE) communities through the implementation of smart, hydrogen-based energy matrixes. The project certifies the commercial maturity of hydrogen technologies by implementing three pilot plants, linking the three main NWE renewable sources, Solar Power, Wind Power and Bioenergy, with energy storage and the main forms of energetic demand; heat, power and transportation fuels. Based on the pilot plants; integrated technical and financial simulation models will be developed.

Together, both models will form a Decision Support Tool (DST) that provides a roadmap for communities from transition to renewable, hydrogen-based energy matrixes. The final goal of the project is, through the combination of sources and forms of demand, to lead NWE's road to sustainability while granting hydrogen its position as a commercially viable energy medium for the future.

Project Objective

GenComm will technically and financially validate and model the renewable H2 value chain and adapt it to a DST that leads NWE communities into sustainable, local and autonomous energy matrixes. The DST is directed to community energy stakeholders (utilities, policy-makers and private firms in the energy sector), as the key agents to implement the proposed matrix. The project will first engage energetically and territorial remote communities to then address the rest of NWE.

Project Sub-Objectives

1. Empower communities to implement hydrogen-based energy matrixes to sustainably satisfy their energetic demand.
2. Stimulate the uptake of renewable hydrogen-based technologies by successfully running three demonstration facilities.
3. Establish a strong group of energy stakeholders devoted to, through the use of hydrogen, "sustainabilise" the energy matrix of the NWE region.

Hydrogen Mobility is coming to Saarland

IZES gGmbH, a partner in the GenComm Project, will be in charge of developing the first Renewable Hydrogen Refuelling Station in Saarland.

The research institute IZES gGmbH will be the partner in charge of developing a solar-fuelled hydrogen refuelling station and analyse the renewable hydrogen mobility value stream as a part of the Interreg NWE funding bid for the €9.39m GenComm Project.

GenComm aims to answer the current energy sustainability challenges being faced by communities across NWE through production, storage and utilization of smart renewable hydrogen. In the current context, where decarbonization of the energy matrix is mandatory and there is a need of an energy carrier that can serve as a buffer between renewable sources and the different forms of energetic demand, hydrogen production from renewable sources has acquired the outermost relevance. Hydrogen generated from electricity relies in electrolysis. Electrolysis is the electro-chemical process in which water is split by an electric current- into its constituent elements, Hydrogen (H_2) and Oxygen (O_2). Hydrogen can then be used in a multitude of applications through, (1) hydrogen fuel cells, (2) combustion and (3) power to hydrocarbons applications. Both technologies can be used for re-electrification and heat production supplying the demand of the three main sectors: Power, Heat and Transportation.

Smart Hydrogen combines the mentioned challenges for mature renewable electricity technologies, the opportunities in Hydrogen supply pathway and applications with the different trends in the energy markets with “Power to X technologies” in order to create a hydrogen value chain that is optimal in technical performance and financial revenues.

GenComm will develop three pilot facilities fuelled by Solar Power, Wind Power and Bioenergy to measure their ability to produce and store hydrogen, together with its viability as a sustainable energy solution for heat, power and fuel for communities across NWE.

The pilot facility in Saarland will be located in the Innovation Campus Saar in Saarbrücken, where the IZES gGmbH is located. It will be fuelled by a 35 kWp PV Array and it will have an on-site nominal hydrogen production capacity of 5 Nm3/hr (6,25 Nm3/hr maximum capacity). The plant will be able to fill the current versions of hydrogen Fuel Cell Vehicles (FCEVs) at 700 bars. Overall, the plant is projected to support one FCEV as part of the IZES fleet and will count with enough storage capacity to supply the vehicle during the low solar power production, and hence low hydrogen production, periods along the year.

Virtual Render of the Solar-fuelled Hydrogen Station to be built in the Innovation CampusSaar in Saarbrücken

The GenComm Project is led by the Belfast Metropolitan College, Belfast Met (NI), with partners IZES gGmbH (Germany), National University of Ireland Galway (ROI), University Institut National des Sciences Appliquées Rouen Normandie (France), Vrije Universiteit Brussel (Belgium); ENSICAEN – CNRS (France); Pure Energy Centre (Scotland), Viridian (NI), and TK Renewables (NI).

Keynote Speaker

Axel Rücker,
Head of Sub-project Component Control & Technology Management,
Department of Hydrogen and Fuel Cells, BMW Group

With its three brands BMW, MINI and Rolls-Royce, the BMW Group is the world's leading premium manufacturer of automobiles and motorcycles and also provides premium financial and mobility services. As a global company, the BMW Group operates 31 production and assembly facilities in 14 countries and has a global sales network in more than 140 countries.

In 2016, the BMW Group sold approximately 2.367 million cars and 145,000 motorcycles worldwide. The profit before tax for the financial year 2015 was approximately € 9.22 billion on revenues amounting to € 92.18 billion. As of 31 December 2015, the BMW Group workforce was 122,244 employees.

The BMW Group is conducting intensive research and development in the area of fuel cells and hydrogen tanks, with the aim of series-producing emission-free vehicles combining extensive range with short refuelling times. The development of cars powered by fuel cells has received additional impetus from the research cooperation between BMW Group and Toyota in this field.

In 2015, BMW unveiled its 5 Series Grand Turismo Hydrogen Fuel-Cell Car. BMW is expecting to produce a low-volume fuel-cell car in 2021, with wider availability in 2025.

IZES gGmbH Subpartners

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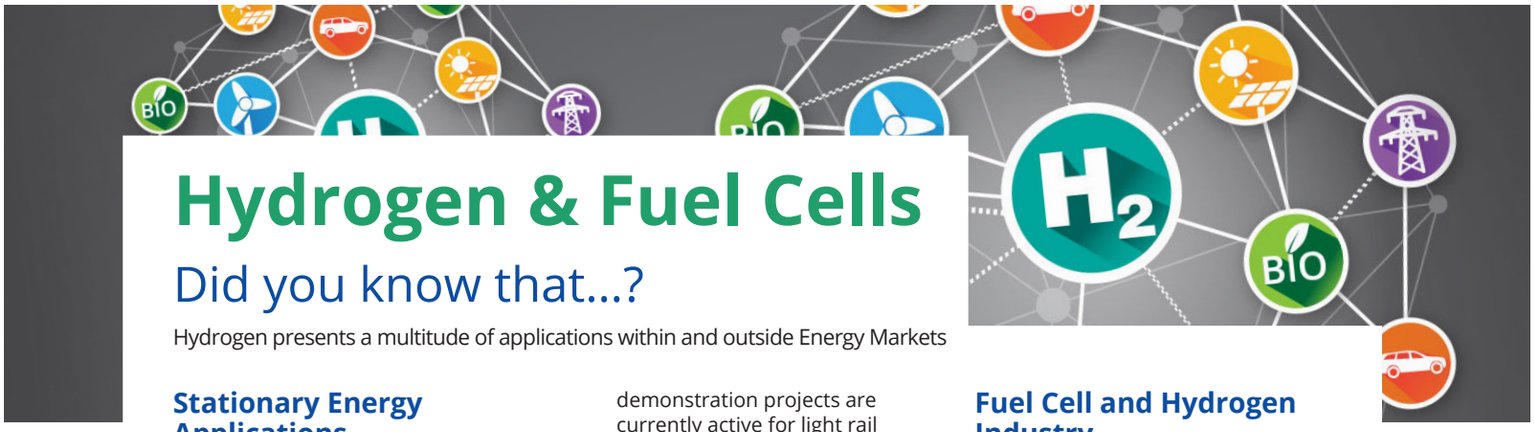

Hydrogen & Fuel Cells

Did you know that...?

Hydrogen presents a multitude of applications within and outside Energy Markets

Stationary Energy Applications

- The use of hydrogen for energy purposes occurs mainly in fuel cells. In 2015 and 2016 alone some 50,000 fuel cell systems were delivered worldwide, with a total generating capacity of approximately 200 MWelec. Around 80% of the fuel cell systems supplied and 60% of the fuel cell capacities shipped were stationary applications.
- Commercial micro CHP fuel cell systems have an output range of 10 kWe and usually rely on polymer electrolyte (PEMFC) and solid ceramic oxide (SOFC) fuel cell technologies.
- The combined efficiency, electrical and thermal, can be as high as 95% while, the electrical efficiency is up to 45%.
- Stationary fuel cells generate both power and heat. Major demonstration projects for fuel cell heating systems have already been introduced in Germany. Major demonstration projects for fuel cell heating systems have already been introduced in Germany, Europe and Japan under the names “Callux”, “Enefield” and “Ene-Farm”.
- The European projects have installed more than 1500 PEMFC and SOFC systems that are currently operating in houses and apartment buildings. In the meantime, the first fuel cell systems for domestic energy supply are now commercially available.
- Japan leads the micro-CHP market with 200,000 units by 2016 and 5.3 million are expected by 2030.

Transport Applications

- Hydrogen fuel cell systems are suitable for virtually all means of transport.
- The use of hydrogen –both as a propellant and as an on-board power source for spaces developed with the space race in the 1950s and 1960s. Currently there is a small market for launch vehicles with few applications.
- Hydrogen for aviation purposes have been proven by a series of demonstration projects, particularly for on-board power supply. The first miniature/small aircraft have been demonstrated but its use in larger commercial aircraft is not yet in sight.
- Concepts for small ship/boat propulsion and fuel cell for on board power generation are being trialled. Emerging concepts for commercial maritime shipping.
- Ground transport have different levels of maturity levels. Several demonstration projects are currently active for light rail vehicles. There are over 11, 000 fuel cell material handling vehicles in North America alone with demonstation.

Stationary Energy Applications

- More than 11,000 small stationary fuel cells units have been deployed globally.
- In 2008, the installed capacity of fuel cells in large scale stationary applications reached 170MWe.
- Japan has 5,862 stationary fuel cells units under operation.
- 6,000 fuel cell CHP units, commercially available today, rated at 400kWe (sufficient to power a supermarket or school) would deliver the same level of CO2 reductions as the proposed Severn Barrage, and could be in place in five years at more than three times lower capital cost.
- If 5.6 million homes had microCHP installed by 2020, the saved CO2 emissions would be equivalent to the emissions from eight new 750MW Combined Cycle Gas Turbine power stations.
- A 2kW stationary fuel cell CHP unit can save up to five tonnes of CO2 per household per annum depending on the installation fuel cells enable wider uptake of combined heat and power generation at 80-90% overall efficiency.

Portable Applications

- More than 10,000 fuel cells units for portable applications were sold in 2008 alone.

Hydrogen

- More than 150 hydrogen refuelling stations have been in operation worldwide for a given quantity of energy storage, compressed hydrogen storage costs are expected be 1/20 that of advanced lithium-ion batteries ($15/KWH vs. $320/KWH).
- European research conducted as a part of the European HyWays project has shown that hydrogen deployment could reduce oil consumption in road transport by 40% by 2050.

Fuel Cell and Hydrogen Industry

- The global fuel cell market could be worth over $26bn in 2020 and over $180bn in 2050. The UK share of this market could be $1bn in 2020 rising to $19bn in 2050.
- The global fuel cell and hydrogen market is projected to be worth $8.5billion (CAD) (£4.89billion) in 2017
- The fuel cell sector is expanding rapidly, and experienced a 22% gain in fuel cell specific employment in 2006, building on a 12% increase in 2005 between 2003 and 2008 the fuel cell and hydrogen industry created 2,000 green collar jobs in Canada alone.
- In the USA, more than 630 companies and laboratories in 47 states are investing $1 billion a year in fuel cell and hydrogen.
- In 2008, approximately 3,870 organisations worldwide were involved in fuel cells, hydrogen energy and related nanotechnology; associated spending was an estimated $8.4 billion.

Research and Academia

- In nine universities in the UK has active R&D programmes in hydrogen and 1 in 20 undertakes research into fuel cells.
- In 2008, this community provided 344 full time jobs and postdoctoral positions. Total university funding in FY2008 for hydrogen and fuel cell research topped £29 million; over 9% of this came from industry, and well over 75% came from UK sources.
- 15 spins-out have been created so far from the research being done in UK universities, with at least five more in the pipeline.

Fuel Cells and Green Jobs Creation

- A DOE study estimates a net increase of fuel cell related jobs of 361,000 in the US by 2050.
- California alone could see up to 25,000 new jobs within the fuel cell supply chain by 2050.
- The global fuel cell industry could create 700,000 green manufacturing jobs over the next decade.