

Demonstrating the use of green hydrogen in energy systems

(22.02.2016) **One of Europe's most advanced hydrogen facilities will be established in Denmark. Air Liquide, Hydrogenics, LBST, Neas Energy, Hydrogen Valley/CEMTEC and the European Joint Technology Initiative have signed a contract to build one of Europe's largest facilities for production of green hydrogen.**

The hydrogen will be produced from water electrolysis, enabling the storage of cheap renewable electricity from wind turbines. It will thus help balance the grid, which is essential for the stability in electricity systems. The green hydrogen will be used for clean transportation and in the industry.

Denmark has been selected for this innovative project as the country focuses on renewable energy, know-how and hydrogen implementation in future energy systems, and Air Liquide already operates 5 hydrogen-charging stations for mobility in Denmark.

The budget of HyBalance reaches 15 million €. The project has received 8 million € in funding from the Fuel Cells and Hydrogen 2 Joint Undertaking as well as 2.6 million € in funding from the Danish ForskEL program, which is administered by Energinet.dk.

Advancing key technologies

The project – named HyBalance - will demonstrate the link between energy storage in the form of hydrogen and the deployment of hydrogen mobility solutions. The production of green hydrogen based on wind power using electrolysis is a well known and proven technology, but the HyBalance project implements advanced key technologies. It will not only validate highly dynamic PEM electrolysis technology and innovative hydrogen delivery processes involved but also demonstrate these in a real industrial environment by applying the latest high pressure hydrogen production and delivery equipment. The HyBalance setting is unique in demonstrating the multiple applications of Power-to-Hydrogen technologies, including how hydrogen can be used in multiple high value markets such as industry and clean transportation, and the project will help validate the business models for these applications.

The potential of using hydrogen in future energy systems

The EU has made a commitment to a forward-looking climate policy with energy security and independence, decarbonizing the economy, as some of the prioritized dimensions. With the share of renewable energy growing in the energy mix, the need to store and downstream use in fossil dependent sectors such as transportation has become a critical issue. Hydrogen is seen as one of the key enablers to solve these questions. Denmark being at the front of the shift to renewable primary energy, is the ideal place for such demonstration.

Denmark has been chosen as the location

In 2012, Denmark framed one of the most ambitious energy strategies in Europe targeting to produce at least 50% of its electricity consumption from wind in 2020, to eliminate all fossil energy use in the heating and electricity sectors by 2035, and to become fossil energy independent in 2050 by substituting these with a mix of renewable energy sources.

Denmark operates a well-established natural gas grid, and hydrogen and green natural gas may play a partnering role in adding energy storage capacity at large scale to the Danish energy system. In the northern part of Denmark, close to the vicinity of Hobro, salt caverns can be used for large-scale storage of hydrogen and/or green natural gas at later stages. These circumstances make Hobro in Denmark an ideal site to demonstrate a Power-to-Hydrogen concept. The hydrogen plant is expected to start delivering hydrogen by the end of 2017.

Partners in the HyBalance project



- o **Air Liquide:** World leader in gases, technologies and services for Industry and Health, Air Liquide is present in 80 countries with more than 50,000 employees and serves more than 2 million customers and patients. Oxygen, nitrogen and hydrogen have been at the core of the company's activities since its creation in 1902. Air Liquide masters the entire hydrogen supply chain, from production and storage to distribution and uses for the end user. www.airliquide.com
- o **Copenhagen Hydrogen Network (CHN):** Refueling station network operator and institution rolling out national hydrogen infrastructure in Denmark. CHN is a joint venture owned by Air Liquide and H2 Logic. www.airliquideadvancedbusiness.com/en/who-we-are/copenhagen-hydrogen-network-chn.html



- o **Hydrogenics:** Electrolyzer technology developer and global leader in advanced large scale PEM-electrolysis, having profound expertise in the design, provision and operation of hydrogen generation, fuel cell power modules and electrolyzers. www.hydrogenics.com



- o **Neas Energy A/S:** Balance Responsible Party and Danish electricity and natural gas trading company. Being an experienced energy company, Neas Energy will prepare for new electricity and natural gas markets from hydrogen technologies and their markets. Neas Energy has outstanding experience of current and future electricity markets and trading schemes, Denmark being at the forefront in Europe of introducing renewable energies. www.neasenergy.com



- o **Hydrogen Valley/CEMTEC:** Danish business incubator acting as a driver in the hydrogen industry in Denmark and contributing to the project by drawing from the local energy market expertise. www.hydrogenvalley.dk



- o **Ludwig-Bölkow-Systemtechnik GmbH (LBST)** Research institute and consultancy with more than 30 years of hydrogen and fuel cells expertise, contributing its knowledge on life-cycle analysis, performance reporting and business case analysis of Power-to-Gas systems for industry and politics. www.lbst.de

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The HyBalance project has furthermore received 2.6 million € in funding from the Danish ForskEL program, which is administered by Energinet.dk. www.forskel.dk

