



Factsheet Research project wind2hydrogen

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OMV Downstream

Transforming renewable energy into hydrogen

The goal of the wind2hydrogen (w2h) research project is to set up the conditions needed to produce renewable hydrogen[®] to store and transport power from renewable energy in Austria which is subject to fluctuation. For this, a 100 kW pilot plant has been set up at the OMV Auersthal compressor station in Lower Austria.

The pilot project should yield new insight into storing hydrogen (H₂) in the natural gas network through to hydrogen applications for transport. It can simulate future business flows in terms of power and from the viewpoint of the gas network operator. The new development of a high-pressure PEM (proton-exchange-membrane) electrolyser also marks an innovative technological advance: the complex downstream compression of hydrogen has already been incorporated into the process.

Detailed project steps

The project has received funding from the Climate and Energy Fund and is being realized as part of its energy research program. It will run from January 1, 2014 to December 31, 2017. Building a 100 kW pilot plant is the starting point and the entire plant started operations in summer 2015.

- ▶ **The world's only high-pressure electrolysis for producing green hydrogen**
Developing a prototype of a high-pressure PEM electrolyser, specially designed for Power-to-Gas applications. This electrolyser produces high-purity hydrogen with 163 bar pressure, without any additional compressor.
- ▶ **Integrated power**
The electrolyser will be tested under different load profiles using renewable energy for flexible operations in the case of base load power, dependency on power prices, handling excess power, both for network operators and providers of regular utility services.

- ▶ **Utilizing gas infrastructure**
By physically storing hydrogen in an OMV natural gas pipe, it is possible to develop and optimize control technology and ensure quality control. H₂ integration in the natural gas infrastructure and simulating storage in the distribution network both play an important role.
- ▶ **Hydrogen from renewable energy sources for H₂ mobility**
Dynamically fluctuating hydrogen production will result in high-purity hydrogen being delivered to sites such as the OMV hydrogen filling stations.
- ▶ **Testing business and roll-out models**
One key component of the project is to secure and examine the economic, environmental and legal backdrop for realization in Austria.



A way to tackle the future – Power-to-Gas

- ▶ The 2030 expansion plans call for power storage of up to 2 TWh a year (~19% of the electricity consumption in this region) in the Austrian provinces of Burgenland and Lower Austria alone. Storing and transforming this amount of energy into hydrogen in Power-to-Gas plants would be enough to power a fleet of 250,000 hydrogen-fueled cars.
- ▶ Strong demand for Power-to-Gas plants: Expanding renewable energy sources in the power sector could require installed storage capacity of up to 4 GW in Austria by 2050.

Strong partners on a strong project

The wind2hydrogen research project is realized in cooperation with OMV Gas & Power, Fronius International, EVN AG, HyCentA Research GmbH and the Energy Institute at the Johannes Kepler University Linz.

OMV **OMV Gas & Power** heads the consortium and is the main sponsor, as well as providing the plot for plant construction and facilitating access to gas infrastructure at the Auersthal compressor station in Lower Austria. OMV G&P is responsible for project management, storage in the natural gas network and marketing the green hydrogen generated for use on the road.

Fronius **Fronius International** provides twelve PEM high-pressure electrolysis modules and is working with HyCentA to develop the modular container system with 100 kW. Strategies for optimal module operation are being developed and tested.

EVN **EVN AG** is responsible for the simulation of various network operation modes. It is developing the modes and control algorithms for operating the electrolyser, which will depict the possible business models and applications. For example, this includes consumption of excess power from the wind farm, the task of providing regular utility services, as well as price-controlled operations. Furthermore, EVN is intensely involved in the gas-related operating constraints for storage in the natural gas network.

HyCentA **HyCentA Research GmbH** plays a key role owing to its comprehensive expertise in hydrogen. HyCentA is responsible for the technical planning and for setting up and operating the research facility.

ENERGIE INSTITUT **The Energy Institute at the Johannes Kepler University Linz** is managing the groundwork for a roll-out and handling the economic evaluation. Key focal points include determining promising operating models, location-based optimization, economic appraisals and simulation, as well as examining legal and environmental aspects.



This project is sponsored by the Climate and Energy Fund and is being realized as part of its energy research program.
www.klimafonds.gv.at

wind2hydrogen pilot plant in Auersthal (Lower Austria)



W2H pilot plant parameters	
12 PEM modules :	total 100 kW
H ₂ production :	14.4 Nm ³ /h at 163 bar Hydrogen 5.0 – quality of fuel cells
Daily H ₂ production (max.):	33 kg: equivalent to the average daily consumption of 85 fuel-cell powered cars
Water required :	50 l/h water
Electrolysis container :	7 x 2.7 x 2.5 m

Contact

OMV Aktiengesellschaft
Public Relations
Trabrennstraße 6-8
1020 Vienna, Austria

Tel.: +43 1 40440-21357
E-Mail: public.relations@omv.com
Web: www.omv.com
Social: <http://youtube.com/omv>