

Project H₂ORIZON

Sector coupling with wind-hydrogen

brief description

The H₂ORIZON project deals with the generation of hydrogen from local wind energy. The gas is used to provide heat and electricity, and as fuel for rocket engine test stands. It is also supplied for hydrogen mobility and industrial applications. This project demonstrates the coupling of the space, energy and transport sectors at a megawatt scale.

goals

- Demonstration of local coupling of space, energy and transport sectors
- Investigation and optimisation of this networked energy system in terms of its contribution towards the implementation of international climate goals and the Energy Transition
- Sustainable on-site heat and electrical power supply
- Provision of green hydrogen for fuel cell electromobility

applications

- Use of the plant infrastructure to address research questions
- Provision of network services
- Sustainable on-site heat and electrical power supply
- Provision of ‚green‘ hydrogen for fuel cell electromobility

perspectives

- Establishment of the H₂ORIZON Test Field in order to develop new technological and conceptual hydrogen-based solutions in cooperation with industry and academia
- Extension of the plants to include ‚Power-to-X‘ applications
- Expansion of the production capacity for green hydrogen up to 10 MW power input



involved

DLR Institute of Space Propulsion
ZEAG Energie AG

facts and figures

Hydrogen production:

PEM electrolyser (0.9 MW, 14,1 kg H₂/h, 99.999% H₂) with a direct connection to Harthäuser Wald wind farm

Hydrogen storage:

Tube trailers up to 350 bar and DLR site network up to 800 bar

Heat and electricity production:

Two gas-engine cogeneration units (total: 1.6 MW_{th}, 1.4 MW_{el}), fuels: natural gas and hydrogen

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DLR's Lampoldshausen site, which lies 50 kilometres north of Stuttgart, is currently creating another element of the energy future. The Institute of Space Propulsion in Lampoldshausen is one of Europe's largest consumers of hydrogen and is situated next to what is currently the biggest wind park in Baden-Württemberg. Taking this infrastructure as their starting point, the DLR Institute of Space Propulsion and ZEAG Energie AG are currently working together to create a hydrogen-based, networked energy system. This will see the energy, transport and space industries coupled on a megawatt scale.

The plant concept of the *H*₂ORIZON project consists of two main components. One is renewable hydrogen production based on wind energy. The polymer electrolyte membrane electrolysis (PEM electrolysis for short) system has a power input of around one megawatt and is directly connected to the Harthäuser Wald wind farm. Hydrogen is processed, compressed and pumped directly into special transport vehicles, known as tube trailers, for distribution. *H*₂ORIZON will also be used to construct a new plant to supply the DLR site with heat and electricity. The two gas-engine cogeneration units with a total output of 1.6 MW (thermal) and 1.4 MW (electric) will also be directly connected to the hydrogen production plant, as well as the conventional natural gas supply.

The DLR Institute of Space Propulsion is bringing its knowledge as Europe's largest consumer of hydrogen to bear on the *H*₂ORIZON project and is drawing upon the highly developed expertise of the whole of DLR, where the study of hydrogen links the fields of aerospace, aeronautics, energy, transport and security. ZEAG Energie AG is the world's longest-established three-phase supplier. As such, it knows the energy sector and is familiar with the challenges of operating renewable energy plants and power grids, as well as the conditions for successful participation in the energy market.

The infrastructure and expertise of the two project participants will be made available to potential industrial partners – especially small and medium-sized enterprises – and scientific institutions, and will be known as the *H*₂ORIZON Test Field.