Background information

www.get-h2.de

GET H2 – Go-ahead for Germany's hydrogen infrastructure

Our strategy:

Germany has set itself the target of reducing CO2 emissions by 80-95 percent (compared to 1990). In order to achieve this, further key technologies are needed in addition to the expansion of renewable energy generation and the electricity infrastructure. The conversion of electricity generated by renewable energies into hydrogen (H2) - power-to-gas - is one of the key factors to a successful energy transition.

The concept:

- Electricity from renewable energies is converted to H2.
- The green H2 is distributed via the existing gas infrastructure.
- In the industrial, transport and heating sectors, green H2 is used as a CO2-free energy source. In industry, it replaces H2 produced from fossil fuels.
- H2 that is not used directly is stored efficiently in existing underground storage facilities.

The strategic goal of GET H2 - an initiative involving RWE Generation SE, Siemens, ENERTRAG, Stadtwerke Lingen, Hydrogenious Technologies, Nowega, Forschungszentrum Jülich and IKEM - Institute for Climate Protection, Energy and Mobility - is to combine regions with a high share of renewable energies from wind and solar sources with H2 production on an industrial scale. Above all, however, GET H2 is focusing on the development of a nationwide H2 infrastructure with the coupling of all sectors.

The starting point is the installation of two power-to-gas plants, so-called electrolysers (one of them with an output of 105 MW) in Lingen in the Emsland region. So in a first region, the entire value chain can be demonstrated as part of a Reallabor project. On an industrial scale, the technology, which has so far been tested in many small R&D facilities, is to be brought to series maturity in a holistic approach.

Second element is an H2 infrastructure:

- Use of the existing infrastructure - especially the underground gas grids
- close link with the electricity grid
- Underground storage, in order to solve the problem of the supply with renewable energies also for dark doldrums and winter times

Due to the high synergy potential with existing infrastructures, the concept is cost-efficient and involves only minor interventions in the landscape - both with a positive effect on acceptance among the population.

The simplified draft of a possible future nationwide H2 infrastructure for the year 2040 shown in the figure covers approx. 3,200 km of already existing high-pressure gas pipelines. The total current pipeline network comprises approx. 40,000 km. Some of the routes outlined are already being used for H2 today or, due to their history (city gas), have already transported H2 earlier.

Simplified draft for a nationwide H2 infrastructure.

Background information

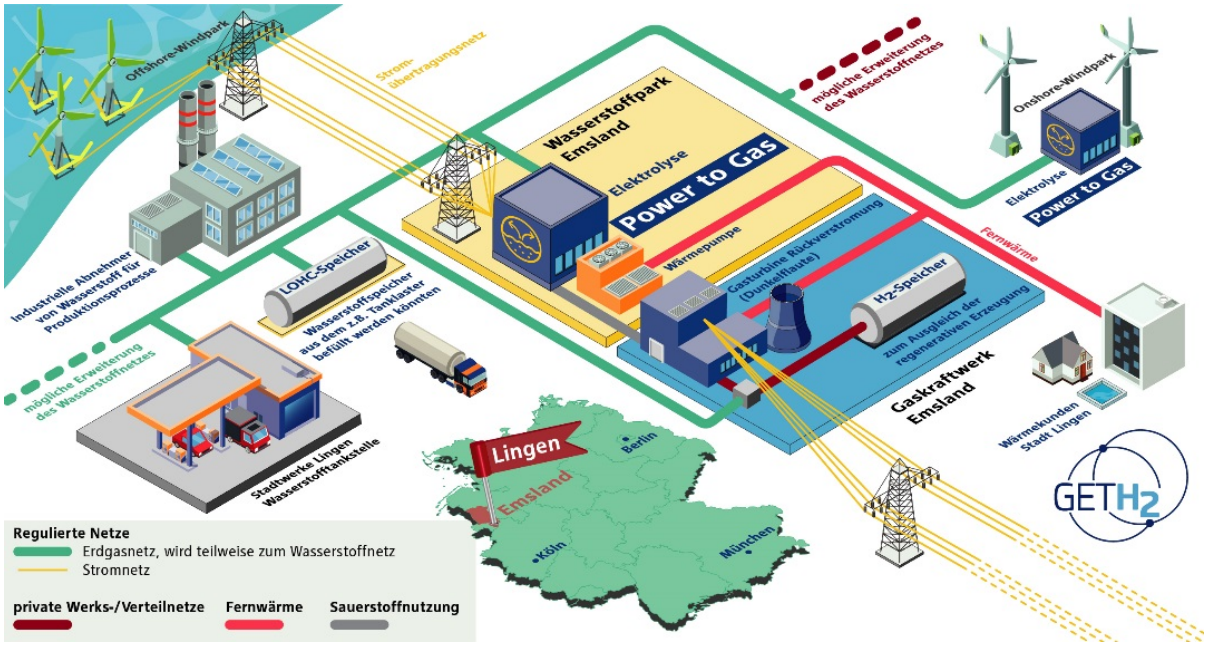
The planned nationwide H2 infrastructure takes into account the locations of refineries and iron and steel works as well as large chemical industry sites as future major consumers of H2. With the H2 infrastructure shown, around 90% of the population can already be reached efficiently for mobility and decentralized applications. The mobility applications should be in the focus already at the beginning of the development, since here an economic efficiency is attainable as the first.

H2 thus becomes a complementary technology base to electricity for energy system transformation, generation, transport and use. Like electricity for local applications, H2 is basically emission-free. As a raw material, H2 also provides the basis for decarbonization, e.g. in the steel and chemical industries, as well as for the production of synthetic fuels, e.g. for air, ship and heavy vehicle traffic.

An H2 infrastructure will be successful in Germany if it is an integral part of the energy system transformation and if it is supported and developed by many actors. With the establishment of an H2 infrastructure, the energy system transformation as a whole can be realized more cost-efficiently and with higher social acceptance. GET H2 pursues this goal.

Our Reallabor project:

The Reallabor GET H2 is planned as the nucleus of this H2 infrastructure for Germany. It uses electricity from renewable energies as well as existing electricity and gas infrastructure, including a first pipeline storage facility. Two power-to-gas (electrolysis) plants will be added, one of them at the gas power plant in combination with a high-temperature heat pump to use the electrolysis waste heat for district heating. The existing liquid fuel infrastructure will also be integrated via a LOHC (Liquid Organic Hydrogen Carrier) storage and transport system. The green H2 will be made available to customers in the transport, industry, heat and energy sectors via the H2 infrastructure. The re-electrification of 100% hydrogen in a 60 MW class gas turbine makes this also a unique showcase project for power generation.



The further expansion of the system has already been designed: Associated partners of the project are examining next steps such as the connection of the cavern storage field in Gronau-Epe and the connection with the existing H2 infrastructure in the Ruhr area.

Further partners from the sectors of mobility and industry accompany the orientation right from the beginning and thus develop their individual connecting points. Our research partners ensure that the project can be evaluated technically, economically, socio-economically and legally and that the results can be used across a wide range of actors for the further development of the energy system transition. Thus, the Reallabor GET H2 contributes to the success of the energy system transformation quickly by many partners.