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A KEY BUILDING BLOCK FOR THE DECARBONISATION OF THE ENERGY SYSTEM AND INDUSTRY

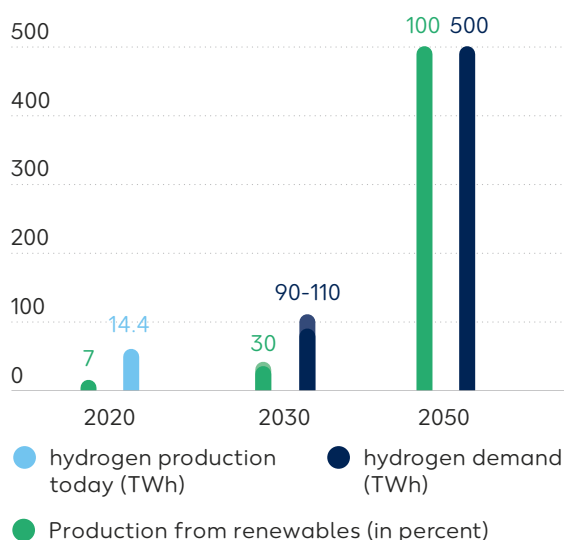
HYDROGEN FROM NATURAL GAS

Germany has set itself the goal of being climate-neutral by 2045. And it has also shown the way to get there: In addition to the expansion of renewable energies, hydrogen, as a gaseous fuel, is to be the pillar of a secure and decarbonised energy supply.

Need large amounts of hydrogen: heavy industry and transport sector

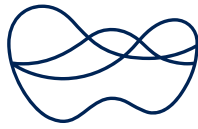
Heavy industries, in particular, will need large quantities of hydrogen to decarbonise. By 2050, hydrogen demand in Germany could climb to 500 TWh per year – an amount of energy equal to Germany’s current annual net electricity consumption. In crucial industries – such as steel, cement or chemicals – many processes today use fossil fuels. Some of these processes will not be able to be completely electrified in the future – or only by using very large amounts of resources.

This also holds true for the transport sector, which is responsible for around a quarter of all greenhouse gas emissions in the EU¹. Heavy goods vehicles account for more than a quarter of these emissions². Due to a number of factors, including their considerable weight and the long distances they travel, these vehicles are particularly difficult to decarbonise through electrification alone. Mobile and decentralised solutions using hydrogen can provide decisive assistance in this field. Hydrogen burns emission-free and can be used flexibly.



Securing the energy supply with hydrogen

German policy is mainly focusing on hydrogen that is produced using electricity from renewable energies and hydro power. However, the pace of renewable expansion will not suffice to meet Germany’s expected annual demand of 90 to 110 TWh by 2030 – owing to the fact that the demand for green electricity in this type of hydrogen production is high. The German government’s recent coalition agreement includes expansion targets for renewable energies for hydrogen of only about 28 TWh per year, which is only about one-third of the expected demand. And if one looks at hydrogen production in 2020, one sees that only 7 per cent was produced from renewable energies via electrolysis³.



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Shaping the path to the hydrogen economy

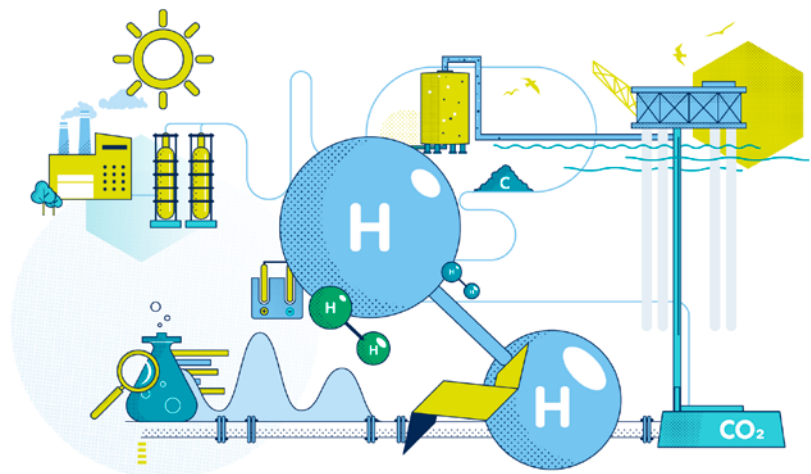
It is now the job of both policymakers and the energy industry to make the energy supply future-proof and to build up a stable hydrogen market. This can only be created if hydrogen is not only made available from renewable energies, but also manufactured from other energy sources – such as natural gas – using climate-friendly production processes. With technologies such as steam reforming together with carbon capture and storage (CCS) or pyrolysis, hydrogen can be produced from natural gas in a climate-friendly way and in large quantities, which in turn would help industries in Germany, Europe and other parts of the world to reduce their emissions.

Wintershall Dea aspires to be an architect for the hydrogen market of the future. We produce the required natural gas from various sources in North-West Europe and North Africa, and we have the know-how to help build the hydrogen infrastructure. What's more, we have vast experience in constructing and operating pipelines, and we have been working closely for decades with the operators of natural gas pipelines and storage facilities, whose infrastructure could also be used for the future transport and storage of hydrogen.

Large-scale production of hydrogen on the North Sea coast

In Wilhelmshaven, a coastal town on the German North Sea, we plan to produce hydrogen from Norwegian natural gas for German industrial customers and to eventually be able to supply over 200,000 cubic metres of hydrogen per hour. In annual terms, that is 160,000 t/a or 5.6 TWh. To put this into perspective, this corresponds to around three times the energy that the massive Volkswagen plant in Wolfsburg consumed in 2019. The CO₂ generated in the process will be transported by ship from Wilhelmshaven to various storage sites in the Norwegian, Danish or Dutch North Sea, where it shall be safely stored under the seabed.

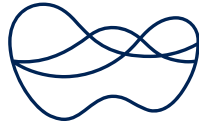
For the decentralized production of hydrogen, the pyrolysis process is suitable. In this process, the main component of natural gas (i.e. methane) is split into hydrogen and solid carbon at high temperatures. In addition to the hydrogen, the solid carbon produced can also be used – such as for particles in inks and paints or for the production of plastics and rubber. Wintershall Dea is involved in several pyrolysis research projects, including with the Karlsruhe Institute of Technology (KIT).



¹ Source: https://www.destatis.de/Europa/DE/Thema/Umwelt-Energie/CO2_Strassenverkehr.html

² Source: <https://www.europarl.europa.eu/news/de/headlines/society/20190313STO31218/co2-emissionen-von-pkw-zahlen-und-fakten-infografik>

³ Source: https://www.dena.de/fileadmin/dena/Publikationen/PDFs/2020/dena-FACTSHEET_Wasserstoff_PtG.pdf



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What we are calling for

The following measures can support to ramp up a hydrogen market:

- #1 **All available technologies must be employed and politically supported** in parallel such that sufficient hydrogen can be produced and made available to the market: electrolysis, steam reforming with CCS, and pyrolysis.
- #2 **The hydrogen infrastructure must be planned and built now** so that it will be available in the next few years. To make this possible, approval procedures must be accelerated.
- #3 **Carbon Contracts for Difference (CCfDs)** should also recognize hydrogen from natural gas as an instrument for decarbonisation. Such contracts originally come from the financial sector and enable investments in climate-friendly practices. For sectors like the energy, steel and chemical industries, such investments are particularly challenging and thus require support, as the use of new technologies is usually more expensive than conventional manufacturing processes.
- #4 Policymakers should support **R&D projects** aimed at advancing hydrogen technologies and setting new standards.
- #5 A **pan-European and international strategy** is needed to ramp up hydrogen-production capacities and thereby accelerate the development of a hydrogen market. Europe must work towards this goal together.

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