

H2morrow steel concludes feasibility study, project partners to continue cooperation: supply of Duisburg steel mill with blue hydrogen technically possible, but clarification of political and regulatory framework required

- Several potential production sites identified with cross-border potentials
- Federal government needs to quickly set the right framework conditions to facilitate the transformation of the energy-intensive industry
- Further detailing required for final investment decisions along the entire value chain

Norwegian-based broad energy company Equinor, gas transmission system operator OGE and steel producer thyssenkrupp Steel Europe have concluded their joint feasibility study started in October 2019 and will continue their cooperation on the topic going forward. The three partners' goal is to evaluate the possibility to supply thyssenkrupp Steel's Duisburg site with blue hydrogen to allow for significant CO₂ reductions via a nearly climate-neutral steel production in the short- and mid-term – when other types of hydrogen, especially green, are expected not to be available in sufficient quantities to meet the demand.

The study finds that the decarbonized production and supply of “blue” hydrogen from natural gas to Germany's largest steel plant in Duisburg is technically feasible. Going forward, the partners intend to continue working on further details and build the basis for potential investment decisions.

The partners are convinced that blue hydrogen as a reliable and available technology has the potential to ramp up the European hydrogen market. Especially taking into consideration the recent decision by the EU to set more ambitious climate targets for 2030, blue hydrogen can play a significant role going forward as a viable and early source for nearly climate-neutral hydrogen in large quantities and therefore in achieving these goals. The intended large volumes of blue hydrogen can support establishing the necessary hydrogen pipeline infrastructure and a hydrogen economy ramp up. Thus, blue hydrogen is complementary to other hydrogen production technologies and can function as a catalyst.

The study's premise has been the production of hydrogen from natural gas with permanent offshore storage of CO₂ accrued in the process. The study has evaluated several options for sourcing and transport of hydrogen to thyssenkrupp's Duisburg steel production site as well as options for transport and storage of CO₂.

Three possible locations for hydrogen production identified

Considering potential sites for hydrogen production, the study has confirmed three locations as principally suitable for a hydrogen plant: A potential production site on the Dutch coast in Eemshaven and two other potential sites on the German North Sea coast. With regard to production capacity, two scenarios have been evaluated: 1.4 GW and 2.7 GW. The locations identified require additional technical detailing as well as further evaluation of available space for the 2.7 GW scenario. Regarding the transportation of hydrogen, all options not based on pipelines have proven commercially unviable. The study concludes that economically viable transport via pipeline is possible with the cost of pipeline transport being minor compared to the cost of hydrogen production. With regard to the transport and storage of CO₂ captured in the blue hydrogen production process, the study has investigated potential CO₂ storage sites with the “Northern Lights” project in Norway and other storage options, e.g. the Porthos project offshore of Rotterdam, of which Northern Lights is the most advanced one. The study concludes that depending on the production capacity, either ships or pipelines may be viable as CO₂ transport solutions.

Based on market forecasts by renowned external market analysts, the study estimates a price for blue hydrogen of approximately 2.1 euros per kilogram (corresponding to 58 euros/MWh) based on an expected future and long-term average natural gas price of 23 euros/MWh.

Project requires clarification on regulatory framework conditions

Besides further technical detailing, the study also concludes that the regulatory framework in Germany and the EU would need further clarification to create the basis for potential investment decisions. This includes clarifications related to the conversion of natural gas pipelines to dedicated hydrogen pipelines. It also requires clarification about the transport of hydrogen independent from its production technology. Furthermore, alignment between the Netherlands and Germany on grid development and transport arrangements is required.

Finally, an EU-wide standardized systematic approach to hydrogen, covering all production technologies considering their carbon footprint as well as an amendment of EU legislation on the CO₂ transport per ship, would be required.

Next steps: building the basis for future investment decisions within an appropriate political framework

Going forward, the project partners will elaborate details of potential production sites. The partners will further continue their dialogue with potential CO₂ storage facilities including Northern Lights and Porthos. The objective in the upcoming months is to form the basis for potential investment decisions. In this context, it is crucial that the appropriate political and regulatory framework conditions are set to enable the fundamental transformation of an energy-intensive industry exposed to international competition.

Furthermore, funding for CAPEX and OPEX intensive climate-related projects and the climate transformation will be a prerequisite for establishing a market for climate-neutral products. Possible OPEX funding mechanisms could be Carbon Contracts for Difference (CCfD) or incentives for customers to source climate-neutral products.

The H2morrow steel feasibility study concludes that the entire project's value chain could be established by 2027 at the earliest.

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Equinor ASA is an international energy company headquartered in Norway. The company employs around 21,000 people worldwide. Equinor is Europe's second largest gas supplier with a market share of around 20 percent. Equinor is already one of the world's most CO₂-efficient producers of oil and gas. In May 2018, the company changed its name from the former Statoil to Equinor to reflect its development into a broad energy company. Equinor leverages strong synergies between oil, gas, renewables, carbon capture and hydrogen. The company has a growing portfolio in offshore wind with wind farms in Europe and the USA and is involved in various hydrogen projects throughout Europe.

thyssenkrupp Steel Europe is one of the world's leading suppliers of carbon steel flat products. With around 28,000 employees, the company supplies high-quality steel products for innovative and demanding applications in a wide variety of industries. Customer-specific material solutions and services around steel complete the range of services. With a production volume of approximately 11 million tonnes of crude steel annually, thyssenkrupp Steel is the largest flat steel producer in Germany.

OGE is one of Europe's leading gas transmission system operators. With our pipeline network spanning approximately 12,000 kilometres, we transport gas throughout Germany. Our geographic location makes us the central link for gas flows across the European single market. 1,450 OGE employees ensure security of supply. We make our network available to all market participants in a transparent and non-discriminatory way in line with market needs. We enable energy supply. Today and in the energy mix of the future.