Offshore Hydrogen Production

Putting the brakes on climate change and meeting the challenges of the energy transition is now more urgent than ever. Tractebel offers a solution.

An experienced team of energy experts from Tractebel Engineering GmbH and offshore engineers from Tractebel Overdick GmbH have developed a unique concept for an offshore platform. This makes it possible to produce environmentally friendly green hydrogen from offshore wind energy at an industrial scale using electrolysis.

Delivering up to 400 MW, this kind of plant exceeds the output of previous technologies many times over. This future-oriented concept is already at the stage where it could be put into practice today, for example in the North Sea.

Using the innovative offshore platform design as the basis, it enables a number of tasks to be solved simultaneously. First, it enables the proportion of green hydrogen (H_2) in the energy mix to be effectively increased on a CO_2-neutral basis. Second, the wide range of options for transporting H_2 provide relief for the electricity transmission grid, the capacities of which are limited. And third, H_2 as an efficient energy storage medium can balance out seasonal fluctuations in renewable energy sources.

KEY PERFORMANCE INDICATORS

- 400 MW electrolysis power
- Up to 80,000 m³/h hydrogen production
- Up to 3,000 m³/day deionised water from desalinisation plant
- Modular and flexible system layout

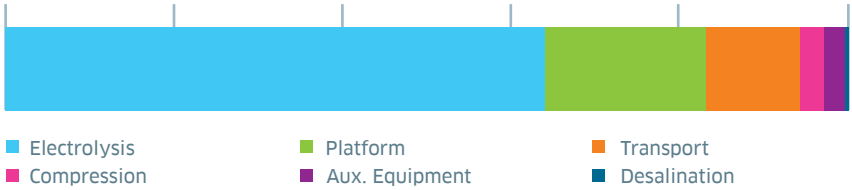
AVAILABLE ARE

- Platform layout & conceptual design
- CAPEX / OPEX estimation
- Economic model, pathway analysis

ENOUGH HYDROGEN FOR

- More than 229,000 cars
- More than 8,000 buses
- More than 2,600 trucks
- More than 520 trains
- Reduction of more than 300 million kg CO_2

Breakdown of hydrogen production costs from offshore wind energy



VIDEO

Watch our video!

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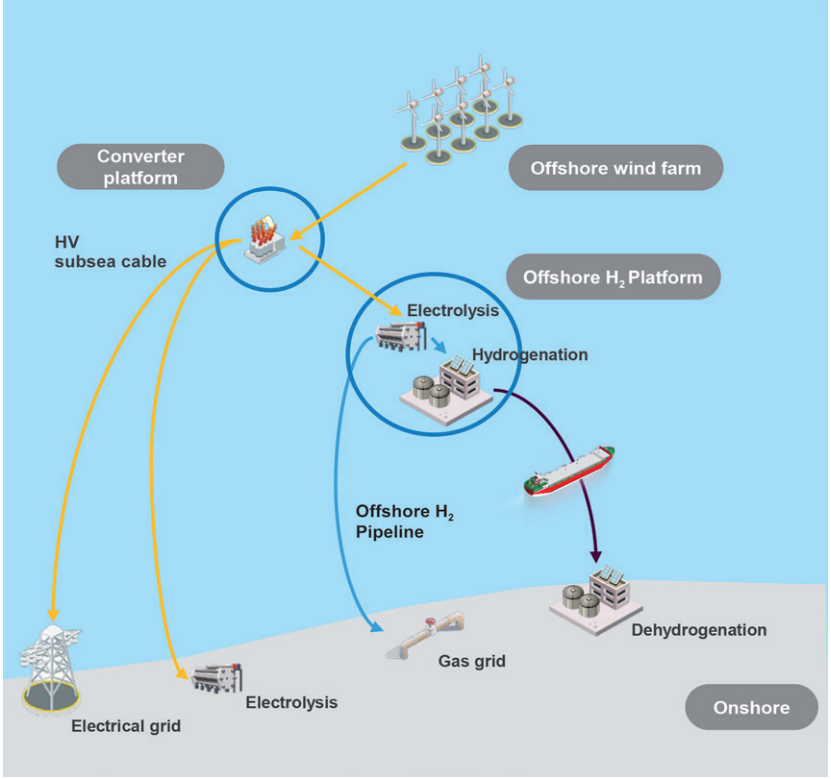

Overview of hydrogen production and transport

Great Flexibility

In the energy mix, hydrogen can serve as an efficient form of storing energy and is easily transportable. Existing infrastructure consisting of gas pipelines and storage facilities such as underground caverns is available.

H_2 can also be stored on ships and transported anywhere in the world. As a source of energy, H_2 is used to power gas engines, gas turbines and fuel cells, but can also be used e.g. as a supplement to natural gas in private households. In addition, hydrogen is a key industrial raw material and source material for the production of ammonia, for example. It can also be used as a CO_2-neutral reducing agent to substitute coke in steel production.

Enormous Potential

The new type of platform model will enable the enormous potential of large-scale offshore wind farms, e.g. in the German North Sea, to be used at an industrial scale (up to 400 MW) for the first time.

It accommodates all the technical components required for the production of "green" hydrogen. This includes the electrolysis units and transformers for the transformation of the electricity supplied by the offshore wind turbines, along with desalination plants for producing the high-purity water required for electrolysis.

ENGINEERING SERVICES

OFFSHORE ENGINEERING

- Concept definition screenings
- Pre-FEED engineering
- FEED engineering
- Detail engineering

PLANT ENGINEERING

- Process design (electrolysis, desalination, cooling systems)
- Electrical layout of MV/HV systems
- Instrumentation & control, SCADA systems

WIND ENERGY

- Wind resource evaluation and energy yield calculation
- Conceptual design of offshore wind farms
- Feasibility study

IMPLEMENTATION PHASE

- Owner's Engineer, EPC Management
- Quality management and site supervison
- Project management

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SELECTED REFERENCES

HYDROGEN

The Netherlands - HyNetherlands, feasibility study for the development of future large scale green hydrogen production at Eemshaven

Chile - HyEx, pre-feasibility study for green ammonia production from renewable hydrogen

Australia - Yuri, pre-feasibility and feasibility study for the development of green hydrogen production for ammonia plant

France - Power-to-Methane, EPCM services for two Power-to-Methane pilot projects combining CO_2 from AD plant and green hydrogen from renewables. Two different methanation technologies will be installed.

OFFSHORE ENGINEERING

Germany - TRIANEL TWB 2 Extension, construction design for monopiles, transition pieces as well as foundation. Design of transport and installation.

Germany - Global Tech I, concept and construction design, foundation design and transport as well as installation design for a self-installing AC converter platform in the german North Sea

Germany - SylWin 1, concept and construction design, foundation design and transport as well as installation design for a self-installing AC converter platform in the german North Sea

OFFSHORE WIND

Germany - Baltic Sea, technical due diligence study for the investor during implementation phase, evaluation of energy yield analysis, technical concept of project and maintenance, possible extension of planned operation, OPEX estimation, HSE concept, 288 MW installed capacity

Germany - Open Sea, technical due diligence study for the investor, including evaluation of construction schedule and contracts, CAPEX and options for value enhancement, approval and grid connection, energy yield analysis, technical risk analysis, maintenance concept, OPEX estimation, HSE concept, 500 MW installed capacity

South Korea - ShinChang OWF, pre-feasibility study, site evaluation, preliminary energy yield analysis, definition of feasible wind farms, 60 MW planned capacity