HOPE

HYDROGEN OFFSHORE PRODUCTION FOR EUROPE

Project ID	101111899
PRR 2025	Pillar 1 - H_2 Production
Call Topic	HORIZON-JTI-CLEANH$_2$-2022-01-10
Project Total Costs	40 287 430.00
Clean H_2 JU Max. Contribution	20 000 000.00
Project Period	01-06-2023 - 31-05-2028
Coordinator Beneficiary	LHYFE, FR
Beneficiaries	STROHM BV, DWR ECO GMBH, FRAMES ENERGY SYSTEMS BV, ERM FRANCE, CNET CENTRE FOR NEW ENERGY TECHNOLOGIES SA, PROVINCIALE ONTWIKKELINGSMAATSCHAPPIJ WEST-VLAANDEREN, ALFA LAVAL COPENHAGEN A/S, COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES

https://hope-h2.eu/

PROJECT AND GENERAL OBJECTIVES

HOPE aims to pave the way for the deployment of large-scale offshore production of renewable hydrogen. It involves developing, building and operating the first 10 MW production unit in the North Sea, off the coast of Belgium, by 2026.

The aim is to demonstrate the technical and economic viability of this offshore project, and of pipeline transport for supplying onshore customers. This unprecedentedly large-scale project (10 MW) will be able to produce up to four tonnes a day of green hydrogen at sea, which will be exported to shore through a composite pipeline, and then compressed and delivered to customers for use in industry and the transport sector. HOPE is the first offshore project of this size in the world to begin actual implementation, with the production unit and export and distribution infrastructure due to come on stream in mid-2026.

The production site will be powered by electricity supplied under power purchase agreement contracts that guarantee its renewable origin. The water used for electrolysis will be pumped from the North Sea, desalinated and purified.

The production site will comprise three units: (i) production and compression (at medium pressure) at sea; (ii) export by composite pipeline; and (iii) compression (at high pressure), storage and distribution onshore.

NON-QUANTITATIVE OBJECTIVES

HOPE will make it possible to improve the technological solutions for the production of renewable hydrogen offshore and its export onshore, helping to reduce the investment risks for much larger-scale projects in the years to come and paving the way for the production of massive quantities of renewable hydrogen in Europe.

The grant awarded by the European Commission will be used to finance the design phases, the supply of equipment and the construction work, as well as research, development and innovation work focusing mainly on optimising technological solutions and the operation of this type of infrastructure.

PROGRESS, MAIN ACHIEVEMENTS AND RESULTS

HOPE's main key innovations under development are:

- Recycled offshore barge: The structure housing the production unit will be a second-hand jack-up barge, demonstrating that it is possible to transform infrastructure previously used for oil and gas and give it a second life for the production of renewable energy, while helping to reduce costs and lead times.
- 10 MW polymer electrolyte membrane electrolyser: This highly compact electrolyser will be the first of its size to be installed offshore.
- Seawater treatment system: This low-energy system which is compact, economical and able to use the heat emitted by the electrolyser, will be used for the first time to produce green hydrogen from seawater purified by evaporation.
- Underwater flexible hydrogen pipeline for hydrogen export: The hydrogen will be exported ashore via a flexible thermoplastic composite pipeline of over 1 km long, which will transport hydrogen produced at sea after being given the technical certification for this specific use.
- Completion of three permit submissions. One of them (H_2 pipeline) has been assessed and amendment is ongoing; routing review to cope with local constraints and associated QRA.
- Completion of basic engineering.
- Initiation of consultation phase.

FUTURE STEPS AND PLANS

- Completion of permit process.
- Procurement LLIFID to be submitted.
- Securing CHCI subsidy (from Belgium).

PROJECT TARGETS

Target source	Parameter	Unit	Target	Achieved to date by the project	Target achieved?	SoA result achieved to date (by others)	Year for reported SoA result
Project's own objectives	PEM Electrolyser electricity consumption @ nominal capacity	kWh/kg	52	54		49	2025
	Degradation	%/1 000h	0.15			0.19	2022
	Cold start ramp time	sec	10	70		30	2022

Clean Hydrogen Partnership
Co-funded by the European Union