

HOPE

HYDROGEN OFFSHORE PRODUCTION FOR EUROPE

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Project ID	101111899
PRR 2024	Pillar 1 – Renewable hydrogen production
Call topic	HORIZON-JTI-CLEANH2-2022-01-10: Demonstrating offshore production of renewable hydrogen
Project total costs	EUR 40 287 430.00
Clean H ₂ JU max. contribution	EUR 20 000 000.00
Project period	1.6.2023–31.5.2028
Coordinator	Lhyfe, France
Beneficiaries	Alfa Laval Copenhagen A/S, Centre for New Energy Technologies SA, Commissariat à l'énergie atomique et aux énergies alternatives, DWR eco GmbH, ERM France, Frames Energy Systems BV, Provinciale Ontwikkelingsmaatschappij West-Vlaanderen, Strohm BV

<https://hope-h2.eu/>

PROJECT AND GENERAL OBJECTIVES

The project aims to pave the way for the deployment of the 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.

This unprecedentedly large-scale project (10 MW) will be able to produce up to 4 t/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.

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: production and compression (at medium pressure) at sea; export by composite pipeline; and then compression (at high pressure), storage and distribution onshore.

NON-QUANTITATIVE OBJECTIVES

The project 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, and also research, development and innovation work focusing mainly on optimising technological solutions and the operation of this type of infrastructure.

PROGRESS AND MAIN ACHIEVEMENTS

- **A recycled offshore barge.** The structure housing the production unit will be a second-hand jackup 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.
- **A 10 MW polymer electrolyte membrane electrolyser.** The first of its size to be installed offshore.
- **A 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 using a flexible thermoplastic composite pipeline over 1 km long, which will transport hydrogen produced at sea for the first time after being given the technical certification for this specific use.

PROJECT TARGETS

Target source	Parameter	Unit	Target	Target achieved?	SOA result achieved to date (by others)	Year for reported SOA result
SRIA (2021–2027)	Degradation	%/1 000 h	0.15		0.19	
	Cold start ramp time	seconds	10		30	
	Hot idle ramp time	seconds	1		2	2020
	Electricity consumption @ nominal capacity	kWh/kg	52		55	