OYSTER

OFFSHORE HYDROGEN FROM SHORESIDE WIND TURBINE INTEGRATED ELECTROLYSER

Project ID:	101007168
PRD 2023:	Panel 1 – H2 production
Call topic:	FCH-02-6-2020: Electrolyser module for offshore production of renewable hydrogen
Project total costs:	EUR 5 025 093.51
Clean H_2 JU max. contribution:	EUR 4 999 843.00
Project period:	1.1.2021–31.12.2024
Coordinator:	ERM, France
Beneficiaries:	Element Energy, Orsted Wind Power A/S, ITM Power (Trading) Limited, Siemens Gamesa Renewable Energy AS, Element Energy Limited

https://oysterh2.eu/

PROJECT AND OBJECTIVES

The overall aim of OYSTER is to justify, develop and demonstrate an electrolyser suitable for deployment in offshore environments. The end goal is to produce a marinised electrolyser that is integrated with offshore wind turbines to produce 100 % renewable, low-cost bulk hydrogen, while facilitating increased roll-out of offshore wind.

NON-QUANTITATIVE OBJECTIVES

- The project aims to develop an electrolyser system capable of operating reliably in an offshore environment.
- It aims to deploy and test a new MW-scale electrolyser designed for marine environments for 18 months, covering all seasons.
- It aims to complete a design exercise for an integrated offshore wind turbine electrolysis module, drawing on the lessons learned from the pilot trial and insights from expert partners in the offshore oil and gas sector. These lessons and insights will contribute to the basis of a detailed design of a complete offshore hydrogen production system.
- The project plans to undertake a preliminary front-end engineering and design study for a specific offshore wind farm site, linked to an existing industrial hydrogen customer.
- It aims to formulate business cases for further deployment of large-scale electrolysis systems in offshore environments. A business case will be developed for the use of hydrogen across different applications, including hydrogen for industrial users, transport applications and heating, by exploiting the onshore gas networks for use in hydrogen distribution.

PROGRESS AND MAIN ACHIEVEMENTS

- Early versions of the water treatment system design and system modelling to be used for simulation of direct connected power electronics have been finalised. These will form the basis for the design used by Stiesdal.
- The location of the trial has been selected. Following investigation, a site in Zeeland, the Netherlands, was selected.

FUTURE STEPS AND PLANS

- Stiesdal will start design and marinisation work for the electrolyser, focusing on compartmentalisation and component specification for marinisation.
- A shoreside trial and data collection are expected to start in 2024.

QUANTITATIVE TARGETS AND STATUS

Target source	Parameter	Unit	Target	Target achieved?
Project's own objectives	Electrolyser footprint	m^2/MW	50	
	Maintenance cost	€/(kg/year)	20	
	Efficiency degradation at rated power	%/1 000 h	0.11	
	Electrolyser CAPEX (at rated power), including ancillary equipment and commissioning	€/(kg/day)	800	
	Time for hot start (min. to max. power)	seconds		
	Current density	A/cm^2	0.2–0.4	

Clean Hydrogen Partnership
Co-funded by the European Union