OYSTER

OFFSHORE HYDROGEN FROM SHORESIDE WIND TURBINE INTEGRATED ELECTROLYSER

Project ID	101007168
PRR 2024	Pillar 1 – Renewable hydrogen production
Call topic	FCH-02-6-2020: Electrolyser module for offshore production of renewable hydrogen
Project total costs	EUR 5 423 843.01
Clean H_2 JU max. contribution	EUR 4 999 843.00
Project period	1.1.2021–31.12.2025
Coordinator	ERM France, France
Beneficiaries	Environmental Resources Management (previously Element Energy Limited), ITM Power (Trading) Limited, Orsted Hydrogen Netherlands Holding BV, Orsted Wind Power A/S, Siemens Gamesa Renewable Energy AS, Stiesdal Hydrogen A/S

https://oysterh2.eu/

PROJECT AND GENERAL OBJECTIVES

The overall aim of the Oyster project 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 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

- The first versions of the water treatment system design and system modelling to be used for simulation of direct connected power electronics have been finalised.
- The water treatment system design has been completed for use in the marinised electrolyser system.
- The system design has commenced and long lead items have been ordered.

FUTURE STEPS AND PLANS

Discussions are under way for a potential partnership with a hydrogen valley funded by the Clean Hydrogen Joint Undertaking.

PROJECT TARGETS

Target source	Parameter	Unit	Target	Target achieved?
Project's own objectives	Time for hot start (minimum to maximum power)	seconds	-	
	Operational load	hours	3 000	
	Electrolyser footprint	m^2/MW	50	
	Maintenance cost	€/(kg year)	20	
	Efficiency degradation at rated power	%/1 000 h	0.11	
	Current density	A/cm^2	0.2–0.4	
	Electrolyser CAPEX (at rated power) including ancillary equipment and commissioning	€/(kg/day)	800	
	Energy consumption at rated power (system AC efficiency, including BoP)	kWh/kg	51.6	
	Operational load run hours within the project	hours	3 000	
	Design of an integrated electrolyser–wind-turbine solution	%	Demonstrate a 30 % capital cost saving in electrolyser costs (avoided power electronics)	

Clean Hydrogen Partnership
Co-funded by the European Union