REFHYNE

CLEAN REFINERY HYDROGEN FOR EUROPE

Project ID	779579
PRR 2025	Pillar 1 - H_2 Production
Call Topic	FCH-02-5-2017
Project Total Costs	19 758 743.71
Clean H_2 JU Max. Contribution	9 998 043.50
Project Period	01-01-2018 - 30-06-2024
Coordinator Beneficiary	SINTEF AS, NO
Beneficiaries	ERM FRANCE, SHELL ENERGY EUROPE LIMITED, SHELL DEUTSCHLAND GMBH, ENVIRONMENTAL RESOURCES MANAGEMENT LIMITED, SPHERA SOLUTIONS GMBH, ITM POWER (TRADING) LIMITED, ELEMENT ENERGY LIMITED, STIFTELSEN SINTEF

http://www.refhyne.eu

PROJECT AND GENERAL OBJECTIVES

The overall objective of REFHYNE is to deploy and operate a 10 MW PEM electrolyser in a power-to-refinery setting. REFHYNE will validate the business model for using large-scale electrolytic hydrogen as an input to refineries, perform technical, financial and greenhouse gas analyses, and create an evidence base for the policy and regulatory changes needed to underpin the required development of this market.

NON-QUANTITATIVE OBJECTIVES

Further contributions from REFHYNE:

- REFHYNE emphasised collaboration between industry partners, bridging knowledge gaps and fostering a cross-functional team. This involved sharing learnings related to regulations, codes, standards, and technical challenges.
- REFHYNE served as a flagship initiative for decarbonising the industrial sector, demonstrating the potential of green hydrogen to reduce carbon emissions in refineries.
- Through strategic communication, workshops, and events, REFHYNE aimed to raise awareness and encourage the adoption of green hydrogen technologies across various industries.
- Establishing a pathway for future projects: REFHYNE was designed to pave the way for future large scale electrolyser projects, by providing valuable operational data, and lessons learned.

PROGRESS, MAIN ACHIEVEMENTS AND RESULTS

REFHYNE is a first-of-a-kind project at the forefront of the effort to supply green refinery hydrogen for Europe. REFHYNE has installed and operated a 10MW PEM electrolyser at Shell Energy and Chemicals Park Rheinland. The final phase of REFHYNE, the successful operation of this ITM produced system, has been established including the gathering of operational data and the dissemination of emerging project results. REFHYNE has held several roundtables and workshops with stakeholders across the hydrogen value chain to demonstrate the business case and share project results.

FUTURE STEPS AND PLANS

The system is in full operation, and the electrolyser produces green hydrogen for the refinery operations. Based on the results and success of REFHYNE, Shell with partners have taken FID to realise a 100 MW PEM electrolyser from ITM Power at the same location. It is expected to be in operation from 2027.

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	Electricity consumption	kWh/kg	52	45.7 - 53.3	✓	55	2020
	Hot idle ramp time H_2 production (stacks)	sec	1	1		2	2020
	CAPEX	€/(kg/d)	2 000	-		2 100	2020
	Degradation rate	%/1 000h	0.15	<0.15		0.19	2020

Clean Hydrogen Partnership
Co-funded by the European Union