AEMELIA

ANIONIC EXCHANGE MEMBRANE WATER ELECTROLYSIS FOR HIGHLY EFFICIENTCY SUSTAINABLE, AND CLEAN HYDROGEN PRODUCTION

Project ID	101137912
PRR 2024	Pillar 1 – Renewable hydrogen production
Call topic	HORIZON-JTI-CLEANH2-2023-01-01: Innovative electrolysis cells for hydrogen production
Project total costs	EUR 2 764 927.00
Clean H_2 JU max. contribution	EUR 2 764 926.75
Project period	1.1.2024–28.2.2027
Coordinator	Commissariat à l'énergie atomique et aux énergies alternatives, France
Beneficiaries	Centre national de la recherche scientifique, Claind SRL, Consiglio Nazionale delle Ricerche, Fundacion Tecnalia Research and Innovation, Imperial College of Science, Technology and Medicine, Matgenix, Rhodia Laboratoire du Futur, SINTEF AS, Solvay Specialty Polymers Italy SpA, Specialty Operations France

https://cordis.europa.eu/project/id/101137912

PROJECT AND GENERAL OBJECTIVES

Aemelia accepts the challenge to design and prototype an anion-exchange membrane electrolysis (AEMEL) method that meets and surpasses Hydrogen Europe's 2030 targets for performance, durability, safety and cost. For example, Aemelia proposes a clear path to reach a high current density (1.5 A/cm^2) at low voltage (1.72 V). Energy efficiency surpasses the 2030 target (46.2 kWh/kg, or 86 % of maximum theoretical efficiency) to increase H_2 production while decreasing energy consumption, compared with Claind's actual product (1.76 V (47.1 kWh/kg) at 0.5 A/cm² in 0.2 M KOH at 42 °C and 10 bar). The levelised cost of hydrogen also outshines the 2030 targets at EUR 2.5/kg H_2 (17 % lower than the 2030 target). The degradation rate meets the 2030 target, enabling a 10-year lifetime. Capital expenditure is slightly higher, according to preliminary estimations, but upscaling is expected to reduce this to the 2030 strategic research and innovation agenda (SRIA) target.

Aemelia brings together leading European AEMEL experts and manufacturers to meet key performance indicators, most importantly to deliver an electrolysis stack that can operate at a high current density (1.5 A/cm^2) at a low voltage (1.72 V). This very high current density triples the hydrogen production per kWh achieved by the state of the art (SOA) at 0.5 A/cm^2.

PROJECT TARGETS

Target source	Parameter	Unit	Target	Target achieved?	SOA result achieved to date (by others)
SRIA (2021–2027)	Degradation	%/1 000 h	0.5 %/1 000 h @ 1.5 A/cm², tested for 2 000 hours		0.9 SRIA target for 2024 / 8-year lifetime for CLD AEMEL and 4-year lifetime for Enapter AEMEL
	Use of CRM as catalysts	mg/W	0		Dioxide Materials' commercial electrodes: 1.85 V @ 1 A/cm² in 1 M KOH with a cathode made of 2 mg/cm² of NiFeCo on a 25 cm² electrode 0.4 SRIA target for 2024
	Electricity consumption @ nominal capacity	kWh/kg	46.2		53.3
	LCOH	€/kg	2.5		2030 SRIA target of €3/kg
	Current density	A/cm^2	1.5		1.0 in 1 M KOH (60 °C)
	CAPEX	€/kW	321		Benchmark is 2024 SRIA target of €550/kW

Clean Hydrogen Partnership
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