PILOTSOEL

ADVANCED PROCESSES ENABLING LOW COST AND HIGH PERFORMING LARGE SCALE SOLID OXIDE ELECTROLYSER PRODUCTION

Project ID	101112026
PRR 2024	Pillar 1 – Renewable hydrogen production
Call topic	HORIZON-JTI-CLEANH2-2022-01-04: Design for advanced and scalable manufacturing of electrolysers
Project total costs	EUR 2 000 000.00
Clean H_2 JU max. contribution	EUR 2 000 000.00
Project period	1.6.2023–31.5.2026
Coordinator	Danmarks Tekniske Universitet, Denmark
Beneficiaries	Aktsiaselts Elcogen, Beneq Oy, Elcogen Oy, SIA Naco Technologies, Univerza v Ljubljani

https://pilotsoel.dtu.dk/

PROJECT AND GENERAL OBJECTIVES

The Pilotsoel project will focus on innovative upscalable and low-cost SOEL-component manufacturing processes, with reduced use of critical raw materials and increased waste recycling in the cell production processes, and will increase the degree of automation in the stack assembly to reduce manufacturing cost.

The project will develop a novel environmentally friendly water-based tape-casting process with a reduced number of process steps for half-cell production. Innovative thin protective barrier layers deposited by atomic layer deposition and physical vapour deposition, together with microstructural cell optimisation, will reduce the cell resistance, thus improving the cell performance and durability at high current operation.

The dense and thin coating made by physical vapour deposition will improve the oxidisation resistance of the interconnector, allowing the use of cheaper alloys and ensuring a long stack lifetime. A life-cycle assessment and a techno-economic analysis will be performed to benchmark the developed processes in Pilotsoel with the state-of-the-art SOEL production processes.

The project is aiming to improve the SOEL processing manufacturing readiness level (MRL) from MRL 4 at the beginning of the project to at least MRL 5 by the end of the project.

PROGRESS AND MAIN ACHIEVEMENTS

A review of the list of coating candidates for the air and fuel sides of interconnector plates has been undertaken.

The design of the optical inspection system for stack assembly automation and quality assurance has been finalised.

FUTURE STEPS AND PLANS

The project will continue working on optimising the manufacture routes for SOEL cells, characterising the manufactured cells and stacks, SOEL interconnector coating and stack assembly with improved optical inspection system.

PROJECT TARGETS

Target source	Parameter	Unit	Target	Target achieved?
SRIA (2021–2027)	CAPEX	€/(kg/day)	1 800	
	Degradation @ UTN	%/1 000 h	< 1	
	O&M cost	€/(kg/day)/year	130	
	20 kW stack assembly	number	20 kW stack assembled and validated	
	Current density	A/cm²	0.85	
	SOEL cell degradation rate	%/1 000 h	< 1	
	Hot idle ramp time	seconds	180	
	Cold start ramp time	hours	4	
	Electricity consumption @ nominal capacity	kWh/kg	38	
	SOEL stack degradation	%/1 000 h	< 1	
Project's own objectives	Interconnector coating degradation	mohm/cm²	5 mohm/cm² after 3 000 hours	
	Waste material recycling	%	Up to 100 % recycling of waste tapes and comparable mechanical and electrochemical performance of the cell	
	Cells produced by water-based tape-casting process	number of cells	30	
	Stack assembly defect recognition	%	> 95 % accuracy in defect recognition by optical inspection system	

Clean Hydrogen Partnership
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