PILOTSOEL

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

Project ID	101112026
PRR 2025	Pillar 1 - H_2 Production
Call Topic	HORIZON-JTI-CLEANH$_2$-2022-01-04
Project Total Costs	2 000 000.00
Clean H_2 JU Max. Contribution	2 000 000.00
Project Period	01-06-2023 - 31-05-2026
Coordinator Beneficiary	DANMARKS TEKNISKE UNIVERSITET, DK
Beneficiaries	SIA NACO TECHNOLOGIES, ELCOGEN OY, BENEQ OY, AKTSIASELTS ELCOGEN, UNIVERZA V LJUBLJANI

https://pilotsoel.dtu.dk/

PROJECT AND GENERAL OBJECTIVES

PilotSOEL will focus on innovative upscalable and low-cost solid oxide electrolysis (SOEL) component manufacturing processes, with reduced use of critical raw materials and increased waste recycling in the cell production processes, as well as and increased degree of automation in the stack assembly to reduce manufacturing cost.

PilotSOEL 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.

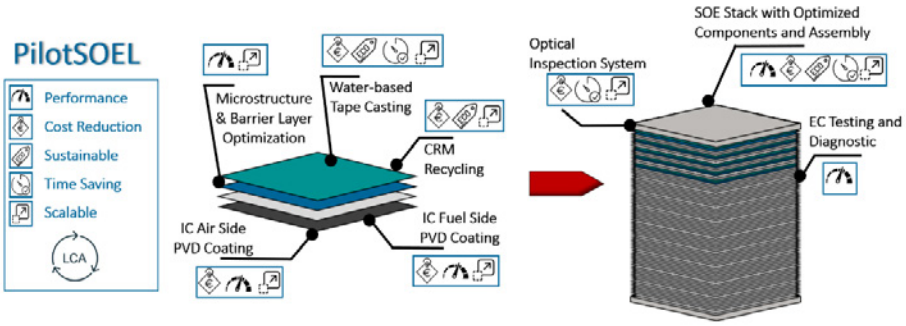
The dense and thin coating made by physical vapour deposition will improve the oxidisation resistance of the interconnector, allowing the use of cheaper alloys, and ensuring a long stack lifetime. A life-cycle assessment and a techno-economic analysis will be performed to benchmark the developed processes in PilotSOEL with the state-of-the-art SOEL production processes. PilotSOEL aims to improve the SOEL processing manufacturing readiness level (MRL) from MRL 4 to at least MRL 5 by the end of the project.

PROGRESS, MAIN ACHIEVEMENTS AND RESULTS

- A review of the list of coating candidates for the air and fuel sides of interconnector plates has been undertaken.
- Design of Optical Inspection System (OIS) for stack assembly automation and quality assurance has been finalised.

FUTURE STEPS AND PLANS

PilotSOEL will continue working on optimising the manufacture routes for SOEL cell, characterising the manufactured cells and stacks, SOEL inter-connector coating and stack assembly with improved optical inspection systems.



PROJECT TARGETS

Target source	Parameter	Unit	Target	Target achieved?
Project's own objectives	Stack assembly	kW	20	
	Waste material recycle	%	Up to 100% recycle 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	
	Interconnector coating degradation	mOhm. cm^2	5 (after 3 000 hours)	✓

Clean Hydrogen Partnership
Co-funded by the European Union