REFLEX

REVERSIBLE SOLID OXIDE ELECTROLYZER AND FUEL CELL FOR OPTIMIZED LOCAL ENERGY MIX

Project ID:	779577
PRD 2023:	Panel 1 – H2 production
Call topic:	FCH-02-3-2017: Reversible solid oxide electrolyser (rSOC) for resilient energy systems
Project total costs:	EUR 3 033 654.71
Clean H_2 JU max. contribution:	EUR 2 999 575.25
Project period:	1.1.2018–30.6.2023
Coordinator:	Commissariat à l'énergie atomique et aux énergies alternatives, France
Beneficiaries:	Aktsiaselts Elcogen, Danmarks Tekniske Universitet, Engie, Engie Servizi SpA, Green Power Technologies SL, Parco Scientifico Tecnologico per l'Ambiente SpA, Sylfen, Teknologian tutkimuskeskus VTT Oy, Universidad de Sevilla

http://www.reflex-energy.eu/

PROJECT AND OBJECTIVES

REFLEX aims to develop an innovative renewable energy storage solution, based on reversible solid oxide cell (rSOC) technology, that can operate in either electrolysis mode, to store excess electricity to produce H_2, or fuel cell mode, when energy needs exceed local production levels, to produce electricity and heat from H_2 or any other fuel that is locally available. It has developed improved rSOC components (cells, stacks, power electronics, heat exchangers) and has defined the system, its set points and advanced operation strategies. An in-field demonstration will be performed in 2023.

NON-QUANTITATIVE OBJECTIVES

- The project aims to complete a techno-economic assessment.
- It also aims to create an inventory of regulations, codes and standards applicable to rSOC systems in France and Italy.

PROGRESS AND MAIN ACHIEVEMENTS

- Enlarged cells were produced.
- The project has improved the stack for rSOC operation.
- The rSOC module design was completed.
- The rSOC module assembly has started.
- The site integration is almost complete.

FUTURE STEPS AND PLANS

- The modules and system assembly are being finalised.
- The installation of the system for an in-field test was planned for 2023.

QUANTITATIVE TARGETS AND STATUS

Target source	Parameter	Unit	Target	Achieved to date by the project	Target achieved?	SoA result achieved to date (by others)	Year of SoA target
Project's own objectives	Current density in SOEC mode	A/cm²	1.2	N/A	⚙	– 1.15 at 750 °C, – 1 at 800 °C	2015–2016
	Durability in SOEC step during rSOC operation at 0.58 A/cm² and SC = 68 %	%/1 000 h	2	1.2	⚙	2.3 for current densities of 0.6–0.7 A/cm² and SC = 50 %	2015
	Cell active area	cm²	200	200	✓	128	2021
	Power electronic efficiency	%	95	96	✓	88	2019
	Power modulation SC = 80 %	%	50–100 (SOFC), 70–100 (SOEC)	58–100 in SOEC, 13–100 in natural-gas SOFC and 23–100 in H_2 SOFC	⚙	57–100 in SOEC	2019

Clean Hydrogen Partnership
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