

ELECTROHYPEM

Enhanced performance and cost-effective materials for long-term operation of PEM water electrolyzers coupled to renewable power sources

Duration:

Start and end date: 1st July 2012, 30th June 2015

Application Area:

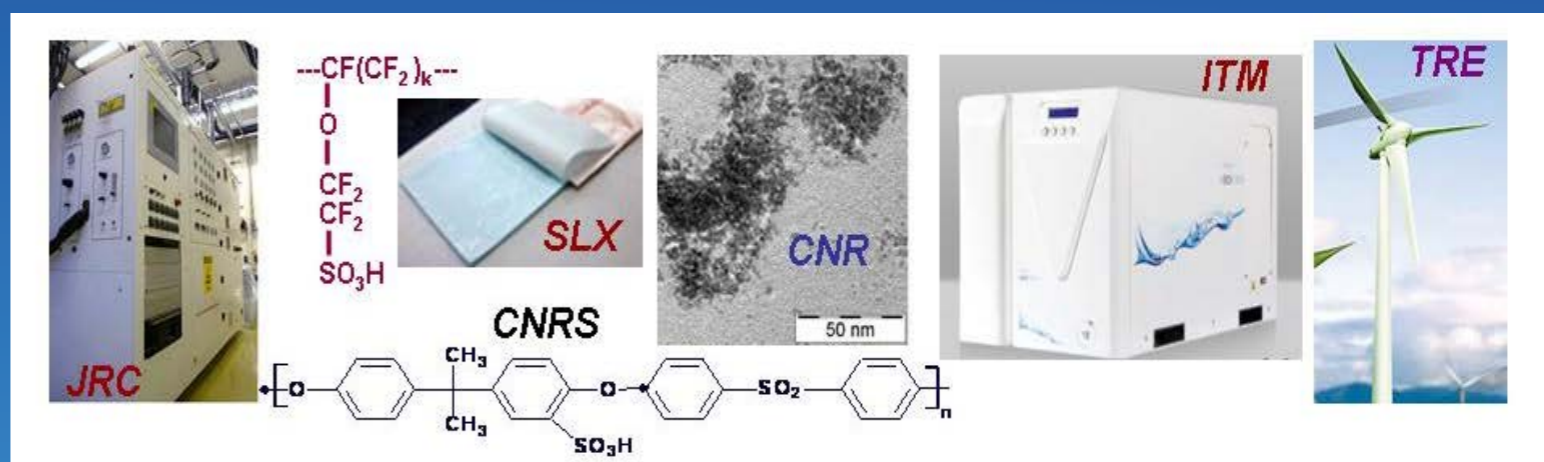
Hydrogen generation and storage

Budget:

Total budget € 2,842,312;
FCH contribution € 1,352,771.

Partnership / consortium list:

CNR-ITAE, JRC-IET, CNRS, SSPI-SLX, ITM, TRE.
Coordinator A.S. Aricò (CNR-ITAE Messina, Italy)



Summary / main objectives of the project:

The project deals with cost-effective and enhanced durability components for PEM electrolyzers amenable to be integrated with renewable energy sources. The approaches are oriented towards both short and long term innovation. (<http://www.electrohypem.eu>).

Technical accomplishment / progress / result

Novel chemically stabilised ionomers and hydrocarbon membranes and improved cost-effective electrocatalysts have been developed. These components are validated in a PEM electrolyser prototype. The stack is integrated in a system and assessed in terms of durability in the presence of current profiles simulating intermittent operation of a renewable power sources.

Contribution to the Programme Objectives:

OBJECTIVES OF THE CALL	OBJECTIVES OF THE PROJECT	CURRENT STATUS
Hydrogen production capacity > 1 Nm ³ /h	Rated capacity > 1 Nm ³ /h	Small laboratory prototypes tested
Efficiency of 75% (LHV)	Energy consumption < 4 kWh/Nm ³ H ₂ at 1 Nm ³ h ⁻¹	Voltage efficiency vs. thermoneutral potential 86% at 1 A cm ⁻²
Voltage increase < 15 μV/h at constant load	Voltage increase < 15 μV/h at 1 A cm ⁻²	Oxide supported catalysts with high resilience to corrosion prepared; N/A
Stack cost < 2.500 €/Nm ³ H ₂ in series production	Stack cost << 2.500 €/Nm ³ H ₂	Low cost membranes and low PGM content electrocatalysts produced; N/

Future Steps:

- 1 - Scaling-up of the newly develop components
- 2 - Validation of components in PEMWE Stacks and Systems in combination with RES.
- 3 - Dissemination of the project results
- 4 - Exploitation of the project results.

Conclusions, major findings and perspectives:

The project addresses the development of PEM electrolyzers based on innovative components for residential applications with the perspective of a suitable integration with renewable power sources. Promising results in terms of performance and durability have been achieved and preliminary tests on the stack/system and renewable power sources have been initiated.