REALHYFC

RELIABLE DURABLE HIGH POWER HYDROGEN FUELED PEM FUEL CELL STACK

Project ID	101111904
PRR 2024	Pillar 3 – H_2 end uses: transport
Call topic	HORIZON-JTI-CLEANH2-2022-03-01: Development and optimisation of reliable and versatile PEMFC stacks for high power range applications
Project total costs	EUR 3 487 157.50
FCH JU max. contribution	EUR 3 487 156.00
Project start - end	1.6.2023–31.5.2026
Coordinator	Commissariat a l'Énergie Atomique et aux Énergies Alternatives, France
Beneficiaries	AVL List GmbH, Deutsches Zentrum für Luft- und Raumfahrt EV, Dynergie, IRD Fuel Cells AS, PowerCell Sweden AB, United Motion Ideas, Univerza v Ljubljani, Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Wurttemberg

https://cordis.europa.eu/project/id/101111904

PROJECT AND GENERAL OBJECTIVES

The project's targeted key improvements are: (i) a new stable stack design, taking advantage of the two consolidated technologies with carbon and metal bipolar plates (from stationary and light-duty applications, respectively), coupled with improved balance of stacks, to hinder irreversible degradation of components; and (ii) optimised operational monitoring options precluding avoidable performance losses. SRIA solutions proposed will produce expected KPIs in terms of efficiency, performance and durability assessed in both representative conditions and scale.

In line with the Clean Hydrogen JU SRIA, RealHyFC will deliver evidence-based insights and models characterising the escalation of reversible and non-reversible losses attributed to critical characteristics of the heavy-duty use case:

- enhanced physical degradation of the core components (leading to irreversible losses), with significant risk of actual bipolar plate corrosion due to longer and harsher usage than in light-duty vehicles and stationary applications, respectively;
- increased local issues due to more significant heterogeneities associated with the large surface area needed to achieve a high power and coupled to driving cycles;
- more challenging control of operating conditions at the stack–system interface within acceptable boundaries for preventing faults and sustaining ultra-low degradation rates.

NON-QUANTITATIVE OBJECTIVES

- Identify performance and durability issues for heavy-duty transport applications;
- Develop model-based new diagnostic and monitoring tools with the aim of optimising hybridisation and operating strategies;
- Improve two key complementary items of the stack itself – use the best-suited bipolar plates to reduce corrosion risk, and optimise mechanical assembly to overcome heterogeneity issues to further enhance stack durability;
- Demonstrate performance and durability improvements in representative conditions at the stack scale;
- Ensure the exploitation of results and the increase of awareness of H2 for heavy-duty applications

PROGRESS AND MAIN ACHIEVEMENTS

- Manufacturing has starting using MEA components defined by the consortium.
- Relevant protocols and operating conditions for testing and modeling were considered so as to comply with the durability and control requirements.
- Degradation mechanisms related to core components and operating conditions have been modelled .
- The development of open-design carbon bipolar plates started.

FUTURE STEPS AND PLANS

- Delivery of MEAs and stacks, and assembly of reference stacks.
- Performance, sensitivity and durability testing based on selected protocols and definition of fuel cell diagnosis algorithms
- Modelling of stack performance and simulation of durability
- Manufacture of first open-design carbon bipolar plates.

PROJECT TARGETS

Target source	Parameter	Unit	Target	Target achieved?	SOA result achieved to date (by others)	Year for reported SOA result
AWP 2022	Degradation for a projected durability of 20 000 hours with fewer than 10 % losses	%	10		N/A	2024
	Power density	W/cm² at 0.675 V at BOL	1		1	2024

Clean Hydrogen Partnership
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