

FCH₂RAIL

FUEL CELL HYBRID POWERPACK FOR RAIL APPLICATIONS



Project ID	101006633
PRR 2025	Pillar 3 - H ₂ End Uses - Transport
Call Topic	FCH-01-7-2020
Project Total Costs	13 378 484.93
Clean H ₂ JU Max. Contribution	9 999 999.12
Project Period	01-01-2021 - 30-06-2025
Coordinator Beneficiary	DEUTSCHES ZENTRUM FÜR LUFT- UND RAUMFAHRT EV, DE
Beneficiaries	CONSTRUCCIONES Y AUXILIAR DE FERROCARRILES INVESTIGACION Y DESARROLLO SL, CAF DIGITAL and DESIGN SOLUTIONS SOCIEDAD ANONIMA, FAIVELEY TRANSPORT LEIPZIG GMBH and CO. KG, RENFE INGENIERIA Y MANTENIMIENTO SME, RENFE VIAJEROS SA, CENTRO DE ENSAYOS Y ANALISIS CETEST SL, CAF TURNKEY and ENGINEERING SOCIEDAD LIMITADA, CAF POWER and AUTOMATION SL, CENTRO NACIONAL DE EXPERIMENTACION DE TECNOLOGIAS DE HIDROGENO Y PILAS DE COMBUSTIBLE CONSORCIO, STEMMANN-TECHNIK GMBH, Renfe Operadora, TOYOTA MOTOR EUROPE NV, INFRAESTRUTURAS DE PORTUGAL SA, Construcciones y Auxiliar de Ferrocarriles S.A., ADMINISTRADOR DE INFRAESTRUTURAS FERROVIARIAS

<https://www.fch2rail.eu/en/projects/fch2rail>

PROJECT AND GENERAL OBJECTIVES

The project consortium is developing and testing a new train prototype. At the heart of the project is a hybrid, bimodal driving system that combines the advantages of an electrical power supply from an overhead line with a hybrid power pack consisting of fuel cells and batteries. This system enables more sustainable and energy-efficient rail transport. The project will show that this type of bimodal power pack is a competitive and environmentally friendly alternative to diesel power.

NON-QUANTITATIVE OBJECTIVES

An expert network with external stakeholders has been created to support the analysis of gaps in the normative framework. Network meetings were held in 2023 and the gap analysis was shared with and commented on by the WP7 network.

Exchanges and collaboration have taken place with other EU projects, including STASHH (standard-sized heavy-duty hydrogen), Virtual-FCH (virtual and physical platform for fuel cell system development), HyResponder (European hydrogen train-the-trainer programme for responders), and Rail4Earth (Europe's Rail Flagship Project 4 – sustainable and green rail systems), as well as national projects such as H2goesRail and H2BAR (use of hydrogen fuel cell drives in local transport in the Barnim district, operated with 100% renewable hydrogen).

PROGRESS, MAIN ACHIEVEMENTS AND RESULTS

- Fuel cell hybrid power pack (FCHPP) development and tests on a Centro Nacional del Hidrógeno test bench were successfully completed.
- The physical integration of two FCHPPs into the demonstrator train was successfully completed.
- The first static test of a FCHPP in a train was conducted.
- The dynamic testing of the demonstrator train on closed tracks was conducted.
- TRL7 authorisation was obtained for Spain's demonstrator system.
- The functioning of the first H₂-powered train was demonstrated on the Spanish railway network.
- The train demonstration was finalised in Madrid and Galicia.
- TRL7 authorisation for Portugal.
- More than 4 600 km were demonstrated in H₂ mode before the end of 2023.
- Train demonstration is ongoing on several lines in Spain.

FUTURE STEPS AND PLANS

- Demonstration of a bimodal train in Portugal.
- Receipt of theoretical track authorisation for Germany.

