Living laboratory demonstration of a complete pure hydrogen fuel cell cogeneration system

"Demonstration of a renewable H_2 power supply in a living laboratory environment, using a H_2 fuel cell cogeneration system with hydrogen generated by electrolysis from renewable energy."

The project „LivingH_2" aims for the **demonstration** of a complete solution of a **renewable hydrogen power supply** in a living laboratory environment, using a H_2 fuel cell cogeneration (H_2-FC-CHP) system. The consortium is widely positioned and characterized by a **French-German collaboration**. The development of pure H_2-CHP can drastically impact the energy sector between the years 2030 and 2050, as renewable hydrogen is an **essential solution** as an energy storage to increase the share of renewable energy within the energy sector. Pure H_2-FC-CHP could become a **CO_2 free** energy solution for buildings that should progressively replace existing natural based CHP solutions.

Project Duration
01.10.2019 - 31.03.2023

Project Budget
Total Budget: € 1.483.630

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Main objectives

- Development of an all-in-one solution for regenerative H_2 energy supply in a laboratory environment using domestic approved standards.
- Electricity and heat generation by the fuel cell cogeneration system for the utilisation within the building including photovoltaic, electrolyser and storage tanks.
- Operation with an odorized H_2 supply line by use of a micro-odorization station.
- Development of odorant resistant fuel cell membrane electrode assembly (MEA) by applying a textured catalyst layer.
- Techno-economic analysis of the all-in-one solution and comparison with alternative technologies.

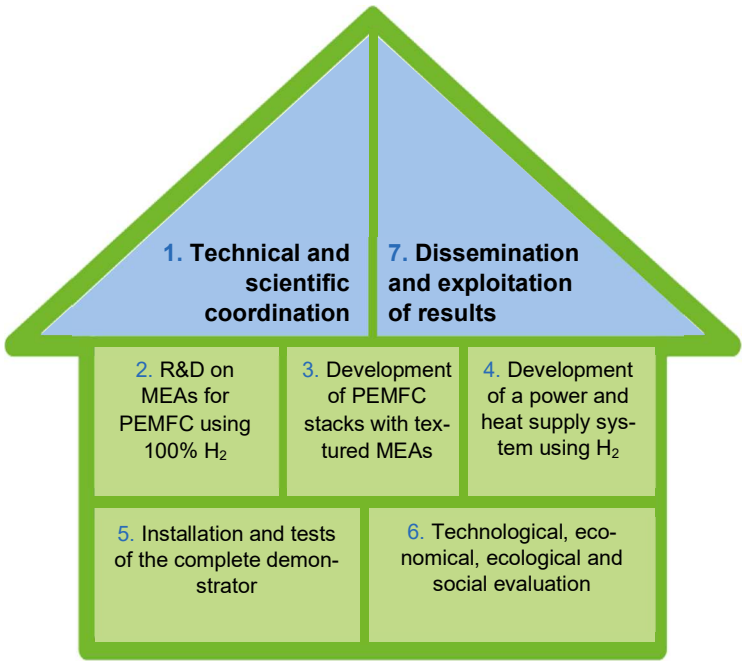
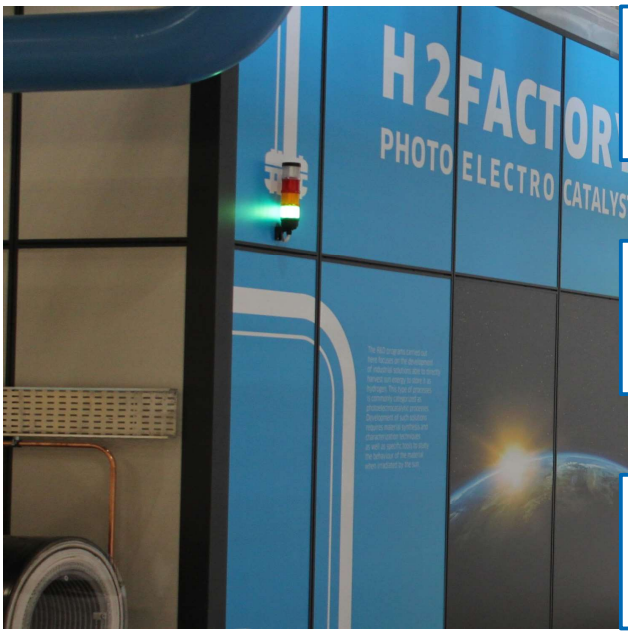


Fig. 1: Project structure of LivingH_2

Key innovation aspects



Improved fuel cell based CHP system with a new catalytic burner that works as the fuel cell off-gas burner and as peak load burner.

Improved PEM fuel cell membrane electrode assemblies (MEAs) to rise stability and lifetime for pure hydrogen operation.

Validation of a complete setup of a pure and renewable hydrogen CHP in a domestic and supervised environment to provide heat and power to a building.

Approach and results

- Fuel cell CHPs will be optimised for pure hydrogen operation through technological innovation.
- A complete, pipeline-based hydrogen supply system will be installed to be tested in a typical domestic environment, the “living lab”, including the production of renewable hydrogen, pipework installation in a building, odorization and a H_2 CHP.
- Finally, the solution will undergo a technical, economical, ecological and social assessment.

Project partners

ERIG · inhouse engineering · DBI Gruppe · ENGIE Lab CRIGEN · Living H2 · OTH Regensburg · cea

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