

“The HIGGS project will help decarbonising the European gas grid by clearing the pathway for the admixture of hydrogen.”

The HIGGS project aims to show that the safe **injection of hydrogen into the EU high pressure, transmission natural gas grid** is a sustainable and long-term solution to decarbonise the energy system.

Safeguarding the hydrogen injection, HIGGS is going to **identify remaining weaknesses** regarding H₂-Readiness and **develop a pathway** for a stepwise integration of hydrogen in the EU gas network.



Project Duration
01.01.2020 - 31.12.2022



Project Budget
Total Budget: € 2.107.672.-



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Main objective

The main objective of the HIGGS project is to discover the gaps of knowledge of the impact that high levels of hydrogen could have on the gas infrastructure, its components and its management. The main tasks within the project are:

- Mapping of technical, legal and regulatory barriers and enablers for up to 100% H₂ in the high-pressure gas grid
- Setting up and operating a testing platform reproducing all the components of a high-pressure network
- Testing and evaluating different accessories, appliances and innovations for various H₂/CH₄ admixtures
- Techno-economic modelling for H₂/CH₄ admixtures within the high-pressure gas grid and equipment

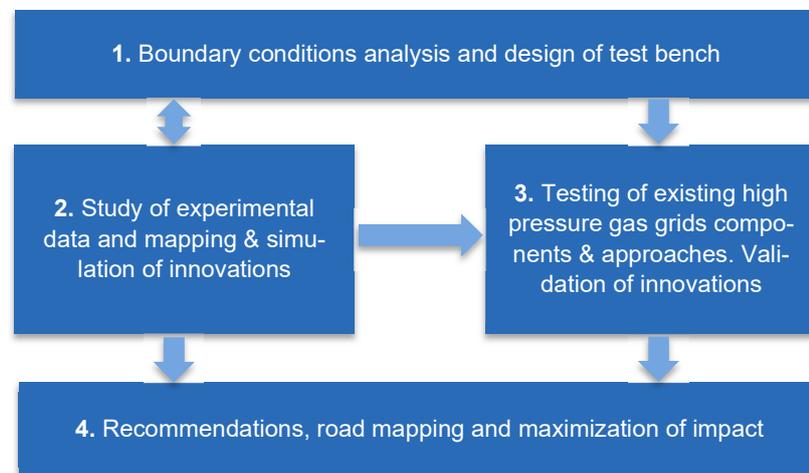


Figure 1: Main elements and outcome of the project

Expected main results

The main findings and assessments compiled in the project will be merged in the form of a document that describes a pathway to enable higher concentrations of hydrogen in the natural gas transmission grid. This pathway, among others, will include a list of potential issues, barriers and facilitators for transport and interoperability in the gas grids, proposals on regulations codes and standards, a summary of the recommendations for admixture and injection facilities as well as for the gas market and operation considerations.

Mapping of key aspects

In order to achieve the envisioned goals, the HIGGS project team collects information on various key aspects regarding the integration of hydrogen in the high-pressure EU gas grid. Special emphasis is set on legal, regulatory and technical aspects by mapping the present equipment, as well as regulations, standards and certification (RSC) of the natural gas grids. The identification of the most critical RSC bottlenecks will not only enable end users and operators to operate the entire gas grid safely but also help to avoid the replacement of fully operable equipment and appliances due to rising hydrogen concentrations in the gas grid.



Figure 2: Whole overview of HIGGS R&D experimental platform at FHa, Spain

Systematic and experimental evaluation

Adding hydrogen into the natural gas grid raises concerns on safety with respect to potential materials deterioration and embrittlement. The HIGGS project is going to target this issue by mapping the existing materials used in the gas networks, defining a test protocol to study them and finally provide recommendations for those materials to be used in high pressure hydrogen mixtures.

These required tests on materials and the impact of transporting high hydrogen amounts in the transmission gas grids, the HIGGS team designed an experimental platform, being in operation since 2021. The site comprises an injection platform, creating the different H₂ flows with various compositions, and a testing loop designed for operation pressures up to 80 bar. The testing loop includes the main components needed to recreate the operational environment of a high-pressure gas grid and a hydrogen purification prototype that is based on membrane technology for the separation of H₂ and CH₄.

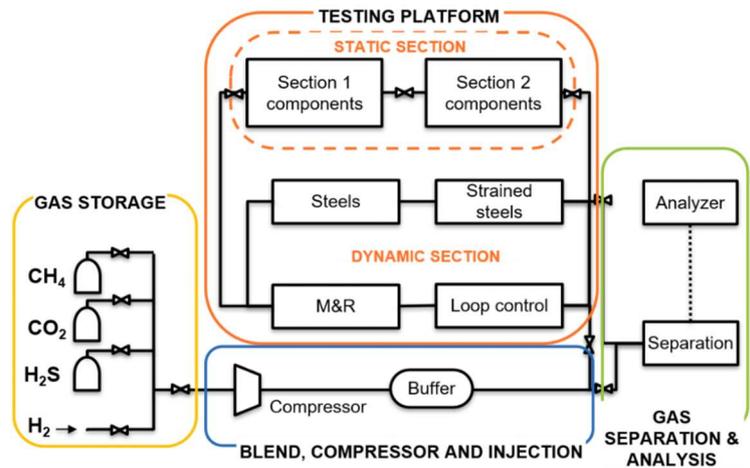


Figure 3: P&ID Scheme of the HIGGS Research and development

Project partners



About the Fuel Cells and Hydrogen Joint Undertaking | www.fch.europa.eu/

The Fuel Cells and Hydrogen Joint Undertaking (FCH JU) is a unique public private partnership supporting research, technological development and demonstration (RTD) activities in fuel cell and hydrogen energy technologies in Europe. Its aim is to accelerate the market introduction of these technologies, realising their potential as an instrument in achieving a carbon-clean energy system. The three members of the FCH JU are the European Commission, fuel cell and hydrogen industries represented by Hydrogen Europe and the research community represented by Hydrogen Europe Research.



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