A systematic validation approach at various admixture levels into high pressure grids

HIGGS
Hydrogen in Gas Grids

"The HIGGS project will help decarbonise 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, long-term solution to decarbonise the energy system.
To enable the power of Hydrogen HIGGS is going to **identify remaining weaknesses** regarding H_2-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 cover 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:

- Mapping of technical, legal and regulatory barriers and enablers for up to 100% H_2 in the high-pressure grid
- Set up and operate a research and development platform reproducing all the components of a high-pressure network
- Testing and validating different accessories, appliances and innovations for various H_2/CH_4 admixtures
- Techno-economic modelling for H_2/CH_4 admixtures within the high-pressure grid and equipment

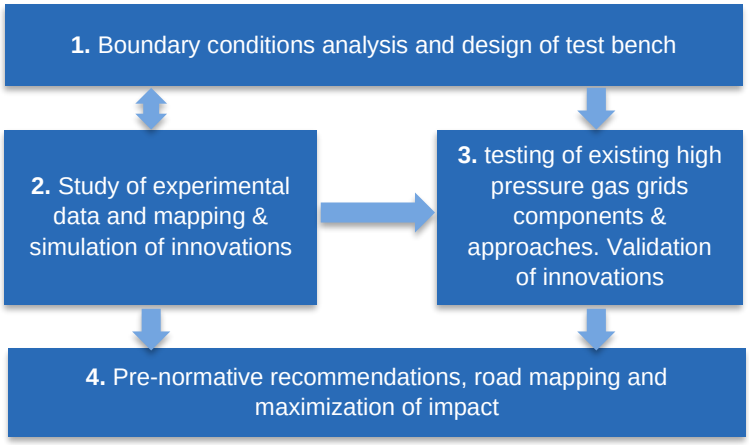

Figure 1: Main elements and outcome of the project

Expected main results

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

Mapping of Key Aspects

In order to achieve the set goals, the HIGGS project team is collection information on various key aspects regarding the integration of hydrogen in the high-pressure EU gas grid. Special emphasis is put on taking up 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 work the entire gas grid safely but also help to prevent the replacement of fully operable equipment and appliances due to rising hydrogen concentrations in the gas grid.

Systematic and experimental validation

The biggest concern for safety when admixing hydrogen into the natural gas grid is related to materials detrition and embrittlement. The HIGGS project is going to target this issue by mapping the existing materials used in the gas networks, defining a laboratory test protocol to study them and finally provide recommendations for those materials to be used in high pressure hydrogen mixtures.

To be able to carry out those tests on materials and the impact of transporting high amounts of hydrogen through the gas grid the HIGGS team is designing an experimental R&D platform that will be built in 2021. The site is composed of an injection platform that recreates the different flows of H_2 with various compositions, a testing loop that is designed to work up to 80 bar and 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 H_2 and CH_4. The P&ID Scheme of the platform is shown in Figure 2.

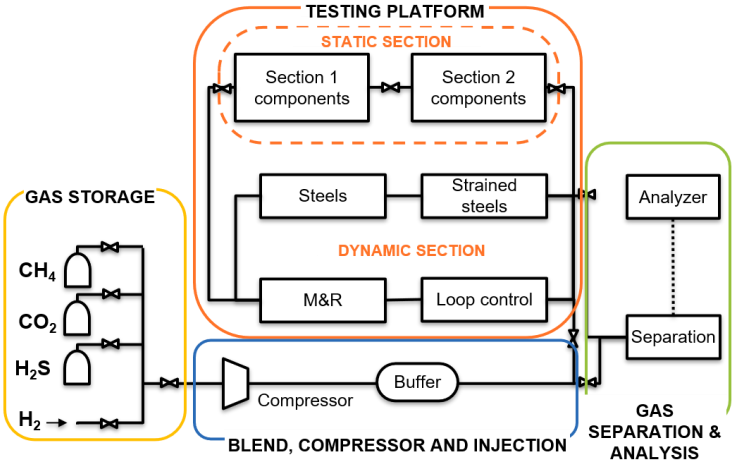

Figure 2: P&ID Scheme of the HIGGS Research and development platform

Project Partners

HIGGS Hydrogen in Gas Grids

FOUNDATION FOR THE DEVELOPMENT OF NEW HYDROGEN TECHNOLOGIES IN ARAGON

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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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