



# Hydrogen in Gas Grids

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

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## Document for Press and Media

**Date**

07 December 2020



This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 875091 'HIGGS'. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe research.

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# 1 Objective

The objective of this document is to compile information about the HIGGS project, rules for communication and general information that shall be useful for media and press to cover the developments and milestones of the project. The document is divided in several sections providing answers and information about the most critical concepts related to the project. It is part of the official press kit of HIGGS and will be updated throughout the duration of the project. The latest version of this document is available on the project Website [www.higgsproject.eu](http://www.higgsproject.eu).

## 2 General Rules

HIGGS dissemination activities, under grant agreement No 875091, have to follow some general rules which are detailed below. The partners must promote the project and its results, but always under the obligations agreed with the programme office.

Any communication activity related to the project, including electronic form must

a) Display the JU logo

- Logo is included below and separately within this press kit
- Further information on usage: [https://ec.europa.eu/info/resources-partners/european-commission-visual-identity\\_en](https://ec.europa.eu/info/resources-partners/european-commission-visual-identity_en)

b) Display the EU emblem (included below and separately within the press kit)

- Logo is included below and separately within this press kit
- Further information on usage: <https://www.fch.europa.eu/sites/default/files/FCH%20JU%20branding%20guide-3.pdf>

c) The following text:

“This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 875091 ‘HIGGS’. This Joint Undertaking receives support from the European Union’s Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe research.”



Figure 1: EU Flag



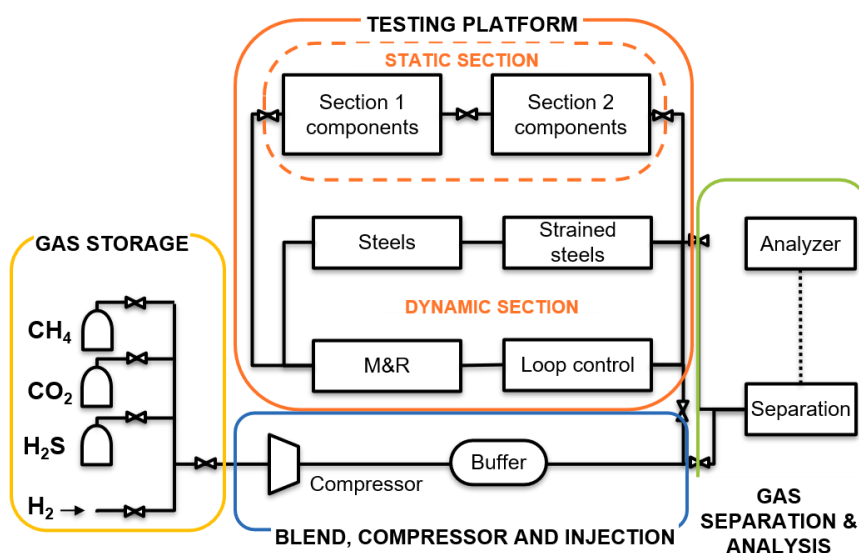
Figure 2: FCH JU Logo (colour version)

### 3 Project descriptions and goals

Hydrogen is considered as one of the key actors when it comes to linking energy sectors and providing large scale storage options. It is able to absorb the excess of renewable electricity production and provide flexibility to the electricity grid. Therefore, by decarbonising the existing gas grid a wider penetration of renewable source will be available. In consequence the acceptance of Hydrogen in the natural gas infrastructure is elementary to elevate its full potential. This is why the main objective of the HIGGS is 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.

In order to achieve this goal the HIGGS project team will tackle various key aspects during this three-year project (duration: 2020-2023). First of all the HIGGS team is going to take 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.

On a more practical side the HIGGS project will examine the impact of transporting high amounts of hydrogen through the gas grid by designing and building an experimental R&D platform at the facilities of FHA in Spain (see Figure 3 for P&ID Scheme). The Platform will include the usual components and materials of gas pipelines and is designed to work at 80 bar (g) with various hydrogen admixture levels up to 100%. The project will be able to recreate the injection of different flows of electrolytic  $H_2$  into a natural gas grid as well as to test its components. A hydrogen purification prototype based on membrane technology is also included in the design to separate  $H_2/CH_4$  for end-use applications.

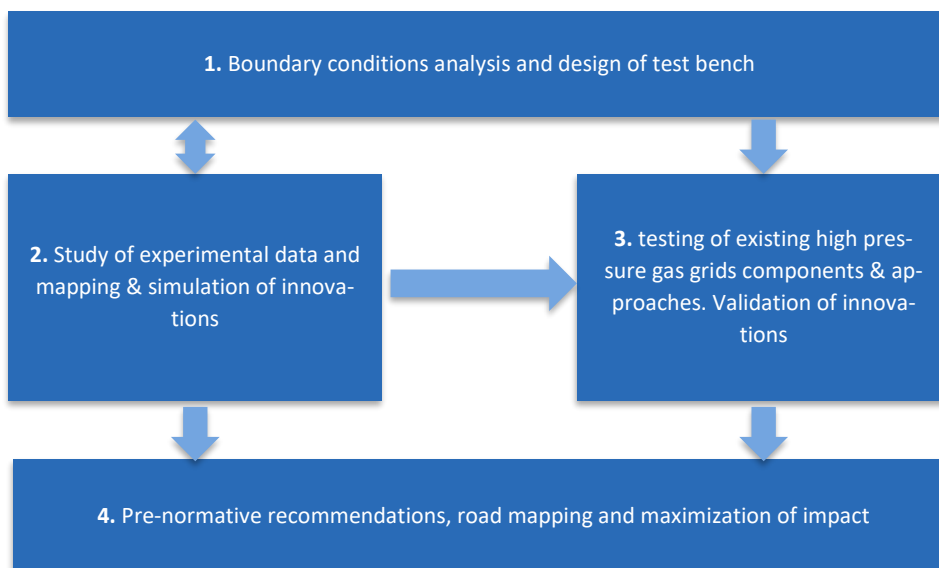


**Figure 3: P&ID Scheme of the HIGGS Hydrogen Research and Development Platform**

The biggest concern for safety when admixing hydrogen into the natural gas grid is related to materials deterioration and embrittlement, especially when hydrogen is present for long periods and at high concentrations and pressures. 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.

The impact of higher  $H_2$  levels on the economics of the gas transport value chain will be assessed in the project, considering gas producers, transport companies up to delivery to the gas distribution networks. A techno-economic model will be built for representative cases in Europe simulating the grid behaviour. The model will allow analysis of how different technological choices in adapting the grid to higher  $H_2$  levels as well as how operational strategies for the future grid with hydrogen injection impact the value chain economics. Sector coupling shall also be considered in the model.

All the work done within the project will contribute to the description of a pathway towards integrating hydrogen in the EU gas networks. Figure 4 shows the relation and interaction between the different main tasks within the project.



**Figure 4: HIGGS Project structure**

The final description of a pathway towards integrating hydrogen in the EU gas networks will not only summarise recommendations for admixture and injection facilities as well as for RSC aspects but also point out potential issues, barriers and facilitators for cross-border and interoperability in the gas grids.

## 4 Project partners: the consortium

The HIGGS project is carried out by a multi-disciplinary consortium, well-balanced and with complementary expertise, which aim at achieving the project objectives. A further description of the individual partners of the Consortium, coordinated by FHA, is given below.

### **Fundación para el Desarrollo de las Nuevas Tecnologías del Hidrógeno en Aragón (Spain)**

Promoted by the Government of Aragon it was founded in 2003 with the support of the administration, industry and the main society actors from different sectors of activity.

With the support of the 70 board members, the Foundation works day by day for the development of new hydrogen technologies integrated with renewable energies and the promotion of Aragon's involvement in economic activities relating to the use of hydrogen as an energy vector.



FOUNDATION FOR THE  
DEVELOPMENT OF NEW  
HYDROGEN TECHNOLOGIES  
IN ARAGON

Figure 5: Logo FHA

The mission of the Foundation is to carry out the organization, management and execution of a wide range of actions with the purpose of generating, storing and transporting hydrogen, for its use in fuel cells, in transport applications or for the generation of distributed energy. In this way it aims to foment research, technological development, cogeneration and industrial adaptation, contributing to industrial modernization and improved competitiveness.

Website: [www.hidrogenoaragon.org/es/](http://www.hidrogenoaragon.org/es/)

### **Deutscher Verein des Gas- und Wasserfaches e.V. (Germany)**

The DVGW - German Technical and Scientific Association for Gas and Water has been working for the gas and water industry as an independent and unbiased technical scientific association since 1859, the objective being to create a basis for the safe and technologically flawless supply of gas and water. It is the reference German institution for the development of technical rules, the associated pre-normative research and certification of gas and water related appliances. Regulations merely constitute the basis of the services the DVGW has to offer its members. The practical work in the gas and water sector is based on the technical rules of DVGW. The association has excellent laboratories for the testing of gas related processes, an unbiased view on renewable gases, power to gas and related technologies.



Figure 6: Logo DVGW

Website: [www.dvgw.de](http://www.dvgw.de)

### **Redexis Gas (Spain)**

Redexis is an integrated energy infrastructure company that is active in the development and operation of networks for the transmission and distribution of natural gas, the distribution and sale of liquefied petroleum gas and the promotion of new gas-powered mobility infrastructure, renewable gas and hydrogen. With 680,512 connection points, Redexis operates 10,498 kilometers across ten autonomous communities, providing Spanish homes, businesses and industries with access to new, more sustainable and efficient energy sources.



Figure 7: Logo Redexis

Website: [www.redexisgas.es/](http://www.redexisgas.es/)

### **Hochschule für Technik Rapperswil (Switzerland)**

HSR is the University of Applied Sciences in Rapperswil and it is dedicated to higher education and applied research and development. HSR educates around 1600 students in eight Bachelor's and ten Master of Science in Engineering (MSE) programmes.



Figure 8: Logo HSR

The Institute for Energy Technology IET is one of 16 applied research and development providers at HSR.

IET's core competences lie in the power-to-gas technology and it is the leading Swiss research institution for applied power-to-gas topics. The IET leads national and international projects, it offers consultancy services for the local industry and it operates a 25 kW pilot and demonstration plant including methanation and grid integration.

Website: [www.iet.hsr.ch/power-to-gas](http://www.iet.hsr.ch/power-to-gas)

### **Tecnalia (Spain)**

TECNALIA is a benchmark research and technological development centre in Europe; with 1,400 experts from 30 different nationalities, focusing on transforming technology into GDP to improve people's quality of life, by creating business opportunities for companies. Its main scopes of action are: digital transformation, advanced manufacturing, energy transition, sustainable mobility, urban ecosystem and health.



Figure 9: Logo Tecnalia

Website: <https://www.tecnalia.com/en/>



## **European Research Institut for Gas and Energy Innovation (Belgium)**

In 2015 seven leading European technical and scientific organizations established a network to foster the role of gas and innovative gas technologies in the future energy system: ERIG – European Research Institute for Gas and Energy Innovation.



**Figure 10: Logo ERIG**

ERIG is a new European research and development network that will guide gas in the transition process towards a future renewable based energy system. It is a non-profit network for European cooperation in research and innovation in the field of sustainable and innovative gas technologies and the use of natural gas with renewable energies.

ERIG members represent national technical and scientific gas organizations and associations that represent in particular the new requirements of energy and gas in Northern/Western Europe.

The research portfolio of ERIG members covers all aspects from the production of gas through to gas utilization in different markets.

Website: [www.erig.eu](http://www.erig.eu)

## 5 The FCH JU and H2020 programme

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. Fuel cells, as an efficient conversion technology, and hydrogen, as a clean energy carrier, have a great potential to help fight carbon dioxide emissions, to reduce dependence on hydrocarbons and to contribute to economic growth. The objective of the FCH JU is to bring these benefits to Europeans through a concentrated effort from all sectors. 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. [1]

Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. It is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market. [2]

## Bibliography and References

- [1] “FCH JU Europe,” [Online]. Available: <https://www.fch.europa.eu/page/who-we-are>. [Accessed 08 12 2020].
- [2] “Horizon 2020,” [Online]. Available: <https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>. [Accessed 08 12 2020].