

# HIGGS

## HYDROGEN IN GAS GRIDS: A SYSTEMATIC VALIDATION APPROACH AT VARIOUS ADMIXTURE LEVELS INTO HIGH-PRESSURE GRIDS



Project ID	875091
PRR 2024	Pillar 2 – H <sub>2</sub> storage and distribution
Call topic	FCH-02-5-2019: Systematic validation of the ability to inject hydrogen at various admixture level into high-pressure gas networks in operational conditions
Project total cost	EUR 2 107 672.50
Clean H <sub>2</sub> JU max. contribution	EUR 2 107 672.50
Project period	1.1.2020–31.12.2023
Coordinator	Fundación para el Desarrollo de las Nuevas Tecnologías del Hidrógeno en Aragón, Spain
Beneficiaries	Deutscher Verein des Gas- und Wasserfaches – Technisch-Wissenschaftlicher Verein EV, European Research Institute for Gas and Energy Innovation, Fundacion Tecnalia Research and Innovation, OST – Ostschweizer Fachhochschule, Redexis SA

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### PROJECT AND GENERAL OBJECTIVES

HIGGS aimed to fill in the gaps in knowledge of the impact that high levels of hydrogen could have on high-pressure natural gas infrastructure, its components and its management. To reach this goal, the project has developed a mapping of technical, legal and regulatory barriers and enablers; tested materials/components; completed techno-economic modelling; and finally concluded preparing a set of conclusions as a pathway towards enabling the injection of hydrogen into high-pressure gas grids.

### NON-QUANTITATIVE OBJECTIVES

- Compile recommendations for regulations, codes and standards according to current and future regulation/standardisation.
- Forge a pathway for the stepwise integration of hydrogen into the EU gas network, to improve the potential of hydrogen injection by 2030 and 2050.
- Create a techno-economic model and study of the roles of technologies for integrating H<sub>2</sub>/CH<sub>4</sub> and sector coupling at the EU level.

### PROGRESS AND MAIN ACHIEVEMENTS

- The testing platform has enabled dynamic and static tests to be carried out with blends of 20 mol % H<sub>2</sub>, 30 mol % H<sub>2</sub> and 100 % H<sub>2</sub>.
- The project has adopted the techno-economic model, and several scenarios have been modelled.

- A system has been created for separating low concentrations of hydrogen in natural gas. The experimental campaign with the gas separation prototype was successful.
- The gas tightness of valves of different natures and joints has been proved for hydrogen blends and 100 % hydrogen. The equipment of the gas grid behaved the same way as when natural gas was transported.
- The tested carbon steels showed no signs of embrittlement due to hydrogen exposure.
- A complete set of findings has been provided to predict what will be expected from gas grids until 2050.

### FUTURE STEPS AND PLANS

The project has finished.



### PROJECT TARGETS

Target source	Parameter	Unit	Target	Target achieved?
Project's own objectives	Blending percentage of H <sub>2</sub> compatible with existing gas transmission networks	%	100	
	Readiness of gas transmission networks for H <sub>2</sub> distribution	%	Complete inventory	✓
	Techno-economic approach to grid repurposing	%	Model scenarios	