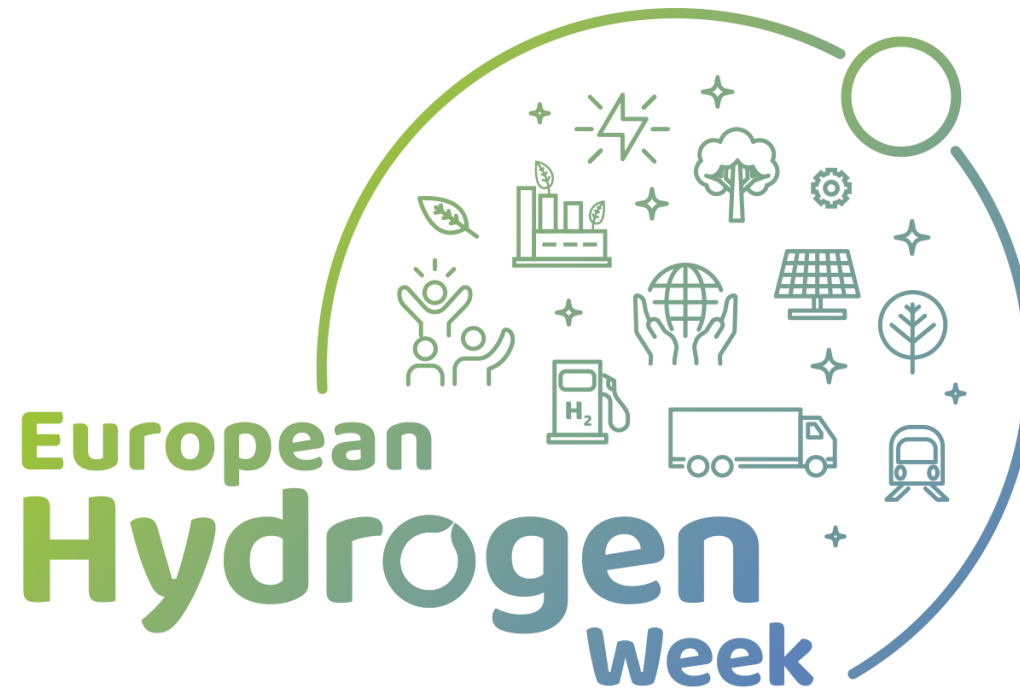


# HIGGS

Hydrogen In Gas GridS: a systematic validation approach at various admixture levels into  
high pressure grids



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#EUResearchDays  
#PRD2022  
#CleanHydrogen

# Project Overview

**Call year:**  
**2019**

**Call topic:**  
Systematic  
validation of the  
ability to inject  
hydrogen at various  
admixture level  
into high-pressure  
gas networks in  
operational  
conditions - H2020  
HORIZON FCH 02-5-  
2019

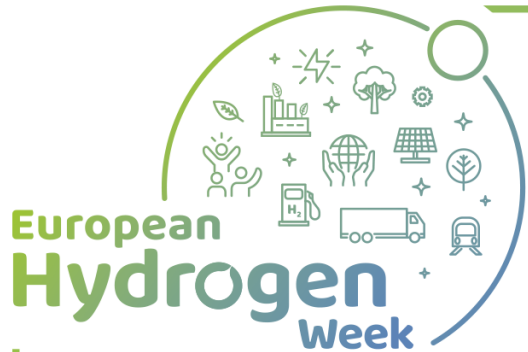
**Project dates:**  
**2020-2023**

**Total project budget:**  
**2,107,672.50 €**

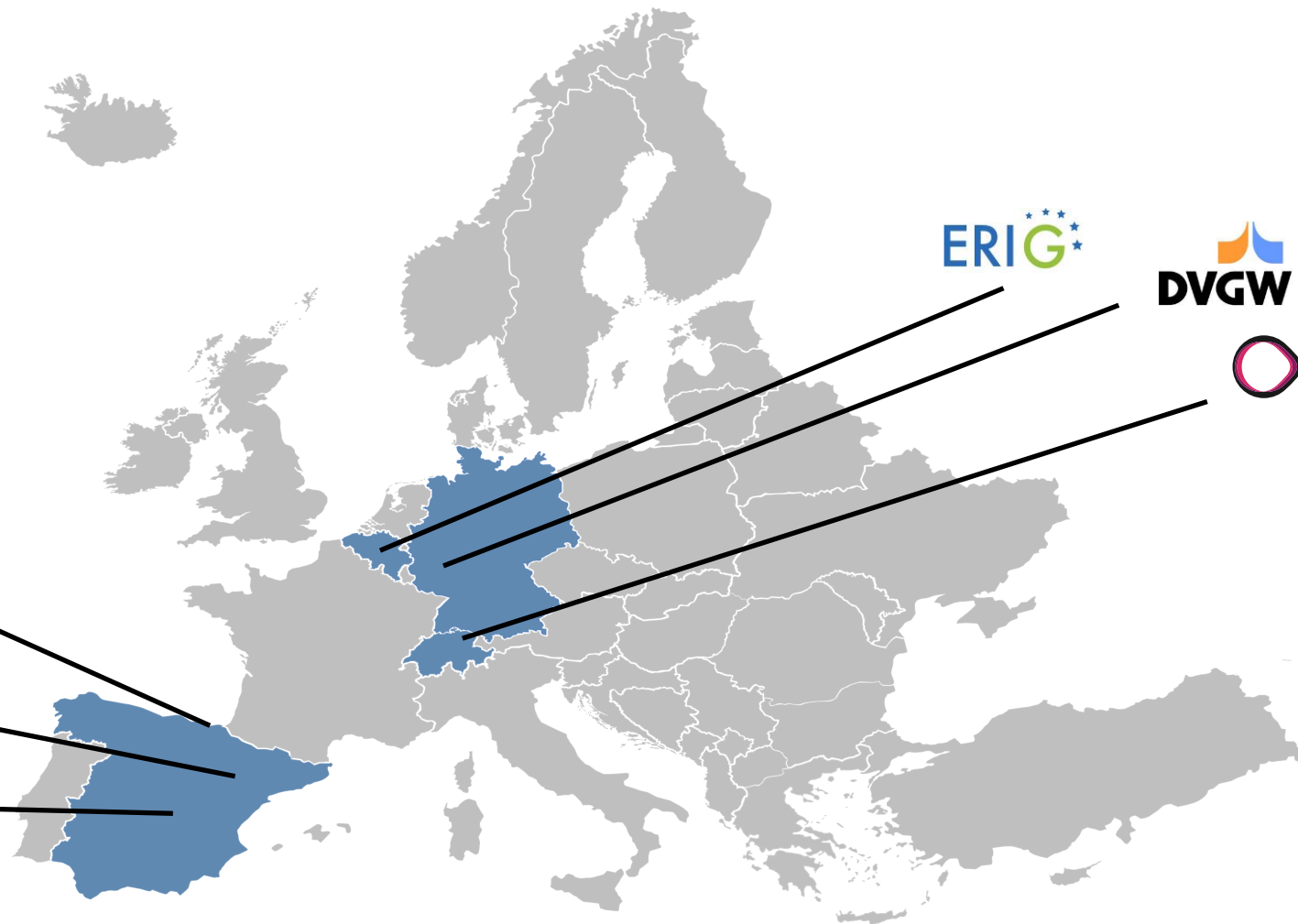
**HIGGS**

**% stage of implementation**  
**01/11/2019: 75 %**

**Clean Hydrogen Partnership max.**  
**contribution: 2,107,672.50€**  
**Other financial contribution: 0 €**



# Partners



ERI G

DVGW

OST  
Ostschweizer  
Fachhochschule

tecnal:a  
MEMBER OF BASQUE RESEARCH  
& TECHNOLOGY ALLIANCE

Ha  
FUNDACIÓN PARA EL  
DESARROLLO DE LAS NUEVAS  
TECNOLOGÍAS DEL HIDRÓGENO  
EN ARAGÓN

Redexis



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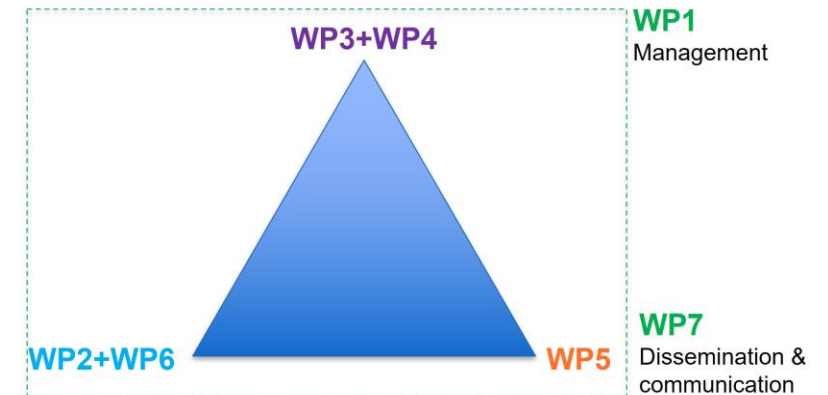
# Project Summary

## Goal

HIGGS project aims to pave the way to **decarbonisation of the gas grid** and its usage, by **covering the gaps of knowledge of the impact** that high levels of hydrogen could have on the **gas infrastructure**, its components and its management.

## Specific objectives

- Mapping of technical, legal and regulatory barriers and enablers
  - Testing and validation of systems and innovation
  - Techno-economic modelling to develop operation strategies
- ➔ Defining a set of conclusions as a pathway towards enabling the injection of hydrogen in high-pressure gas grids



# Experimental testing campaign on tightness

## Progress/Actions - Completion



Achievement to-date

0% completed

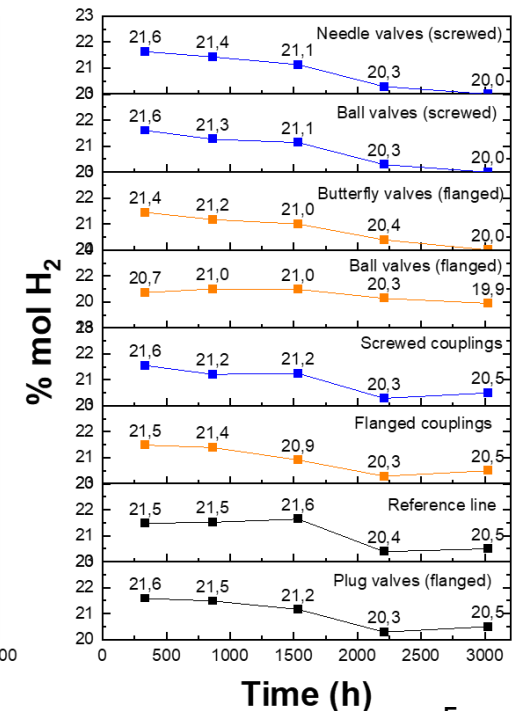
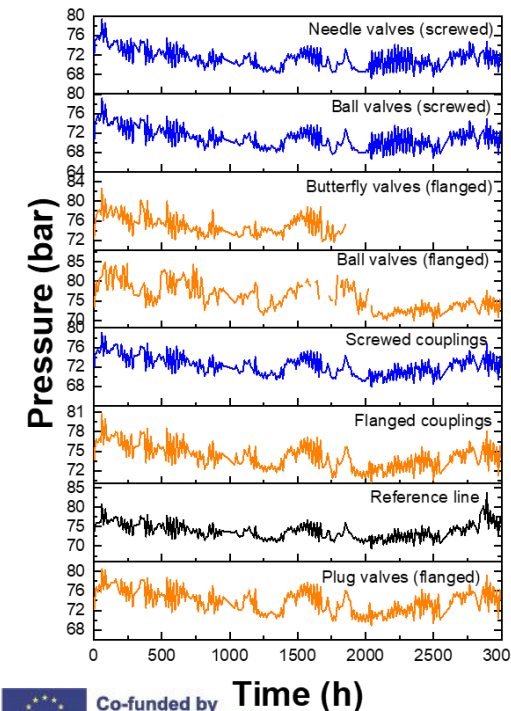


20% H<sub>2</sub>

30% H<sub>2</sub> + impurities

## Results for first experimental campaign

- No critical pressure losses:  $76.7 \pm 4.5$  bar
- Oscillation in H<sub>2</sub> concentration < 1% mol
- Max. average leakage rate of hydrogen 1 Nml·h<sup>-1</sup> per valve.



# Experimental testing campaign on components Progress/Actions - Completion



Achievement to-date

0% completed



60 %  
completed

20% $H_2$

30% $H_2$  + impurities

20% $H_2$  + impurities

100% $H_2$

## Results for first experimental campaign

- No cracks on C-ring or 4pb specimens
- Crack propagation <0.25 mm in CT-Wol specimens
- No cracks or other sign of damage in filter, regulator or valves (seals, membranes, body, etc.)





# Experimental testing campaign on gas separation

## Progress/Actions - Completion



Achievement to-date

0% completed

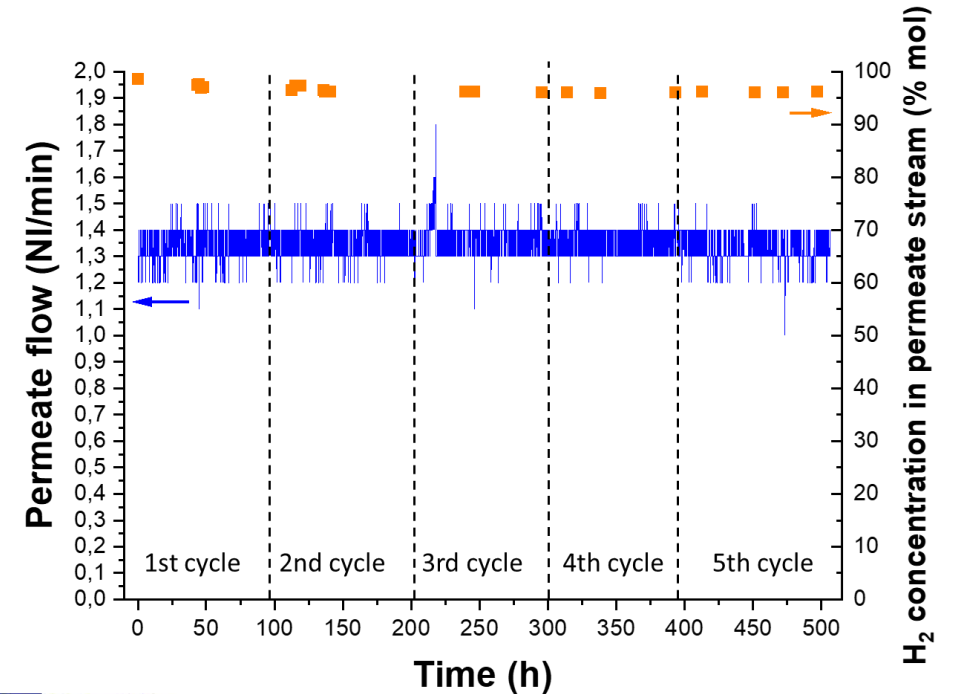


20%H<sub>2</sub>

100 %  
completed

### Main achievements

- Feed stream @ 80 bar
- Stable gas separation performance for at least 500h proved
- High H<sub>2</sub> recovery achieved



# Risks, Challenges and Lessons Learned

## Lack of information on the European high-pressure gas grid

- TSOs did not send the information or were not willing to contribute either due to own projects or sorrows on the confidentiality

## Delay in assembly and maintenance intervals of the R&D platform

- Modification of the testing campaign and need for project extension
- Failure in gas booster of the testing platform reported in HELLEN

## RCS and hydrogen strategies incomplete

- High dynamic process in Europe and member countries
- Gathering data in due time was very difficult or even impossible

## Acquisition of network data for simulations

- Simplification of the model were necessary
- There is no standardized method for such tasks and it is very difficult to obtain solid data from TSOs



# Exploitation Plan/Expected Impact

## Exploitation

- 6 KERs identified in HIGGS of different nature (experimental results, recommendations, modelling results, etc.)
- Horizon Results Booster module C assisting
- Exploitation webinar involving the EAB planned for the end of the year
- Business model will be tackled in 2023

## Impact

Name of the Result	Expected time to impact	Target Group	Market maturity
Testing Platform	1-5 years	Policy-makers and authorities, international Standardisation Bodies Innovators	Emerging: Growing demand and few offerings
System for separation of low concentration of hydrogen in natural gas	1-5 years	Industry/Business Partners	Emerging: Growing demand and few offerings
Design of injection sites	1-5 years	Industry/Business Partners	Emerging: Growing demand and few offerings
Recommendations on codes, standards adaption	1-5 years	Policy-makers and authorities, international	-
Recommendations and inventory list for adaptations of the gas grid	1-5 years	Industry/Business Partners	-
Adapted techno-economic models to include innovations and considerations for H2 admixtures	1-5 years	Policy-makers and authorities, international )	-

# Dissemination Activities

## What happened so far:

- Over 30 conferences, workshops, and events have been attended
- EGERID Conference included a whole HIGGS day (17<sup>th</sup> of November 2021)
  - “H<sub>2</sub> tolerance of the gas infrastructure”
- D2.3 - Hydrogen compatibility in high-pressure grids: technical, RCS barriers, enablers, and innovations
- D5.1 - Baseline, assumptions and scope for techno-economic modelling of hydrogen admixture into the gas grid

## What is planned in 2022/2023:

- Showcase Event at the demo-site of HIGGS
- Workshops and a final Conference
- Participation/Contribution at further events

## HIGGS Online Presence:

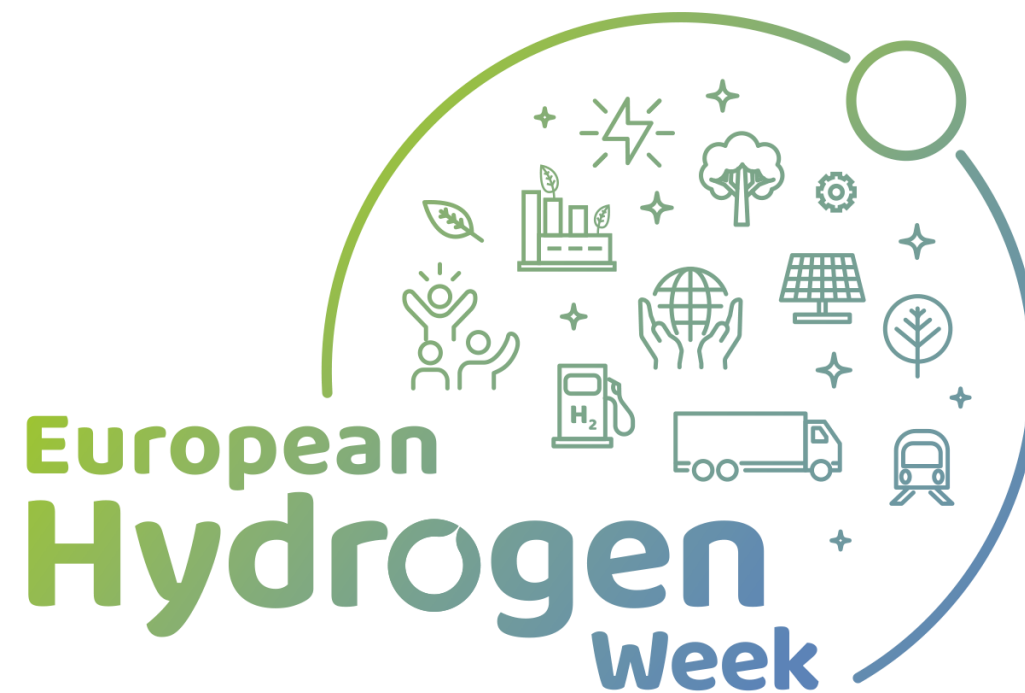
- Project Homepage: <https://www.higgsproject.eu>
- [LinkedIn](#)





# THANKS FOR YOUR ATTENTION!





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