

Newsletter

Pre-normative research on integrity assessment protocols of gas pipes repurposed to hydrogen and mitigation guidelines



As we come to the end of the year, we reflect on the progress achieved within the PilgrHYm project and are inspired by the dedication and engagement of each PilgrHYmer.

Below, you will find key updates from across the PilgrHYm project. We encourage you to stay engaged as we move into the coming year.

The PilgrHYm consortium wishes you all a restful end of the year and a happy, healthy, and prosperous New Year.

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University of Burgos: Activities and Achievements within the PilgrHym Project

The University of Burgos (UBU) has been actively involved in WP3 and WP4 during this year. The experimental activities in WP3 focused on the participation in the round robin test in order to validate the procedures. In addition, fracture and tensile testing has been started for two steels that representative of the European grid for gas transport.

UBU has led the Task 4.3 within the work package 4, focused on the development of innovative numerical models. This specific task has the aim of building and validating a model to predict hydrogen-assisted fracture. Different codes and subroutines have been developed in the commercial finite element software ABAQUS.

The innovation and main contribution of the model development in WP4 lies in the consideration of both ductile and brittle modes of failure for steels. The developed fracture model has also been coupled to hydrogen diffusion and trapping processes, which is crucial to obtain predictive digital tools.

UBU hosted and organised the **4th General Consortium Meeting**, the **EEAB Meeting**, and the **General Assembly**, held on **March 17–18th**. During the two-day event, partners had the opportunity to review the project's scientific and technical progress, coordinate upcoming activities, and strengthen collaboration among the consortium.



PilgrHym



As part of its dissemination activities, the **UBU** has highlighted the **PilgrHym project** on a banner showcasing the different hydrogen-related research initiatives in which the university is involved. This banner is currently displayed at the **H2 Laboratory**, contributing to the project's visibility within the university's research environment (see banner on the right).

Moreover, **training** and **capacity building** remain essential pillars for fostering the future hydrogen economy. The University of Burgos actively contributes to this goal through its **Master's Degree in Hydrogen Technologies**, which provides advanced training to students and professionals entering the sector. This year, UBU has also expanded its educational outreach by offering **Microcredentials on "Introduction to Hydrogen"** and specialized **Hydrogen Safety courses for Vocational Education and Training (VET) students**, preparing the next generation of technicians and specialists in safe and efficient hydrogen handling.

At the **international level**, UBU strengthened its role in high-level hydrogen education through the participation of **Prof. Andrés Díaz Portugal** in the **International Summer School on Hydrogen Embrittlement**, held at the **Norwegian University of Science and Technology (NTNU)** in Trondheim, Norway (June 23–27, 2025). His contribution focused on **H₂ transport phenomena** and **H₂ transport modelling**, reinforcing the university's expertise and visibility in advanced hydrogen research and training.

In a more **informal outreach format**, UBU also promoted hydrogen awareness among the general public through its participation in **Pint of Science**, where our colleague **Víctor Arniella** delivered the talk "Can engineering solve the hydrogen challenge?", helping bring hydrogen science closer to society.

Finally, UBU celebrates a major milestone: the **H2Lab** has become the **first laboratory in Spain accredited by ENAC** to perform **hydrogen embrittlement testing** according to **ASTM G142** (UBU News, July 23, 2025). This achievement strengthens UBU's leadership in hydrogen-materials interaction research and supports several national and European projects.

UNIVERSIDAD DE BURGOS

Grupo de Integración Estructural
IE
 Universidad de Burgos



 H₂ Lab | University of Burgos
 Hydrogen Technology Research Laboratory

ESTUDIO DEL COMPORTAMIENTO DE MATERIALES PARA EL TRANSPORTE DE HIDRÓGENO POR LA RED DE GAS



Introducción
 El uso de la actual infraestructura de la red de gas para el transporte de hidrógeno, desde los centros de producción hasta los puntos de consumo, representa una atractiva y rentable alternativa para alcanzar los objetivos de descarbonización fijados por la UE. El hidrógeno puede transportarse por la red de gas en forma de mezcla con el gas natural en diferentes proporciones (*blending*) o también puede plantearse la utilización de determinadas conducciones para el transporte de hidrógeno puro (*repurposing*). Uno de los principales retos para la reutilización de la red de gas está relacionado con el conocimiento de la susceptibilidad del acero de las tuberías a la fragilización por hidrógeno y el desarrollo de modelos fiables de predicción de su degradación a lo largo del tiempo.

Objetivos
 El objetivo principal de esta línea de investigación es evaluar la viabilidad y predecir la susceptibilidad a la fragilización por H₂ de los aceros de la red de gas, para el transporte seguro de hidrógeno a presión en diferentes condiciones de mezclas con gas natural y para el 100% de hidrógeno, así como analizar un método de mitigación adecuado para reducir el nivel de fragilización del material.




Detalle de países y redes del EHB. Fuente: ehb.eu

Mapa de infraestructuras de la red de gas más importantes de nuestro país (Fuente: EHB/GAS)

Líneas de trabajo

- Estudio experimental de la susceptibilidad a la fragilización por H₂ de los aceros de la red de gas, para diferentes mezclas de H₂ y gas natural (hasta 20%). *Blending*
- Evaluar la viabilidad de los aceros de la red de gas para el transporte del 100% de H₂. *Repurposing*
- Desarrollo de modelos numéricos para la simulación de la permeación, difusión y fragilización por H₂ en los aceros de la red de gas, y que permita predecir su comportamiento en función de la presión y contenido de H₂ en la mezcla.
- Estudiar técnicas de mitigación de la entrada de hidrógeno en el material, mediante la aplicación de capas protectoras a base de resinas epoxi, y estudiar su efecto en la cinética de difusión y en la fragilización del material.

Proyectos de investigación vinculados y entidades participantes

PRE-INITIATIVE RESEARCH ON INTEGRITY ASSESSMENT PROTOCOLS OF GAS PIPES REPURPOSED TO HYDROGEN AND MITIGATION GUIDELINES

PilgrHym



EVALUACIÓN DE LA INTEGRIDAD ESTRUCTURAL DE LOS MATERIALES DE LA RED DE GAS PARA UN TRANSPORTE SEGURO DE HIDRÓGENO (SAFEH2)

Safe-H2



Entidades financiadoras








UNIVERSIDAD DE BURGOS



PilgrHYm at key external events

PilgrHYm at The HAPI / MESSIAH seminar

PilgrHYm was presented at the high level **HAPI / MESSIAH seminar** by one WP3 leader, **Laurent Briottet (CEA LITTEN)**.

The MESSIAH industrial chair, funded by the French National Research Agency (ANR), focuses on the use of mini-test techniques for in-service structural monitoring, with particular application to hydrogen transport and embrittlement. Launched in late 2020, the chair has supported four PhD students and one post-doctoral researcher and has delivered significant advances in materials characterization using mini-test tubes.

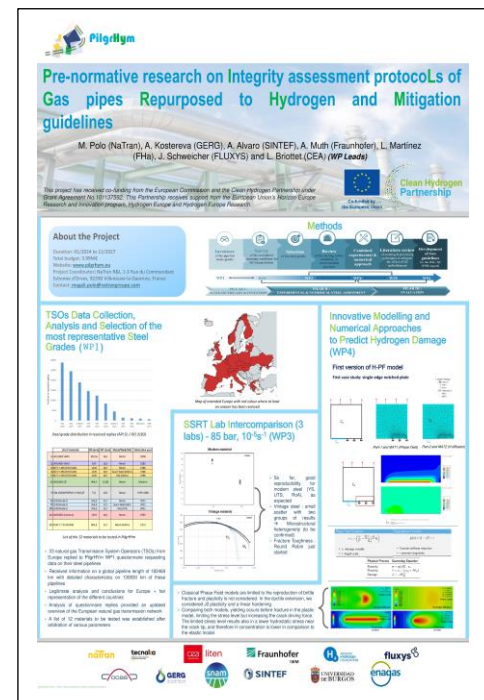
In parallel, the ERC Advanced Grant HAPI addresses the thickness dependence of fracture toughness in metal plates, from plane stress to plane strain conditions. The project aims to establish a robust experimental database and develop predictive models to support the design of tougher metallic materials.

PilgrHYm at the SteelyHydrogen 2025

Back in October 2025, PilgrHYm partners **Julien Schweicher (Fluxys)** and **Laurent Briottet (CEA LITTEN)** had the opportunity to participate in the 5th International Conference on Metals and Hydrogen (SteelyHydrogen 2025).

The conference was organised through a collaboration between OCAS and Ghent University and provided a unique platform for sharing and exchanging experiences on the interaction between metals and hydrogen, including hydrogen-microstructure interactions, hydrogen embrittlement, and hydrogen detection.

Additionally, the project partners displayed the PilgrHYm poster, giving participants a comprehensive overview of the project.



PilgrHYm presented in episode 10 of the World Pipelines Podcast

Furthermore, the European **Gas Research Group (GERG)** had the opportunity to present the PilgrHYm project in [episode 10](#) of the **World Pipelines podcast**.

The episode also discussed key issues facing Europe's gas pipelines, including current technical challenges, innovations for existing infrastructure, and how GERG ensures research improves safety, sustainability, and efficiency. Insights on Europe's energy resilience were also shared during the session.


PilgrHYm


Closing the year with the successful PilgrHYM Stakeholder Workshop

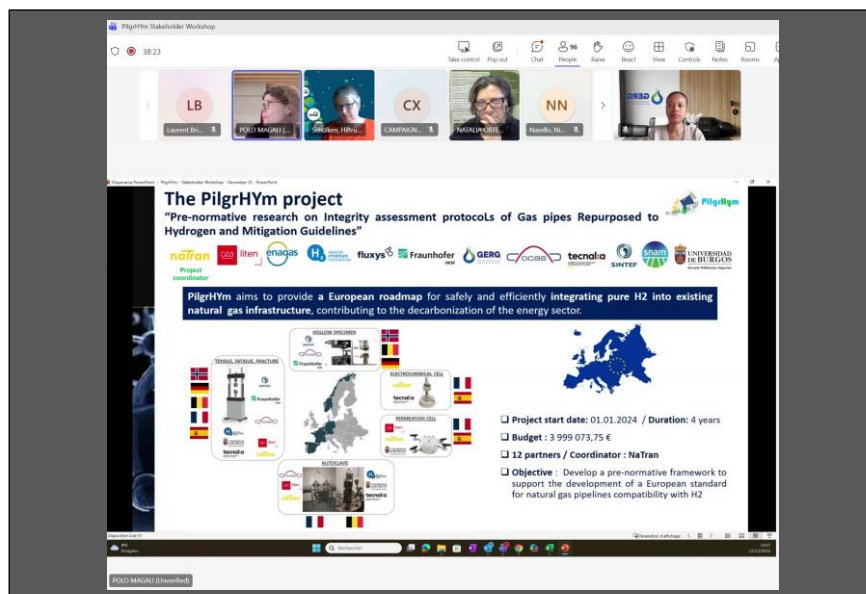
On December 12, PilgrHYM held its first public Stakeholder Workshop to showcase the project's progress at its midpoint. Over 100 participants attended presentations from work package leaders, covering achievements, ongoing challenges, and next steps.

The workshop focused on integrating hydrogen into the European natural gas infrastructure, stakeholder engagement, and the development of testing protocols. Highlights included:

- **Work Package 1:** Mapping the European gas pipeline grid and selecting steel materials for testing, with data collected from 23 Transmission System Operators (TSOs). Discussions included hydrogen limits in natural gas and monitoring pipeline pressures.

- **Work Packages 2 & 3:** Updates on round-robin testing of steel samples, including tensile and toughness tests, with some delays noted in results.
- **Numerical Modeling:** Efforts to develop fracture and fatigue models, including considerations of hydrogen uptake at crack tips.
- **Operational Guidelines:** Work Packages 5 and 6 will focus on hydrogen pipe operational parameters and the development of future guidelines.

The workshop provided a platform to align stakeholders on PilgrHYM's objectives and next steps in safely and efficiently integrating hydrogen into gas networks.



Upcoming events



11th -13th March 2026
Fibes II - Congress and Exhibition Cen
Seville, Spain

European Hydrogen Energy Conference 2026

11th - 13th March 2026 | Seville

The fast track to the hydrogen economy



3-4 JUNE 2026
Advancing Hydrogen for Net Zero



International Pipeline Conference & Expo 2026

European Hydrogen Energy Conference (EHEC 2026)

Presenter from PilgrHYM consortium :

Lorena Cuenca Fuente (Enagas)

Date : March 11th – 13th, 2026

Location: Seville, Spain

H2science

Presenter from PilgrHYM consortium :

TBT

Date: June 3rd – 4th, 2026

Location: Trondheim, Norway

International Pipeline Conference & Expo (IPCE)

Presenter from PilgrHYM consortium:

TBT

Date: September 21st – 25th, 2026

Location: Calgary, Canada

Stay tuned!

Thank you for your interest in the PilgrHYM activities!

Follow us on [social media](#) ! 

You want more information? [Visit our website.](#) 

Interested in joining PilgrHYM's IAB? Contact the project coordinator → magali.polo@natrangroupe.com

Project Partners



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