About Consortium

Academic

-Fondazione Bruno Kessler	IT	
-Eindhoven University of Technology	NL	
-Fundacion Tecnalia Research & Innovation	SP	

Industry

-Hydrogen Onsite (Coordinator)	ES	
-Türkiye Petrol Rafinerileri Anonim Şirketi	TR	
-SNAM S.P.A.	IT	

Horizontal

-Intract Inovasyon Dan. Ltd. Sti	TR	

HERMES

HYDROGEN EFFICIENT PURIFICATION
USING MEMBRANES IN INDUSTRIAL GAS STREAMS

Clean Hydrogen, Smarter Systems:
Powering a Sustainable Future

Clean Hydrogen Partnership

Co-funded by the European Union

Grant Agreement ID: 101192352
Call: HORIZON-JTI-CLEANH2-2024-02-03
Start/End: January 2025-December 2028

About Project

HERMES is a groundbreaking European project set to transform the future of clean energy by advancing hydrogen separation and purification technologies. As Europe intensifies efforts to transition towards a low-carbon economy, hydrogen stands out as a key enabler of sustainable energy systems. However, current purification methods remain costly and energy-intensive, limiting widespread adoption. **HERMES** aims to overcome these barriers by developing, scaling up, and demonstrating two innovative membrane technologies, **Palladium-based** and **Carbon Molecular Sieve (CMS) membranes,** capable of delivering high-purity hydrogen efficiently and cost-effectively.

The project will design, build, and operate two advanced prototypes at industrial sites in Italy and Türkiye. These systems will demonstrate the capability to separate up to **100 kilograms of hydrogen per day** from five different industrial gas streams, covering both high and low hydrogen content scenarios. The technologies are being engineered to significantly reduce energy consumption to **less than 3.5 kWh per kilogram** of hydrogen and achieve production costs **below 1 euro per kilogram—milestones** that would represent a major leap forward for the hydrogen economy.

HERMES is powered by a strong consortium of leading European universities, research centers, and industrial companies working in close collaboration to create a robust value chain for hydrogen purification. The project not only focuses on technological breakthroughs, but also includes comprehensive assessments of environmental impact, economic viability, and safety. This includes detailed analyses such as **Techno-Economic Assessment (TEA), Life Cycle Costing (LCC), Life Cycle Assessment (LCA), and Process Hazard Analysis (PHA).** Public engagement and awareness activities will also play a vital role in fostering acceptance and support for hydrogen solutions.

By combining cutting-edge research with real-world industrial validation, **HERMES** will deliver scalable, green, and economically viable hydrogen purification solutions. The project is poised to make a significant contribution to **Europe's clean energy ambitions, setting a new benchmark for hydrogen technologies and supporting the growth of a resilient, climate-neutral energy future.**

Objectives

HERMES aims to revolutionize hydrogen separation and purification by reducing costs through two advanced membrane technologies: **Palladium-based and Carbon Molecular Sieve (CMS) membranes.** Two prototypes will be developed and tested at industrial sites for **the separation of 100 kgH_2/day** from streams with varying hydrogen content, using both membrane types.

01

Develop and test two TRL7 prototypes (100 kgH_2/day) using advanced membranes for various industrial streams.

02

Ensure stable hydrogen purity from fluctuating input compositions.

03

Complete TEA, LCA, & LOC studies of HERMES.

04

Conduct preliminary safety analysis for all use-cases.

05

Create protocols to assess membrane lifetime.

06

Identify new industrial applications for HERMES technologies.

07

Prepare for the exploitation of HERMES results.

08

Promote project results and strengthen stakeholder engagement.

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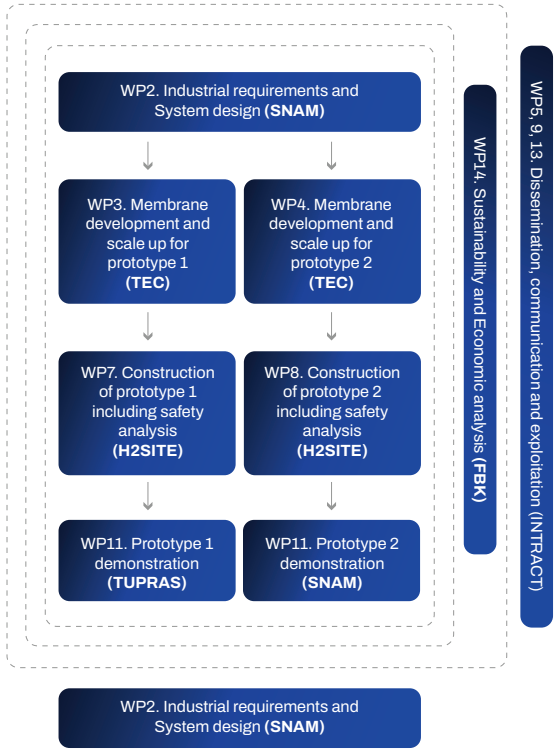
Methodology



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