

## Topics in the call 2024

## Hydrogen Storage and Distribution

**D.** Tsimis





# Hydrogen Storage and Distribution Overview



### Main Focus

Hydrogen Storage

- Microbiological interactions in H<sub>2</sub> underground storage in porous media
- Next generation aboveground storage solutions

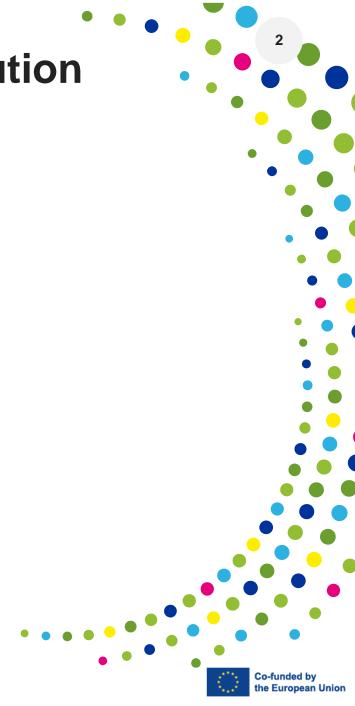
### Hydrogen Distribution

- Scaling up and demonstrating purification prototypes
- Flexible compressor coupled to RES



### What is new

Multi-purpose HRS up to 3,000kgH<sub>2</sub>/day





## Hydrogen Storage and Distribution Overview

Торіс	Type of Action	Budget (M€)
HORIZON-JTI-CLEANH2-2024-02-01: Investigation of microbial interaction for underground hydrogen porous media storage	RIA	3
HORIZON-JTI-CLEANH2-2024- <b>02-02</b> : Novel large-scale aboveground storage solutions for demand-optimised supply of hydrogen	RIA	4
HORIZON-JTI-CLEANH2-2024-02-03: Demonstration of hydrogen purification and separation systems for renewable hydrogen-containing streams in industrial applications	IA	6
HORIZON-JTI-CLEANH2-2024- <b>02-04</b> : Demonstration of innovative solutions for high-capacity, reliable, flexible, and sustainable hydrogen compression technologies in commercial applications	IA	6
HORIZON-JTI-CLEANH2-2024-02-05: Demonstration and deployment of multi-purpose Hydrogen Refuelling Stations combining road and airport, railway, and/or harbour applications	IA	8





## **Hydrogen Storage- Topics**

## HORIZON-JTI-CLEANH2-2024-02-01: Investigation of microbial interaction for underground hydrogen porous media storage

Comprehensive assessment of the risks due to microorganisms in porous media (TRL  $2 \rightarrow 4$ )

- Characterisation of microbial populations present in various EU porous media formation.
- Develop methodologies that enable cross-laboratory sample testing.
- Definition of guidelines and protocols to support SSOs in the identification of risks of storing H2 in porous media.
- Consortium should include wide coverage of SSOs across EU.

## HORIZON-JTI-CLEANH2-2024-02-02: Novel large-scale aboveground storage solutions for demand-optimized supply of hydrogen



Enabling low-cost bulk storage of hydrogen (TRL  $3 \rightarrow 5$ )

- Reduce the footprint of the storage solutions by targeting 40kgH<sub>2</sub>/m3
- Target a CAPEX of  $600 \notin kgH_2$  when the solution is scaled to 20 tonnes.
- Single or modular system should be demonstrated at TRL5 at a scale of minimum 100kg H<sub>2</sub>



## **Hydrogen Distribution- Topics**

HORIZON-JTI-CLEANH2-2024-02-03: Demonstration of hydrogen purification and separation systems for renewable hydrogen-containing streams in industrial applications

Large scale prototype demonstration of a purification system at 100kg/day (TRL 5  $\rightarrow$ 7)

- Reduction of energy consumption by 25% compared to the standard technology
- Solution should demonstrate its applicability on 2 different types of streams( e.g <20% and >98% H<sub>2</sub> content).
- The 100kgH<sub>2</sub>/day system should be demonstrated at TRL7 for a minimum of 3,000 hours.
- Levelized cost of hydrogen separation/purification of less than 1€/kg

HORIZON-JTI-CLEANH2-2024-02-04: Demonstration of innovative solutions for high-capacity, reliable, flexible, and sustainable hydrogen compression technologies in commercial applications Direct coupling of the compressor to RES system and a demonstration of at least 24 months (TRL  $\rightarrow$ 8)

- Innovative non-mechanical compression or a hybrid consisting of at least one non-mechanical innovative element
- Demo site should be secured ahead of proposal submission that allows access to a real RES production profile.
- Flexibility both in terms of inlet pressure (from 1 bar to 200bar) but also in terms of the operation coupled to RES.
- Able to cope with challenging conditions (hot/cold climates, marine environment, high altitude, remote etc)





## **Hydrogen Distribution- Topics**

HORIZON-JTI-CLEANH2-2024-02-05: Demonstration and deployment of multi-purpose Hydrogen Refuelling Stations combining road and airport, railway, and/or harbour applications

.<u>`</u>@`.

Designing an HRS that can cope with the upcoming requirements of heavy-duty fleets (TRL  $5 \rightarrow 7$ )

- Develop high throughput stations:
  - Focus on heavy-duty vehicles with capacities ranging from 1,000 to 3,000 kg/day.
  - Individual fills of more than 200 kg should be achieved in less than 20 minutes.
- Reduce CAPEX and OPEX through innovation:
  - o Implement innovative technological components (e.g., compressors, cooling systems, dispensers).
  - Optimize integration into the design and operation of the HRS to lower capital and operational costs.
- Standardize and industrialize HRS equipment:
  - Develop protocols for safe and reliable refueling in collaboration with OEMs and distributors.
  - Set specific targets for improved reliability, safety, and availability of HRS equipment and infrastructure.





Questions? Join us on Slido - <u>www.sli.do</u> with the code #InfoDay2024





#CleanHydrogen

#InfoDay2024