

Topics in the call 2024

Hydrogen Storage and Distribution

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Hydrogen Storage and Distribution Overview



Main Focus

Hydrogen Storage

- Microbiological interactions in H₂ 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 3,000kgH₂/day

Hydrogen Storage and Distribution Overview

Topic	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-CLEANH2-2024-02-02: 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-CLEANH2-2024-02-04: 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→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→5)

- Reduce the footprint of the storage solutions by targeting 40kgH₂/m³
- Target a CAPEX of 600€/kgH₂ when the solution is scaled to 20 tonnes.
- Single or modular system should be demonstrated at TRL5 at a scale of minimum 100kg H₂



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 →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% H₂ content).
- The 100kgH₂/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 →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



Designing an HRS that can cope with the upcoming requirements of heavy-duty fleets (TRL 5→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:
 - 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?
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