

Topics in the call 2023

Hydrogen Storage and Distribution

D. Tsimis



Hydrogen Storage and Distribution Overview



Main Focus

Hydrogen Storage

- Scaling up underground storage for both salt caverns and depleted gas fields
- Next generation on-shore liquid hydrogen storage.

Hydrogen Distribution


- Facilitating the re-purposing of steel pipelines to transport hydrogen
- High pressure supply chain for gaseous hydrogen transport



What is new

- Liquid Hydrogen Refuelling Stations

Hydrogen Storage and Distribution Overview

Topic	Type of Action	Ind. Budget (M€)
HORIZON-JTI-CLEANH2-2023-02-01: Large-scale demonstration of underground hydrogen storage	IA 	1 x 20
HORIZON-JTI-CLEANH2-2023-02-02: Pre-Normative Research about the compatibility of transmission gas grid steels with hydrogen and development of mitigation techniques	RIA	1 x 4
HORIZON-JTI-CLEANH2-2023-02-03: Novel insulation concepts for LH2 storage tanks	RIA	1 x 2
HORIZON-JTI-CLEANH2-2023-02-04: Demonstration of high pressure (500-700 bar) supply chain	IA	1 x 5
HORIZON-JTI-CLEANH2-2023-02-05: Demonstration of LH2 HRS for Heavy Duty applications	IA	1 x 5

Hydrogen Storage- Topics

HORIZON-JTI-CLEANH2-2023-02-01: Large-scale demonstration of underground hydrogen storage



Hydrogen underground storage in salt caverns or depleted gas fields



- Demonstration in an underground storage facility that has potential of at least 1,000 tonnes H₂
- For caverns: At least 100 injection & withdrawal cycles at various pressures/volumes.
- For gas field: At least 1 injection & withdrawal cycle
- Evaluate the performance integrity, environmental impact and safety of the hydrogen storage.
- Qualify the purity of the recovered hydrogen and ensure T&D from/to storage site

HORIZON-JTI-CLEANH2-2023-02-03: Novel insulation concepts for LH₂ storage tanks



Novel insulation to enable the safe, cost and energy efficient storage of large quantities of LH₂



- Concept definition, material selection and integrity evaluation.
- Concept should be scalable to similar LNG tanks for on-shore storage and shipping
- Testing at laboratory scale to evaluate the viability of the concept at relevant conditions
- Concept design and cost estimation targeting onshore containment tank CAPEX of 70€/kg in 2024

Hydrogen Distribution- Topics

HORIZON-JTI-CLEANH2-2023-02-02: Pre-Normative Research about the compatibility of transmission gas grid steels with hydrogen and development of mitigation techniques



Facilitating the re-purposing of the natural gas grid to 100% H2

- Gap analysis & proposal for a testing approach covering the most representative EU steel grades.
- Deliver harmonised testing protocols and test them confirming that results are comparable between different laboratories
- Deliver to standardisation bodies a matrix of gas grid steel behaviour in the presence of hydrogen across various network conditions
- Investigate and propose mitigation techniques to limit hydrogen uptake and embrittlement.

HORIZON-JTI-CLEANH2-2023-02-04: Demonstration of high pressure (500-700 bar) supply chain



Demonstration of the entire high-pressure concept from the filling centre to trailers and finally the HRS

- Demonstrate a complete logistic scheme with a distribution radius at relevant scale
- It should demonstrate the distribution capability to two HRSs minimum;
- It should encompass an innovative compressor capable of filling trailers at pressures of 500 to 700 bar enabling trailer payloads of 1,000 to 1,500 kg
- A techno-economic assessment should be included, demonstrating the economies of scale due to the high-pressure

Hydrogen Distribution- Topics

HORIZON-JTI-CLEANH2-2023-02-05: Demonstration of LH2 HRS for Heavy Duty applications



Development, construction and operation of a liquid hydrogen refuelling station with a flowrate of at least 5 tonnes per hour



- Development of a demonstrator with proven scalability in railroad, aircraft or maritime applications
- Development of a model to forecast boil-off gas generation during operations
- Techno-economic analysis of the performance of these systems including energy consumption (in kWh/kgH₂), CAPEX, OPEX;
- Development of a metrology system or methodology for measuring or evaluating the quality and quantity of delivered hydrogen (Potential synergies with EURAMET to be explored)
- Development of operations protocols, including for fuelling, venting or flaring, stand-by and emergency;
- Explore potential synergies with the topic HORIZON-CL5-2023-D5-01-07: 'Hydrogen-powered aviation' and with the activities of ZEWTP partnership.

Questions?
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