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

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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 ZEWT partnership.
Questions?
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