

Topics in the call 2022

Hydrogen Storage and Distribution

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Hydrogen Storage and Distribution Overview



Main Focus

- Improved hydrogen carriers
- Preparing hydrogen refuelling stations for the demands of Heavy-Duty applications
- Scaling-up innovative hydrogen compression solutions



What is new

- Next generation liquefaction units and large scale liquid H₂ storage for shipping.
- Developing increased capacity tube trailers
- Improving quality control for Hydrogen dispensed in HRS

Hydrogen Storage and Distribution Overview

Topic	Type of Action	Ind. Budget (M€)	Deadline
HORIZON-JTI-CLEANH2-2022-02-01: Compatibility of Distribution non-steel metallic gas grid materials with hydrogen	RIA	2,5	20/09/2022
HORIZON-JTI-CLEANH2-2022-02-02: Hydrogen and Hydrogen/Natural gas mixture leak detection system for continuous monitoring and safe operation of HRS and future Hydrogen/Natural gas mixture networks	RIA	2,5	31/05/2022
HORIZON-JTI-CLEANH2-2022-02-03: Validation of a high-performance hydrogen liquefier prototype	RIA	5	31/05/2022
HORIZON-JTI-CLEANH2-2022-02-04: Ammonia to Renewable Hydrogen: efficient system for ammonia cracking	RIA	3	20/09/2022
HORIZON-JTI-CLEANH2-2022-02-05: Efficient system for dehydrogenation of liquid organic hydrogen carriers	RIA	3	20/09/2022
HORIZON-JTI-CLEANH2-2022-02-06: Development of large scale LH2 containment for shipping	RIA	6.5	20/09/2022


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HORIZON-JTI-CLEANH2-2022-02-07: Increased hydrogen capacity of GH 2 road trailers	RIA	2,5	31/05/2022
HORIZON-JTI-CLEANH2-2022-02-08: Development of novel or hybrid concepts for reliable, high capacity and energy-efficient H2 compression systems at real-world scale	IA	5	31/05/2022
HORIZON-JTI-CLEANH2-2022-02-09: Sampling methodology and quality assessment of HRS	RIA	4	31/05/2022
HORIZON-JTI-CLEANH2-2022-02-10: Implementing new/optimised refuelling protocols and components for high flow HRS	RIA	2 x 4	31/05/2022
HORIZON-JTI-CLEANH2-2022-02-11: Development and demonstration of mobile and stationary compressed hydrogen refuelling solutions for application in inland shipping and short-distance maritime operations	IA	7	20/09/2022

HORIZON-JTI-CLEANH2-2022-02-01: Compatibility of Distribution non-steel metallic gas grid materials with hydrogen




Test and improve the compatibility of the natural gas distribution network with hydrogen mixtures

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- Deliver a preliminary inventory of non-steel metallic materials in the distribution grid
 - Test the effect of hydrogen and natural gas mixtures up to 20% as well as with 100% hydrogen
 - Create a database of results of gas grid metallic materials' behaviour in the presence of hydrogen

HORIZON-JTI-CLEANH2-2022-02-02: Hydrogen and Hydrogen/Natural gas mixture leak detection system for continuous monitoring and safe operation of HRS and future Hydrogen/Natural gas mixture networks



To develop and validate reliable sensor technologies for hydrogen and NG/H₂ mixtures

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- New and optimised leak detection sensors and tools should be developed in order to enable safer storage, transport and distribution of hydrogen.
 - The proposed technology should be suitable for continuous leak detection monitoring or/and periodic maintenance
 - The scope of the topic is open to any kind of sensing technology

HORIZON-JTI-CLEANH2-2022-02-03: Validation of a high-performance hydrogen liquefier prototype



To develop and validate an improved hydrogen liquefaction system



- An innovative concept that can focus at system level or on one of the sub-systems of a liquefaction unit
- Construction of an industrial prototype at limited scale
- Evaluate the performance, durability and efficiency of the prototype

HORIZON-JTI-CLEANH2-2022-02-04: Ammonia to Renewable Hydrogen: efficient system for ammonia cracking



Develop and test an improved ammonia dehydrogenation system



- Work should focus around the catalyst and reactor of the dehydrogenation unit.
- System should be demonstrated for at least 500 hours and producing at least 10 kg H₂/day at atmospheric pressure
- Scalability should be demonstrated to 100 tH₂/day

HORIZON-JTI-CLEANH2-2022-02-05: Efficient system for dehydrogenation of liquid organic hydrogen carriers



Develop and test an improved LOHC dehydrogenation system



- Work should focus around the catalyst and reactor of the dehydrogenation unit.
- System should be demonstrated for at least 500 hours and producing at least 10 kg H₂/day at atmospheric pressure
- Scalability should be demonstrated to 100 tH₂/day

HORIZON-JTI-CLEANH2-2022-02-06: Development of large scale LH₂ containment for shipping



To develop and validate containment concepts intended for the bulk shipping of liquid hydrogen



- Concept selection for large scale LH₂ containment to be used in shipping
- Detailed design, construction, and testing of a scaled-down prototype of at least 10 t LH₂ capacity
- General Approval for the LH₂ containment system by one of the major IACS classification societies

HORIZON-JTI-CLEANH2-2022-02-07: Increased hydrogen capacity of GH2 road trailers



To develop and validate a solution with a minimum payload of 1.2 tonne of compressed hydrogen above 500 bar by end of the project



- Applicants should propose new solutions to decrease the specific weight (e.g. per unit of hydrogen transported) of the package.
- Examples of solutions could be but are not limited to lighter tubes, larger diameter composite tubes, etc.
- The applicant should identify if the proposed solutions are covered by existing standards and/or regulations.

HORIZON-JTI-CLEANH2-2022-02-08: Development of novel or hybrid concepts for reliable, high capacity and energy-efficient H2 compression systems at real-world scale



To develop, scale-up, build, install and test a compression prototype at a client site with real-life applications



- The solution should demonstrate high levels of availability and efficiency, with low costs, low maintenance requirements, and high operational safety.
- The demonstration duration should be at least one year of real commercial use case and have a projected lifetime of 20 years.

HORIZON-JTI-CLEANH2-2022-02-09: Sampling methodology and quality assessment of HRS



Ensure that the hydrogen quality can be accurately measured according to the standards.



- Validate the capability of at least 5 EU based hydrogen purity laboratories, for both sampling as well as analysing hydrogen according to the applicable standards
- A publicly accessible hydrogen quality database representing the hydrogen quality supplied in the EU should be established.

HORIZON-JTI-CLEANH2-2022-02-10: Implementing new/optimised refueling protocols and components for high flow HRS



To validate new fueling protocols for heavy duty applications as well as the necessary components that will allow high capacity refueling



- Proposals should address the qualification of the components necessary to achieve the specific flow rates.
- Proposals should address the qualification of the protocol by testing it with the developed components in full assembly.
- The components shall be developed within the first 2.5 years of the project to allow 1.5 years for integration and testing in a full refueling line assembly.

HORIZON-JTI-CLEANH2-2022-02-11: Development and demonstration of mobile and stationary compressed hydrogen refuelling solutions for application in inland shipping and short-distance maritime operations



To focus on either a stationary (pipe-to-ship) or on a floating (ship-to-ship or platform-to-ship) solution



- Demonstrate smart and safe logistics solutions and develop a market standard to support front-running shipping projects.
- Techno-economic analysis of the proposed solution.
- Standardisation of the developed engineering solutions, including components such as refueller, connections, nozzles, as well as of fuelling protocols, is also a key priority.
- Synergies with HORIZON-JTI-CLEANH2-2022-03-05.