# NICOLHY

## NOVEL INSULATION CONCEPTS FOR $LH_2$ STORAGE TANKS

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| **Project ID** | 101137629 |
| **PRR 2025** | Pillar 2 – $H_2$ storage and distribution |
| **Call topic** | HORIZON-JTI-CLEANH$_2$-2023-02-03 |
| **Project total cost** | EUR 1 999 628.75 |
| **Clean $H_2$ JU max. contribution** | EUR 1 999 585.00 |
| **Project period** | 01-01-2024 - 31-12-2026 |
| **Coordinator Beneficiary** | BUNDESANSTALT FUER MATERIALFORSCHUNG UND -PRUEFUNG, DE |
| **Beneficiaries** | NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU, ETHNICON METSOVION POLYTECHNION, DEUTSCHES ZENTRUM FUR LUFT - UND RAUMFAHRT EV, ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA |

**http://nicolhy.eu**

### PROJECT AND GENERAL OBJECTIVES

NICOLHy aims to develop a novel insulation concept based on vacuum insulation panels that enables safe, cost and energy efficient storage of large quantities of liquid hydrogen ($LH_2$). Such large scale $LH_2$ storage technology is needed for establishing a hydrogen storage facility with dimensions from 40 000 m to over 200 000 m of $LH_2$. However, new design concepts are needed because the currently available technologies used in small and medium sized storage facilities are not suitable for upscaling. The main problems preventing upscaling are the long production time due to the process chain, the low failure tolerance and the spherical shape, which reduces the payload in technical applications by around 50% compared to other shapes. The novel NICOLHy concept will change these conditions by using a system which is modular, open-form, end time and cost efficient, while ensuring multi-failure tolerant production, operation and service, for onshore and offshore applications. The NICOLHy consortium consists of experts from the fields of cryothermodynamics, marine, chemistry, process, and safety engineering.

NICOLHy's technical objectives:

- Design a tank, along with its thermal insulation and supporting structure, which is suitable for the large-scale storage of $LH_2$, scalable, energy-efficient, sustainable, with low construction and operation costs, and with improved safety standards.
- Define materials and predict overall thermal insulation performance.


- Test novel insulation concept at laboratory scale.
- Perform safety and risk analyses during operation and fire scenarios.
- Perform circularity, sustainability and scalability assessments of the concept developed.

### FUTURE STEPS AND PLANS

- Design and produce a test rig.
- Design and test diverse novel insulation concepts for $LH_2$ storage.
- Perform manufacturing, assembly, safety, circularity, sustainability, and scalability studies.

### PROJECT TARGETS

| Target source | Parameter | Unit | Target | Target achieved? | SoA result achieved to date (by others) | Year for reported SoA result |
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| **Project's own objectives** | $LH_2$ tank capex | €/kg | 20 | | 100 | 2020 |
| | $LH_2$ boil-off | Mass-% | 0.1 | | 0.3 | 2020 |



Clean Hydrogen Partnership
Co-funded by the European Union