



STORAGE RESEARCH INFRASTRUCTURE ECO-SYSTEM

RI Information sheet 2022

Organisation, RI name

Technology(ies) of Energy Storage (that can be assign to the facility, e.g. electrochemical, chemical, thermal, cross-cutting, ...)

Contact person 1:

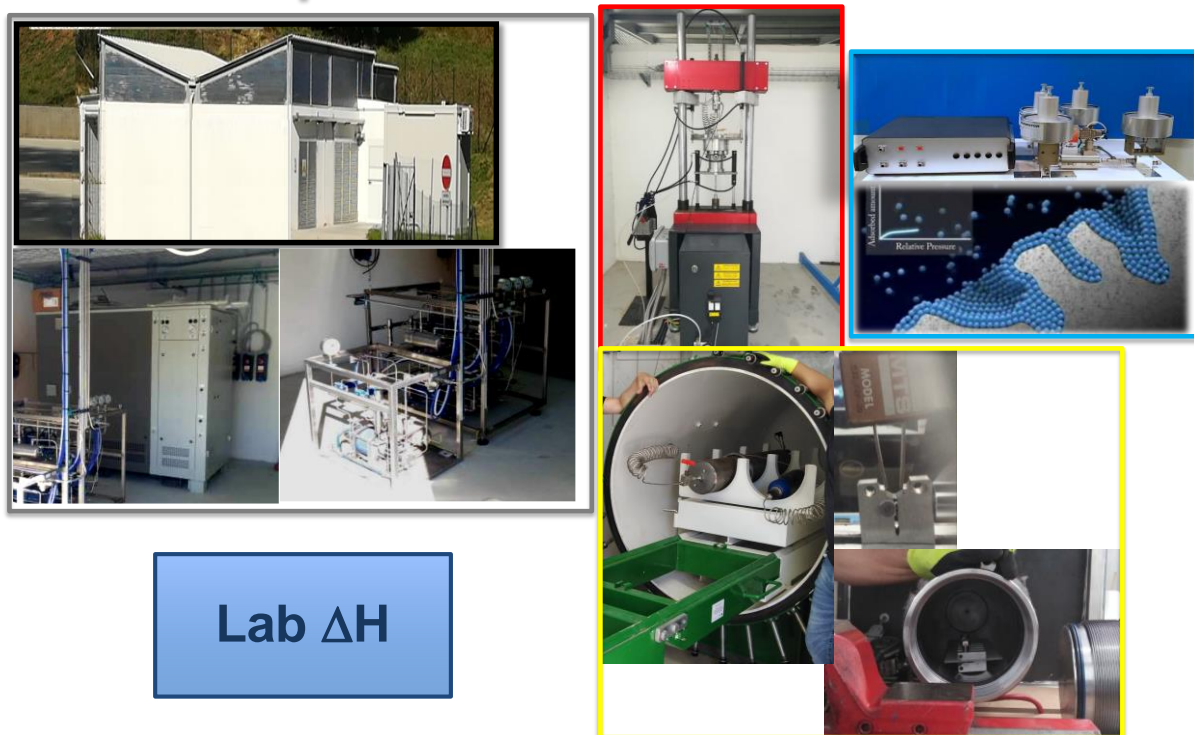
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Project Acronym	StoRIES
Call	H2020-LC-GD-2020
Grant Agreement No.	101036910
Project Start Date	01-11-2021
Project End Date	31-10-2025
Duration	48 months

1. Photo



2. Geographical coordinates (39°21'47.5"N 16°13'28.0"E)

Delta H lab is located in Cosenza, in the Technological Pole of the University of Calabria.

3. Description of the research infrastructure for the webpage

Delta H lab, developed in cooperation between Rina Consulting Centro Sviluppo Materiali SpA and University of Calabria, is a recently built infrastructure supporting research related to hydrogen storage and transportation through the evaluation of material and component performances in gaseous Hydrogen, or hydrogen mixtures up to very high pressure (up to 1000 bar). In the lab there are three areas:

- Small scale testing unit, equipped with one servo-mechanic and two servo-hydraulic testing equipment to perform testing in gaseous hydrogen environment to investigate mechanical properties. The following tests can be performed:
 - tensile tests at slow strain rate
 - Fracture toughness test (rising load method: ASTM E 1820)
 - fatigue tests
 - fatigue crack propagation tests (FCGR).

Tests can be performed at pressure levels up to 1000 bar, at different temperatures (i.e. 0 °C ÷ 80 °C).

- Large scale testing unit where a testing facility equipped with an autoclave to perform tests in gaseous hydrogen is available. This device allows to perform tests on materials as well as on components. The following tests can be carried out:



- Fracture toughness tests (K_{IH}) according to ASME B31.12 (referring to Method in ASTM E 1681, static loaded sample in long time exposure)
- Pressure cycling tests on tanks, vessels, flanged pipes....
- Fit for purpose tests on materials and components (e.g. valves, fittings, flanged pipes) according to specific requirements.

Tests can be performed at pressure values up to $p=1000$ bar.

- Solid State materials (SSMs) testing equipment named High pressure Concentration temperature (HPCT) unit, to perform the evaluation of sorption/desorption of the SSM in quantity from 100 g to 20 kg in a pressure range 0–30 MPa and temperature range 77–473 K using tanks from 1 to 50 litres.

4. Availability of the research infrastructure

(Please indicate time periods in which infrastructure will not be available for StoRIES in the next 2 years – if already known)

The small scale and large scale units will be available starting from 2023.

5. Special considerations (confidentiality / NDA agreements, insurance requirement, special training, HSE training)

NDA Agreement to be set and signed, no direct involvement in the test execution of external personnel, HSE training.

6. Energy storage technology that can be analysed/studied by using the research infrastructure

- Electrochemical
- Chemical
- Thermal
- Mechanical
- Superconducting Magnetic
- Cross-cutting (Specifically: ...)

7. Key words for the webpage

Gaseous H₂, storage, embrittlement, mechanical testing, adsorption/desorption testing, nanomaterials (carbon, zeolites, polymer, MOF, metal hydrides).

8. TRL level (if applicable):

- 1-3
- 4-6
- Above

