Ammonia and MOF Based Hydrogen for EuRope (AMBHER)

Funded by the European Union

Summary and Concept

The **AMBHER project aims at providing a quantum leap in the development of hydrogen storage technologies**. For that purpose, it develops its main activities around **ammonia synthesis for the long-term storage** and around novel **nanoporous Metal Organic Frameworks (MOFs) for the short-time storage** (Figure 1). For long-term storage, **advanced catalysts and membranes** and their combination in an intensified **3D-printed periodic open cell structured reactor** will be developed to allow hydrogen storage in the form of ammonia in a cost-efficient and resource effective process at lower temperatures and pressures compared to conventional systems. For short-term hydrogen storage, **novel nanoporous MOFs** of high surface area and low-cost synthesis will be developed following an original shaping process (3D printing). **Conformable cryo-vessel** to accommodate stacks of MOF bodies of tailored-made shape will be also developed.

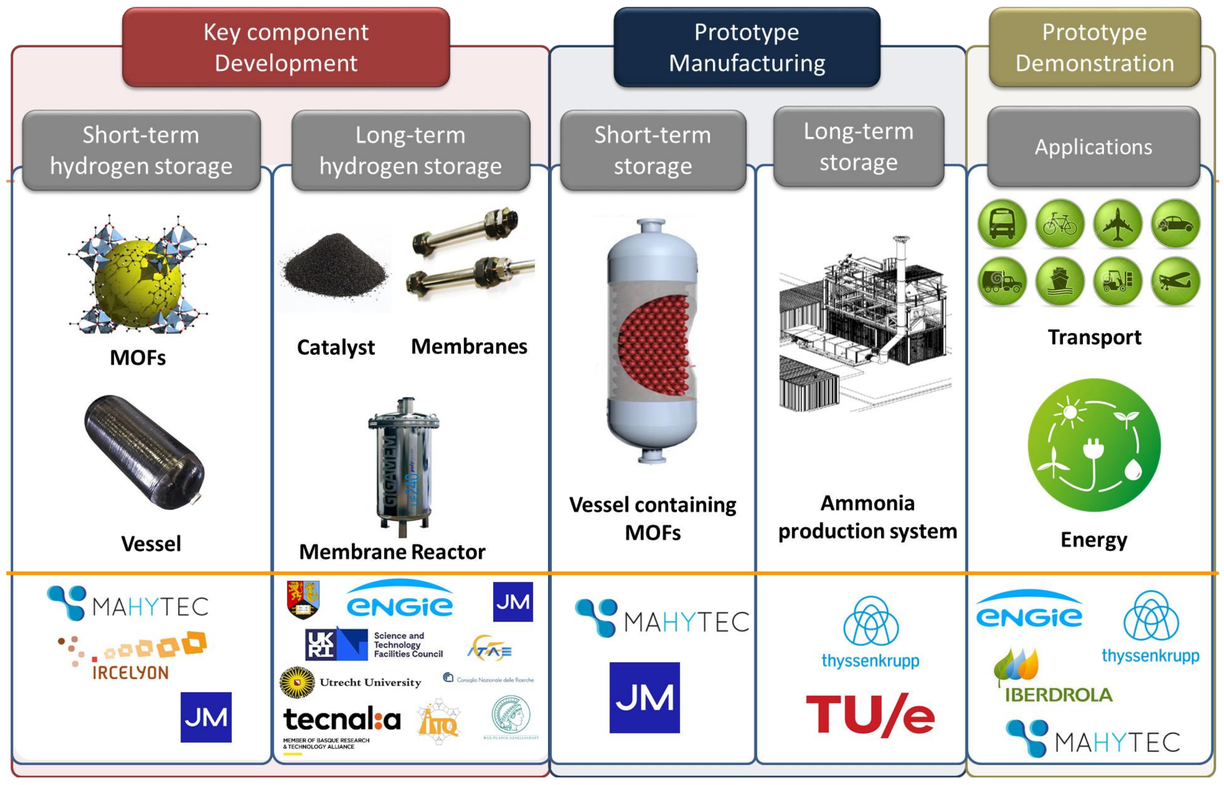
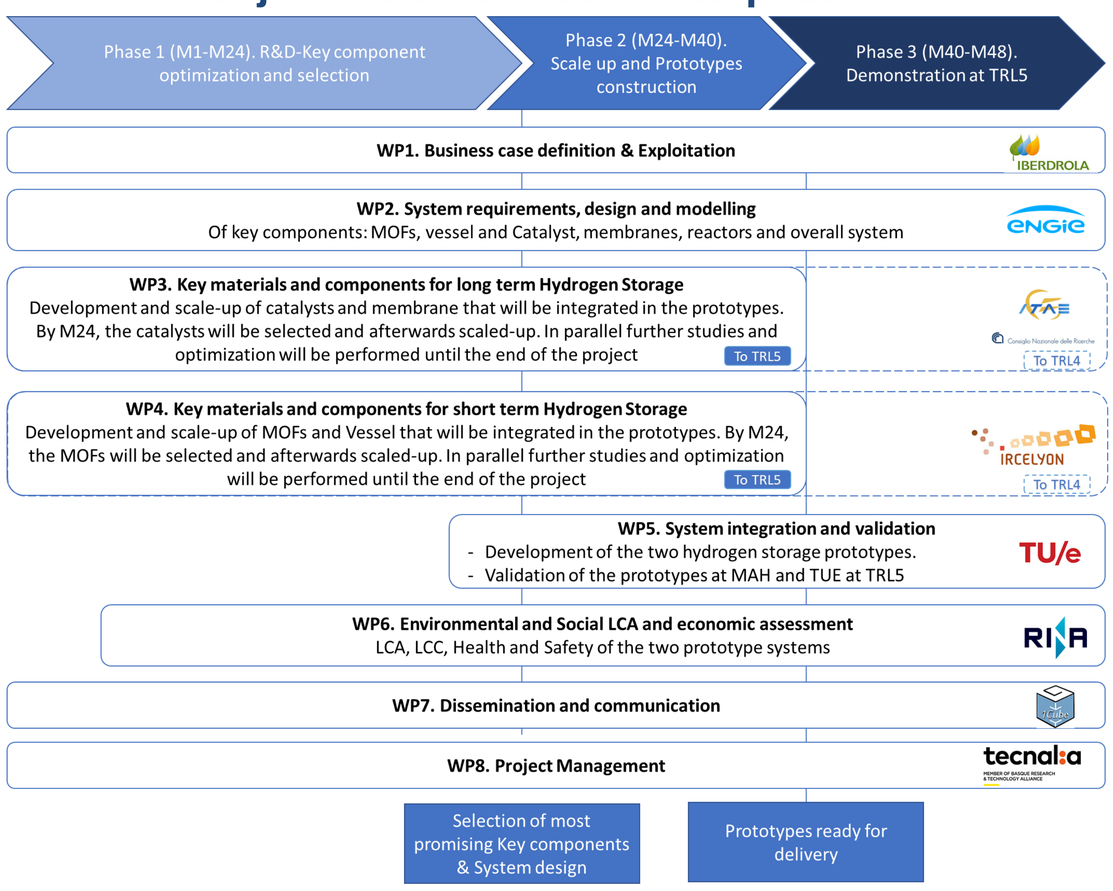


Figure 1. AMBHER project value chain

Project Objectives

Project structure and work plan



AMBHER project is validating both short term and long-term solutions at TRL 5. The main technical objectives on material and system level are the following:

- To design and develop a MOF container for a storage hydrogen capacity of 40 g/L at 100 bar whilst at competitive cost (600-1.000 euros/kg_{H2}).
- To develop innovative conformable cryo-vessel operating up to 100 bars to be used in Hydrogen Refuel Station for Heavy Duty Vehicles.
- To develop Haber-Bosch process operating at pressures below **20 bar** and temperatures below **250 °C** with NH_3 production rates 4 times higher than conventional reactors operated at the same conditions.
- To develop innovative membranes for selective separation of ammonia during the gas phase production process with selectivities of **NH_3/N_2 > 50 and NH_3/H_2 > 10**.
- To design and manufacture highly **conductive Periodic Open Cellular Structures** with optimized heat and mass transfer and thin struts.
- To develop a full LCA, LCC and Health and Safety Analysis (HSE) of AMBHER.
- To pave the way for future exploitation of AMBHER Key Exploitable results.

Project details

Project details

Start Date: 1 June 2022
Duration: 4 years
UE Funding: 4,915,870 Euro

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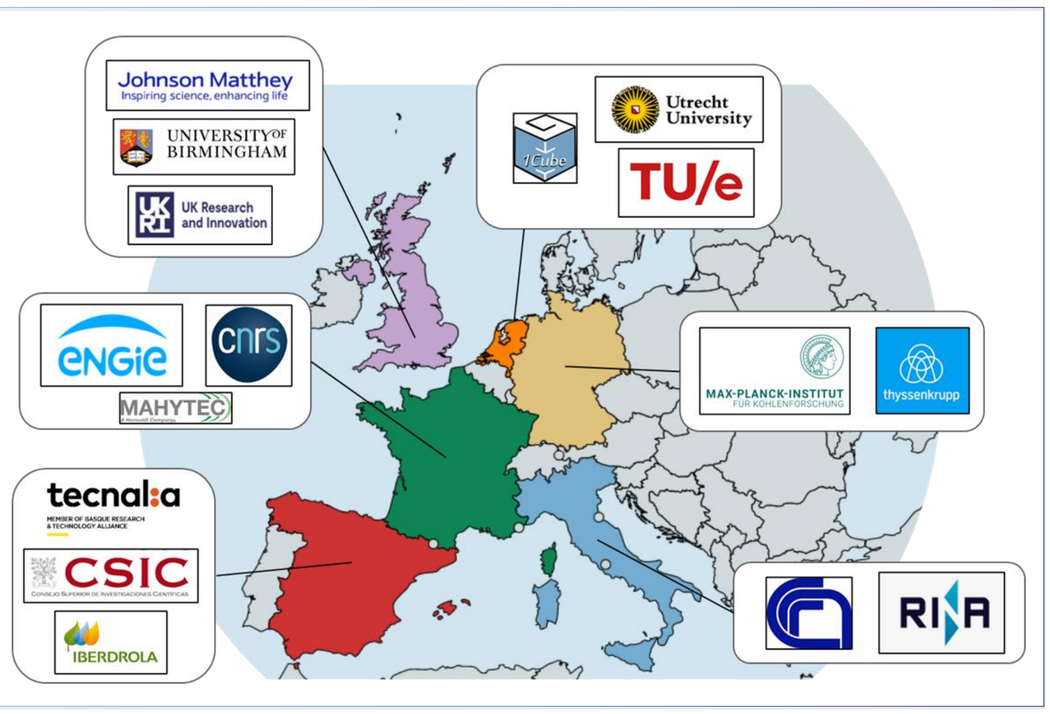
More information at: https://ambherproject.eu

Consortium

The AMBHER consortium gathers 16 organizations from 6 countries. The consortium has been set-up to gathers the complete value chains for the two hydrogen storage technologies. In AMBHER, the total industrial participation is around 44% of the consortium, while innovative SMEs represent 13% of the participants.

1 TECNALIA, Spain	9 CNRS, France
2 TU/e, Netherlands	10 TK, Germany
3 CNR, Italy	11 IBER, Spain
4 UU, The Netherland	12 MAH, France
5 CSIC, Spain	13 ENGIE, France
6 MPI, Germany	14 UoB, United Kingdom
7 1Cube, The Netherland	15 UKRI, United Kingdom
8 RINA-C, Italy	16 JM, United Kingdom



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