PROJECT PARTNERS

A consortium of 16 partners from large, small, and medium-sized enterprises and research and technology organisations covering the whole European energy value chain is involved in the development of the HySTrAm solutions.

The involved partners will work collaboratively in the optimisation of technologies, construction, operation and validation of the pilot, in the assessment of their sustainable performance, as well as in the communication, dissemination and exploitation of activities and results.
Aalborg University (Denmark), coordinates the implementation of the project.

CONTACT US

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DURATION

1 June 2022 – 31 May 2025 (36M)

PROJECT BUDGET

€5.7 million

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WEBSITE

www.hystram.eu

HySTrAm

Hydrogen Storage and Transport using Ammonia

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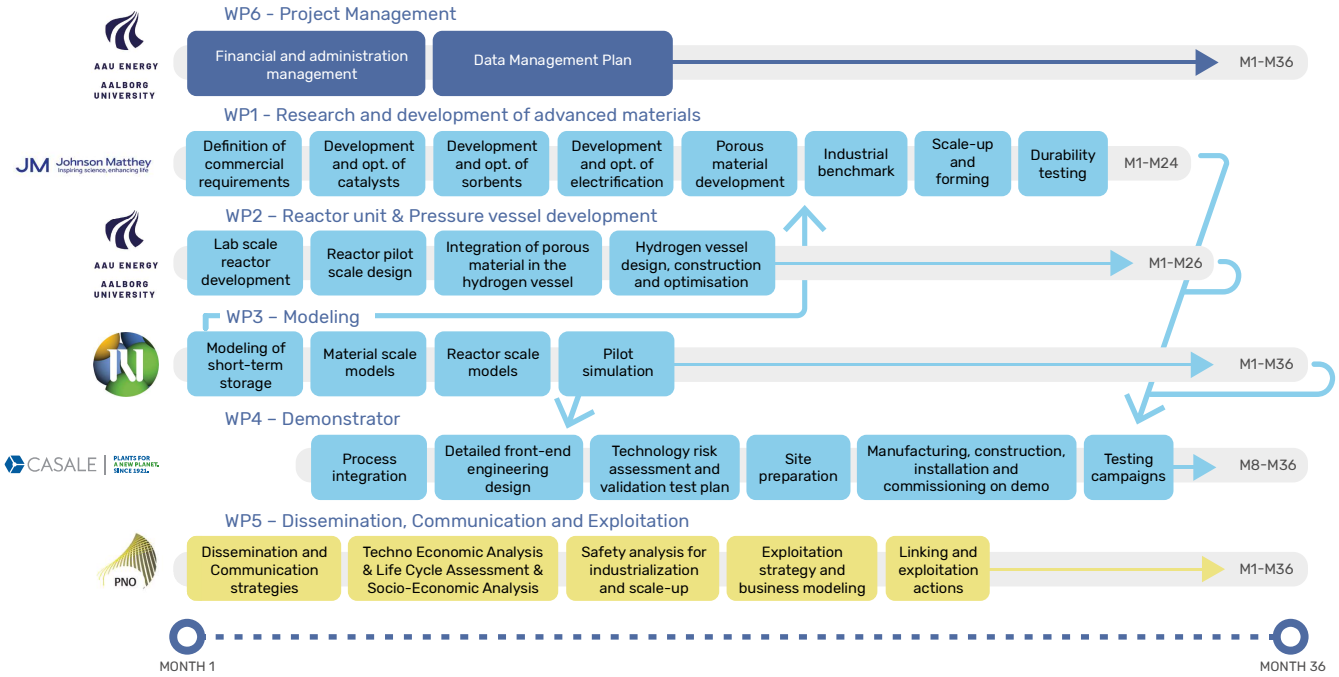
Grant Agreement N° 101058643.

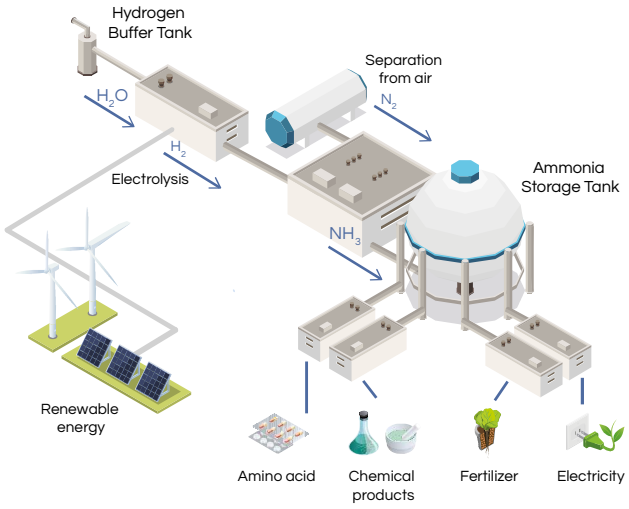


TOWARDS THE TRANSFORMATION OF THE GLOBAL ENERGY SECTOR

Europe aims to become the first climate-neutral continent by 2050. The 2020 EU strategy for energy system integration highlights the importance of creating a European hydrogen ecosystem from research and innovation, to scaling up production and infrastructure to international dimensions. This includes a vision to turn clean hydrogen into a viable solution to decarbonise different sectors over time, installing at least 6 GW of renewable hydrogen electrolyser in the EU by 2024 and 40 GW by 2030. Ammonia doesn't have the highest volumetric energy density among hydrogen carriers. Methanol for instance has both higher volumetric and gravimetric energy density than ammonia. The HySTrAm project will demonstrate a compact containerised ammonia synthesis system which is based on two main consecutive stages:

1. A short-term storage hydrogen vessel which will serve as a buffer to store and transport the hydrogen produced by electrolysis. Within the hydrogen vessel, new ultraporous material will be identified and optimised through machine learning technology.
2. An ammonia synthesis reactor based on an improved Haber-Bosch process, where the stored hydrogen will react with nitrogen to form ammonia using the novel catalysts and sorbents developed in HySTrAm.

THE HYSTRAM CONCEPT



OBJECTIVES

The aim of the HySTrAm project is to build a plant at Technology Readiness Level (TRL5), which demonstrates a production process of green ammonia that is equally cost effective and commercially attractive.

The HySTrAm project has the following objectives:

- Development of functional catalyst/sorbent materials for ammonia synthesis;
- Development of new ultra-porous materials with high H2 capacity;
- Realisation of a lightweight composite vessel for physical-adsorption hydrogen storage;
- Design, construction, optimisation and demonstration of dynamically operated packed bed reactors for ammonia synthesis;
- Demonstration of the overall HySTrAm solution at TRL5; and
- Validation of a business case.

IMPACT

The HySTrAm project will allow to store "green ammonia" from hydrogen at lower pressure and to transport it in much safer conditions, enabling a more descentralised process. Moreover, the use of porous materials and pressure cylinders is expected to create a buffering facility of hydrogen, which facilitates the stable operation of the reactor, facilitating a more efficient coupling with renewables for hydrogen production.

The innovative results will have technological, economical and societal benefits:

- Resilient, sustainable and secure (critical) raw materials value chains for EU industrial ecosystems, in support of the twin green and digital transformations;
- New sustainable-by-design materials with enhanced functionalities and applications in a wide range of industrial processes and consumer products;
- Leadership in producing materials that provide solutions for clean, toxic/pollutant free environment, decarbonising industry, and safeguarding civil infrastructures;
- Leadership in circular economy that strengthens cross-sectorial cooperation along the value chain and enable SMEs to transform their activities and business models; and
- Increased adoption of key digital and enabling technologies in industrial value chains and strategic sectors, paying particular attention to SMEs and start-ups.