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## ŝH<sub>2</sub>Yṗ́S

Sustainable HYdrogen powered Shipping

### Advancing the sHYpS Project Key milestones in fuel cell testing, LH2 Design and site preparations

In recent months, the sHYpS project has achieved key milestones across multiple fronts. Testing on the fuel cell module has begun following the successful completion of its build and transfer to a newly upgraded test bench, with early results surpassing efficiency targets. In parallel, the design phase for the LH2 tank and TCS/FPR has been finalized, with all essential materials ordered and Container production set to start. Additionally, the test facility project has received full approval from the fire brigade and municipal authorities, allowing work at the Monfalcone site to proceed as planned. These advancements mark significant progress toward achieving the project's objectives.

Discover more by reading the 5<sup>th</sup> issue of the sHYpS newsletter!

# Completion and initiation of tests on the fuel cell module



In Newsletter #4, it was reported that the module design was complete and that the prototype build was nearing completion. Since then, the module build has been completed and moved to a newly upgraded test bench. The module is equipped with extensive instrumentation to enable functionality development, including over 220 laboratory-grade measurements for temperature, pressure, relative humidity, flow, and gas sampling points.

With the addition of control sensors, actuators, intermediate signals, and engineering calculations derived from these inputs, thousands of channels of development data are available to optimize module functionality.

Initial testing included the commissioning of key subsystems, such as electrical, controls, thermal, anode, and cathode. Each system was independently assessed before the first electrical generation event to minimize the risk of unexpected events during initial operation.

The first generation milestone was achieved on September 26, 2024. The module systems started under the fully automated control of the on-board module controller, reached 100 A gross current on each of the two stack strings, and successfully shut down afterward. This corresponds to 105 kW of net electrical power, marking a substantial milestone for the project and a major success in achieving automated functionality on the first attempt.

Since then, development has continued, reaching 240 kW of net electrical power out of the target peak power of 375 kW for the module. The highest chemical-to-electrical net efficiency recorded so far is 57.8%, exceeding the project target of 55% at one of the key project use-case operating points. As power output increases, additional development requirements have become evident, and the team is working diligently to meet the program's target power output, aiming for completion by the end of 2024.





Finalization of LH2 tank design and TCS/FPR + confirmation of supplier orders to begin construction of various components



The design phase for both the Container and TCS/FPR is officially complete! Chart has ordered all key materials and long lead-time items, with Container production set to kick off this November.

#### Approval from the relevant authorities to conduct tests, and the start of work at the Monfalcone site where the tests will be conducted



The test facility project has received approval from the fire brigade and municipal authorities. Safety assessments, including the identification of ATEX zones, have been conducted.

In September 2024, CENERGY started to prepare the site for onshore testing in Staranzano (GO), Italy. The site construction will proceed in three phases. In the current first phase, construction work necessary for equipment installation will be completed. The second phase will commence at the beginning of 2025, focusing on plant arrangements, piping, vent systems, and auxiliary connections. The third phase will start once the TCS/FPR and auxiliary equipment have been received, involving the integration of these components into the plant.

### PARTNERS

























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