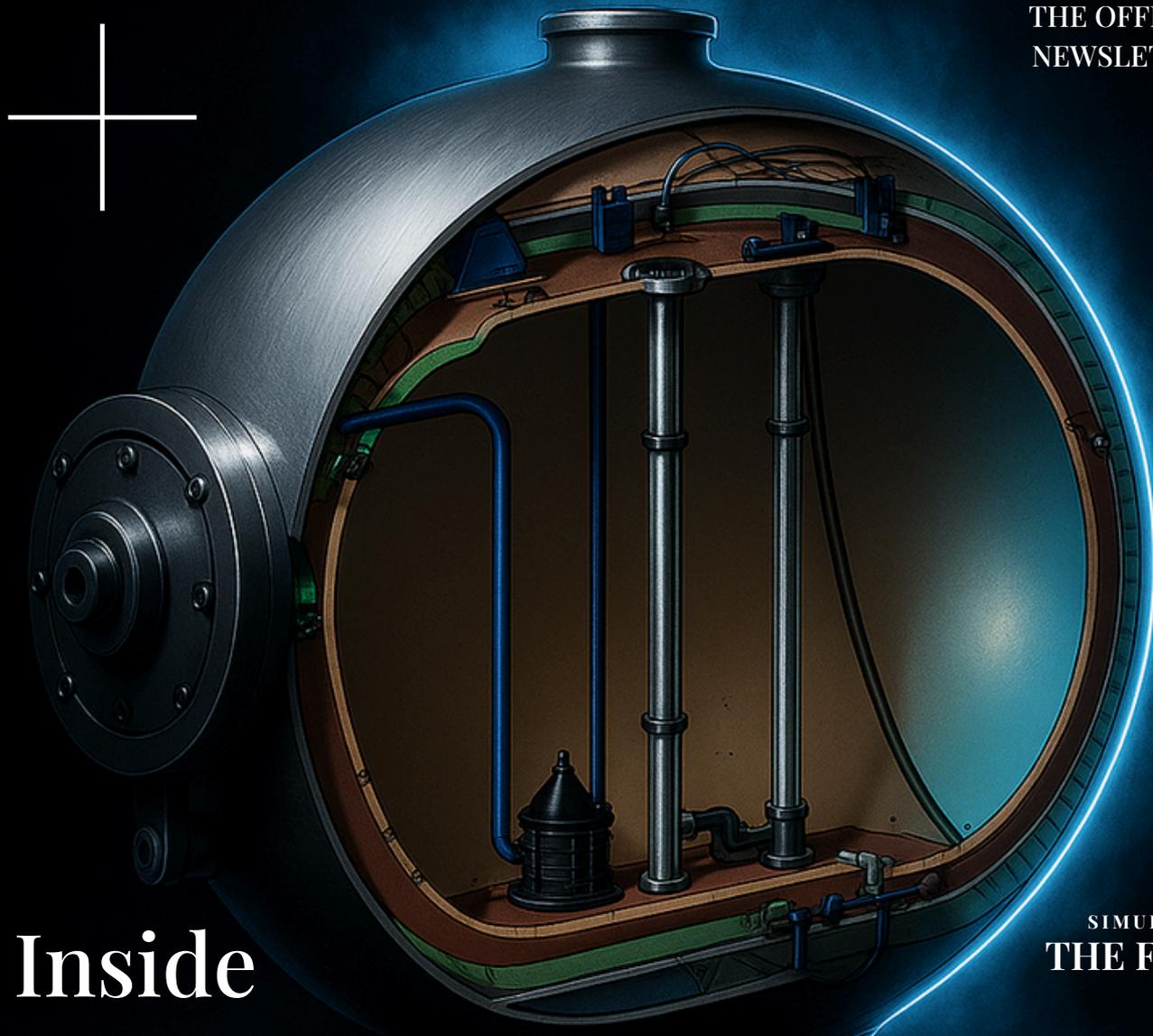


DECEMBER, 2025

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H₂ELIOS

THE OFFICIAL
NEWSLETTER



Inside

INNOVATION

Unveiling the new separated system bay architecture and internal sensor integration. Plus, a look at the thermal digital twins predicting performance

SIMULATING
THE FUTURE



Co-funded by
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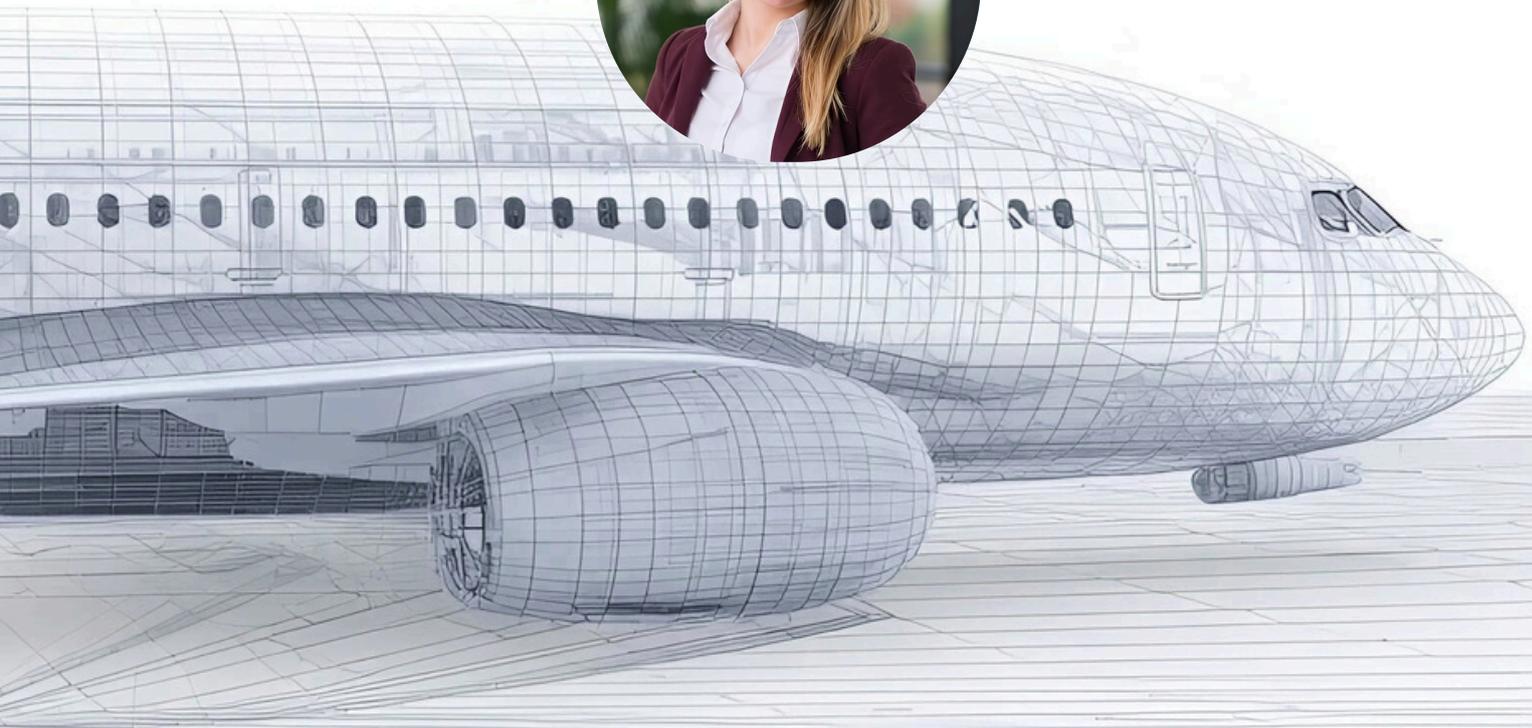
Coordinator's View

By Emma Celeste Lope Retuerto, Project Coordinator, ACITURRI

Welcome to the Late 2025 edition of the H2ELIOS newsletter.

As we enter the final stretch of our journey, the project has shifted from definition to rigorous validation. This quarter was defined by a major regulatory milestone: receiving the green light from EASA on our Means of Compliance, allowing us to proceed with critical safety testing.

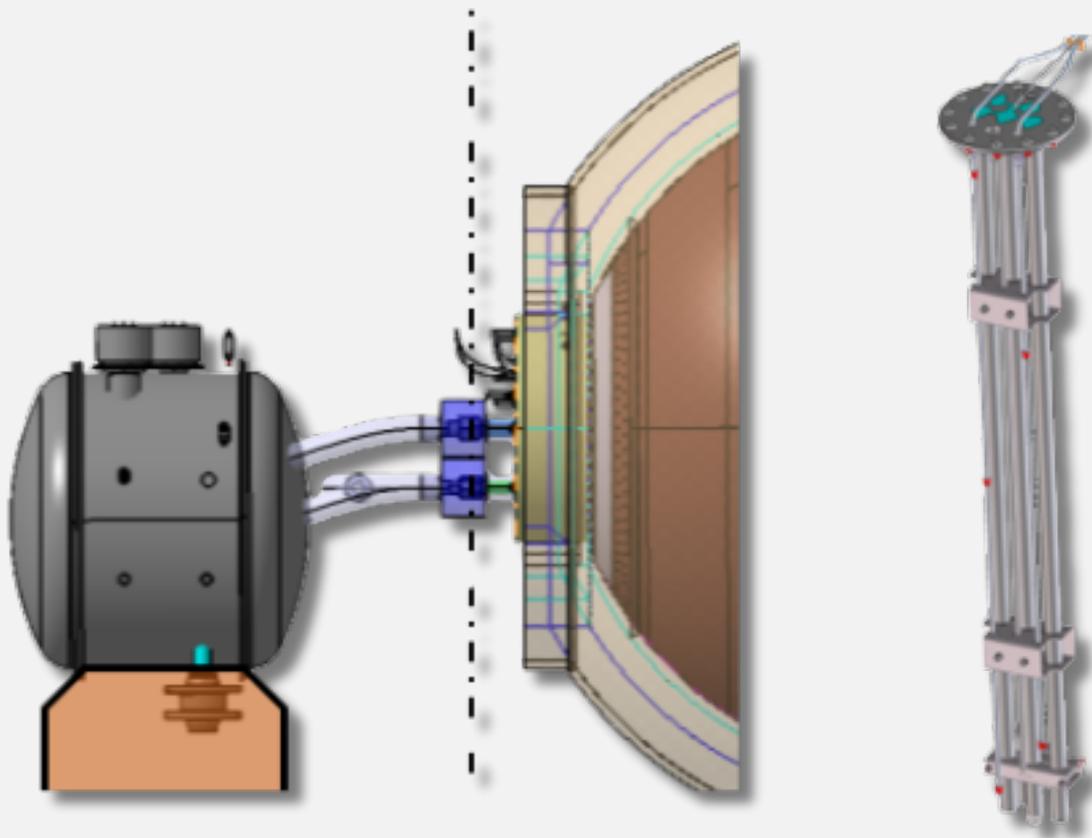
Simultaneously, our engineering teams have finalized key design choices for the system bay and validated our digital models against real-world data. We are proud to share these breakthroughs with you.



The project is supported by the Clean Aviation Joint Undertaking and its members. Funded by the European Union, under Grant Agreement No 101102003. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or Clean Aviation Joint Undertaking. Neither the European Union nor Clean Aviation JU can be held responsible for them.

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SYSTEM ARCHITECTURE

The Decision: Separated Configuration

A critical design trade-off has been resolved. The consortium evaluated two concepts for connecting the system bay to the LH2 tank: direct mounting versus a separated configuration.

The Verdict: We have selected the Separated Configuration. By connecting the bay via flexible hoses, we gain superior flexibility during testing and installation. This architecture allows for modular assembly and safer maintenance routines. [Aciturri](#) and [TEST-FUCHS](#) are now finalizing the **Preliminary Design Review (PDR)** for this new interface.

Sensing & Monitoring

Inside the tank, the "nervous system" is taking shape. The designs for the **Fuel Level Sensors** and **Electrical Heaters** are complete and currently in production.

Safety First: In parallel, [Fraunhofer](#) is testing advanced hydrogen leak detection systems, while [CIRA](#) is validating **Structural Health Monitoring (SHM)** protocols. These systems will define the installation procedures ensuring the tank is not just a vessel, but an intelligent, self-monitoring component.

PUSHING MATERIALS TO THE LIMIT

The Durability Test

Survivor: The 900-Cycle Challenge

How long can a tank survive at **-196°C**? **NTNU** found out by subjecting tank materials to tailored accelerated aging—**300, 600, and 900** cycles of cryogenic immersion.

The Results: The **Outer Tank** material proved incredibly resilient, resisting degradation even after repeated thermal shocks. However, the **Inner Tank** material showed signs of aging, and X-ray computed tomography revealed that manufacturing porosity began to evolve after 900 cycles. These findings are crucial for our lifetime prediction models.

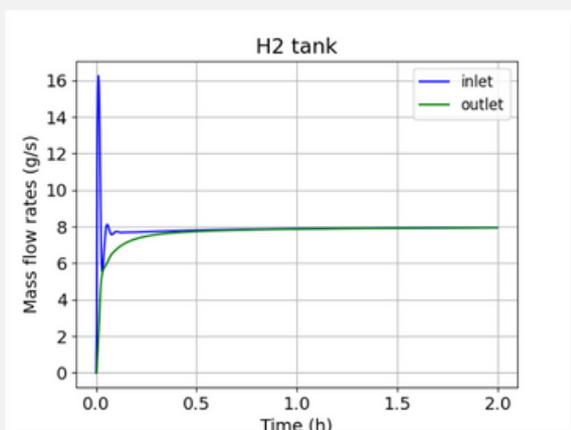
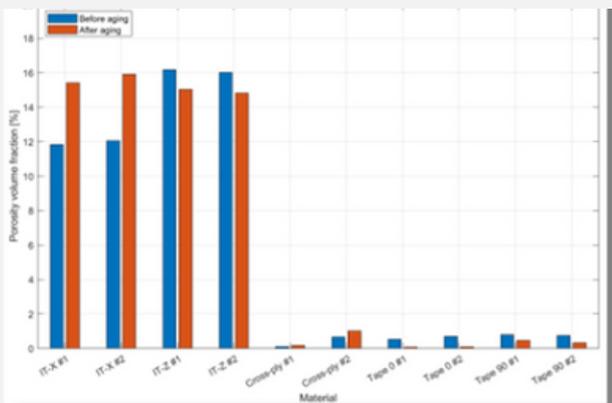
The Green Light

EASA Validation: All Systems Go

In **August 2025**, we reached a pivotal milestone: **EASA** froze the **Means of Compliance (MoC)** for cryogenic materials, giving **PVS** the official green light to begin validation testing.

The Campaign: To support this, a custom multi-axial cryostat has been built and calibrated. It uses fiber optic sensors to monitor strain and hydrogen concentration at 80K. The testing campaign launched mid-November and runs through January 2026, feeding critical data into the final demonstrator design.

Porosity levels rising after 900 aging cycles.



Digital Twin simulation of transient mass flow rates during gaseous hydrogen cooldown.



Fiber optic strain sensors surviving -196°C conditions.



The newly commissioned multi-axial cryostat test rig.

ON LOCATION

From Slovenia to Spain, H2ELIOS is shaping the global conversation on zero-emission flight.



THE DIGITAL DIALOGUE

Engaging the global aerospace community through interactive insights and strategic market alignment.



Knowledge Sharing

H2ELIOS is breaking down complex hydrogen concepts for the next generation of engineers. Our digital campaign includes:

Interactive Quizzes: Testing the industry's knowledge on cryogenic storage realities.

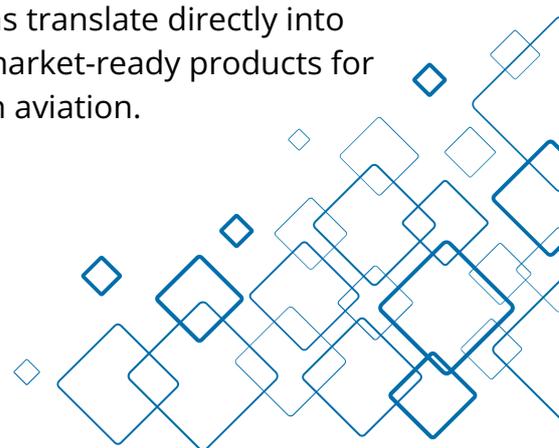
Team Spotlights: Introducing the experts behind the consortium, like our partners at Applus+.

"Did You Know?": Bite-sized engineering facts driving awareness and understanding.

Market Alignment and IPR

Beyond the social feed partners are working in securing the project's commercial future. Led by **PVS**, the consortium recently held two critical **IPR** and **Exploitation Workshops**.

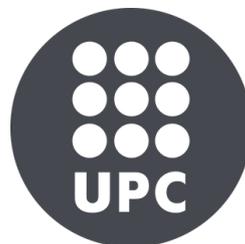
The Goal: Refining Intellectual Property management and benchmarking H2ELIOS solutions against the external market landscape. This ensures our technical breakthroughs translate directly into exploitable, market-ready products for zero-emission aviation.



THE CONSORTIUM



Italian Aerospace Research Centre



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