Newsletter #4

June 2026

Advancing Hydrogen Aviation through Intelligent LH_2 Innovation

Enabling the Future of Low-Emission Aviation

CLEAN AVIATION

Co-funded by the European Union

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.

EDITORIAL NOTE

Message from the Project Coordinator

Dear readers,

As H2ELIOS approaches its final phase, the project is currently focused on the last stages of assembly, marking a critical moment in the overall development. In recent months, significant progress has been achieved, including the closure and testing of the Inner Tank (IT), a key milestone demonstrating the maturity of the system. In parallel, the system bay has been successfully completed, further consolidating the integration of the different subsystems.

At this stage, preparations for the upcoming cryogenic testing campaigns with LN_2 and LH_2 are well underway. These activities will be essential to validate the system performance under representative operational conditions and to confirm the technological advancements achieved throughout the project.

In the coming weeks, the full assembly of the demonstrator will be finalised, enabling the transition towards the final testing phase. This will be followed by comprehensive post-processing activities supported by the digital twin, allowing a deeper analysis and validation of the results obtained.

These achievements reflect the strong commitment and collaboration across the consortium, bringing H2ELIOS closer to its ultimate objectives and contributing to the advancement of hydrogen technologies in aviation.

Emma Celeste Lope Retuerto

ACITURRI

CLEAN AVIATION

Co-funded by the European Union

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.

Manufacturing & Engineering Development

Transforming innovative tank concepts into fully integrated cryogenic systems

METALLIC INNER TANK SUCCESSFULLY DELIVERED
A Major Milestone for the Inner Tank Prototype

- Final metallic demo prototype completed in AISI 316L stainless steel
- Manufacturing supervised by AIMEN to ensure compliance with approved drawings
- Deliverable D3.6 successfully submitted to the European Commission
- Transition from composite concept toward metallic inner-tank solution successfully implemented

EXPLORING THERMOPLASTIC COMPOSITE SOLUTIONS

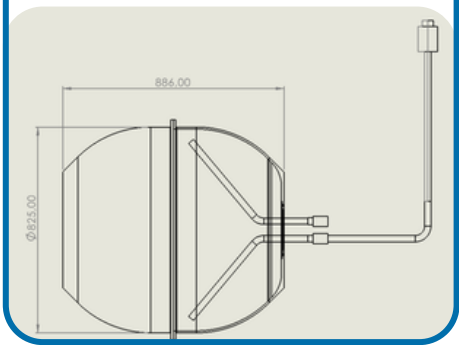
- Development of a down-scale composite vessel using Large Format Additive Manufacturing
- Pellet-based PC-CF20% manufacturing approach
- Resistance welding of 3D-printed hemispheres
- LN_2 testing preparation underway
- Deliverable D3.9 nearing completion

Delivered from a thermoplastic down-scale inner tank and delivered from a metallic inner tank to be used as the final prototype.

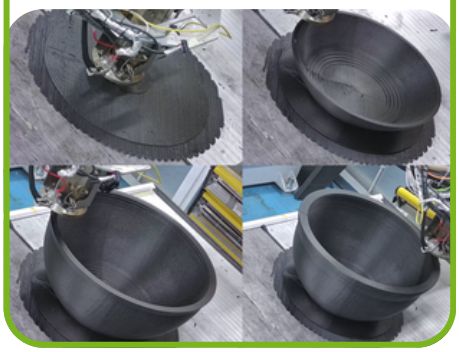
VALUE TO THE PROJECT

The main objective of the WP3 is the manufacturing of a functional prototype and a full-size prototype for the demonstration of functional and performance characteristics of the LH storage system under simulated operational conditions. The metallic inner tank has been manufactured by an external provider, the external tank has been manufactured by ALESTIS using AFP (Automated Fiber Placement) for the outer surface and HLU (Hand Lay-up) process for the manufacturing of the domes, and insulation materials has been developed by ACITURRI.

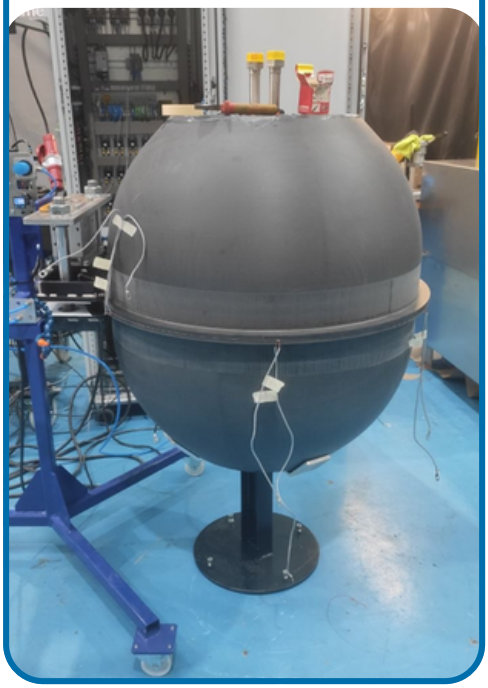
1 Thermoplastic composite LN2 vessel design



2 Thermoplastic composite LN2 vessel manufacturing



3 Thermoplastic composite LN2 vessel hemispheres welding process



4 Complete Additive Manufacturing thermoplastic composite vessel with the cryogenic connections for the LN2 test

CLEAN AVIATION

Co-funded by the European Union

Entering the Full Assembly Phase – From Components to Complete System Integration

Integrating sensors, structures, and subsystems into a fully operational LH_2 storage architecture

MILESTONES ACHIEVED

This activity is currently in full assembly phase, marking a major milestone for the project. Significant progress has been achieved on both the inner tank and the composite outer tank. All internal components have been installed, internal and external sensors have been integrated, and the first verification test of the inner tank has been successfully completed. This validation confirms the correct execution of the assembly steps and enables the team to proceed confidently with the next stages.

MAIN RESULTS

- Start of the complete assembly process, transitioning from design and preparation to physical implementation.
- Successful completion of the first verification test of the inner tank, confirming its integrity and readiness for further integration.
- Full installation of all internal components inside the inner tank, including structural and functional elements.
- Preparation of the composite outer tank, including installation of the connection elements required for the upcoming integration with the inner tank.
- Integration of internal and external sensors, ensuring proper monitoring capabilities for future testing and operation.
- Effective coordination among partners to align mechanical, functional, and operational requirements during assembly.

VALUE TO THE PROJECT

This work is one of the **core pillars of H2ELIOS**, as it is the stage where the engineered designs developed across the project are transformed into a real, fully assembled system. Its contribution is essential in several ways:

- **Bringing the design into reality**, physically implementing the dual-tank system based on the specifications and models developed in earlier work packages.
- **Performing partial structural and functional validation during assembly milestones**, ensuring that each step is executed correctly and meets the required standards before moving forward.
- **Coordinating multiple partners** to integrate the various components developed across the consortium, ensuring full compatibility and seamless assembly.
- **Capturing lessons learned from the assembly process**, which will support future improvements, enhance reproducibility, and facilitate industrial scalability.

CLEAN AVIATION

Co-funded by the European Union

Subsystems Development - Ready for Integration

Innovative cryogenic components enabling safe and efficient hydrogen operations

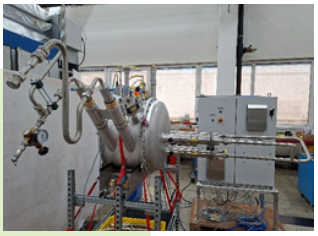
TEST-FUCHS has reached a key milestone in the H2ELIOS project with the successful design and manufacturing of the so-called coldbox required for LH_2 tank operation. The team developed innovative cryogenic LH_2 valves that are not yet available on the market, including dedicated LH_2 component testing to validate their performance. In addition, key components such as an fuel level sensor, electrical heater, and a dedicated controller were built, tested, and integrated into the system. A major achievement was the successful completion of leakage (helium) and functional (LN_2) testing of the coldbox at TEST-FUCHS, confirming its full system performance and readiness. The coldbox is now on its way to Sevilla for the next phase of integration—bringing hydrogen aviation one step closer to reality.

KEY ACHIEVEMENTS

- Successful design and manufacturing of the coldbox, a critical system component enabling tank operation
- Development of novel cryogenic LH_2 valves, specifically tailored for this application
- Overcoming significant challenges in precision welding and component integration to realize a highly efficient and compact design
- Assembly and integration of key subsystems:
  - In-house developed fuel level sensor
  - Electrical heater
  - Project-specific controller system
- Completion of internal testing at TEST-FUCHS:
  - Helium leakage tests confirming tightness
  - LN_2 functional tests verifying operational performance

Following successful validation at TEST-FUCHS, the coldbox is being transferred to Sevilla for the next integration phase.

All tests were successfully passed, confirming readiness for next project phases.



VALUE TO THE PROJECT

This achievement marks a significant step toward safe and efficient hydrogen storage in aviation and highlights TEST-FUCHS' key contribution to the H2ELIOS project. By developing advanced cryogenic components—including extensively tested LH_2 cryogenic valves—and successfully validating a fully integrated coldbox, the team is enabling a fully operational LH_2 tank system while significantly reducing technological risks.

CLEAN AVIATION

Co-funded by the European Union

Next Phase for H2ELIOS

The Road to System-Level Validation

The final period of H2ELIOS will focus on complete system integration and operational testing under cryogenic conditions.

WP3 UPCOMING ACTIVITIES

ACING:

- Coordination and installation of the connection interfaces between the inner and outer tanks.
- Installation of thermal insulation materials, essential for ensuring proper performance under operational conditions.
- Closure of the outer tank, completing the structural assembly of the full storage system.
- Functional testing of the complete tank system under operational conditions, validating performance before integration with other subsystems.
- Installation of the external insulation layer (ailane) to provide additional thermal protection and stability.

AIMEN:

- The composite vessel will be tested under liquid nitrogen conditions (LN2) within May 2026 by Applus.
- Deliverable D3.9: Downscale demo inner-tank TP prototype will be submitted at the end of May 2026.
- The final complete demo will be tested in June 2026 at Applus and a ground test through a liquid hydrogen (LH2) filling functional test will be carried out.

WP4 UPCOMING ACTIVITIES

- Delivery of the coldbox to Sevilla (currently in transit)
- Integration of the coldbox with the tank at ACITURRI
- Execution of initial system-level LN_2 tests
- Subsequent transport to Lleida for:
  - Extended LN_2 testing campaign
  - Follow-up LH_2 testing under operational conditions

Various Communication & Dissemination Activities

Non-Scientific Publications

H2ELIOS featured in the EASN periodic newsletter, in several issues:

- Issue #3 – 2025: Read it **here**
- Issue #1 – 2026: Read it **here**
- Issue #2 – 2026: Read it **here**

Scientific Publications by H2ELIOS to Date

Optical Sensing Technologies for Cryo-Tank Composite
Monica Ciminello , Carmine Carandente Tartaglia, Pietro Caramuta

Environmental impact of multi layered aerospace composite structures
Andrea P. Helåsen, Angela D. La Rosa, Sotirios Grammatikos

Sustainability Assessment of Composite Aircraft Liquid Hydrogen Tanks Using Multi-Criteria Decision-Making Methods
Aikaterini Anagnostopoulou, Konstantinos Tserpes, Dimitris Sotiropoulos, George Labeas, Jorge Rafael Teodoro González, Loras Carrasco

Thermal Digital Twin of a LH2 Aircraft Storage Tank
Eugenio Schillaci, Carles Oliet, Joaquim Rigola

Permeation Characterization of Thermoset and Thermoplastic CFRP Materials for LH2 Tank Solutions, Thermally Shocked and Mechanically Cycled at Cryogenic Temperatures
Giacomo Dreossi, Andrej Bernard Horvat

LH2 tank wall material permeability: A means of compliance (MoC) approach
Andrej Bernard Horvat

Calibration and verification of CFD-VOF models for the analysis of pressurization scenarios in LH2 tanks
Schillaci, Eugenio - Oliet, Carles - Rigola, Joaquim

Meetings

The H2ELIOS consortium gathered in Lleida, Spain, on 12–13 May 2026 for the project's 14th Technical Committee and 6th Steering Committee meetings, hosted by APPLUS. For more details about the happenings of the meeting, you may check out the dedicated news article **here**.

H2ELIOS

CONSORTIUM

ACITURRI

PIAGGIO AEROSPACE

PIPISTREL

TESTAUGHS
safety in test > safety in flight

Applus laboratories

aimen TECHNOLOGY CENTRE

Fraunhofer

CIRA
Centro Italiano Ricerche Aerospaziali

NTNU

UNIVERSITY OF PATRAS
ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΑΤΡΩΝ

CTTC UPC
Centre Tecnològic de Transferència de Calor
UNIVERSITAT POLITÈCNICA DE CATALUNYA

EASN TIS

CLEAN AVIATION

Co-funded by the European Union

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.