

H₂ELIOS

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UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH



Con el apoyo de



Reto tecnológico

Flying towards a sustainable aviation sector with innovative hydrogen storage technologies

The H2ELIOS project will develop a lightweight, innovative and efficient LH₂ aircraft storage prototype, ready to be integrated into the aircraft architecture for flight demonstrations at later stages. Hydrogen lightweight & innovative tank for zero-emission aircraft (HORIZON-101102003-H2ELIOS)



12 partners



8 EU Countries



36 months



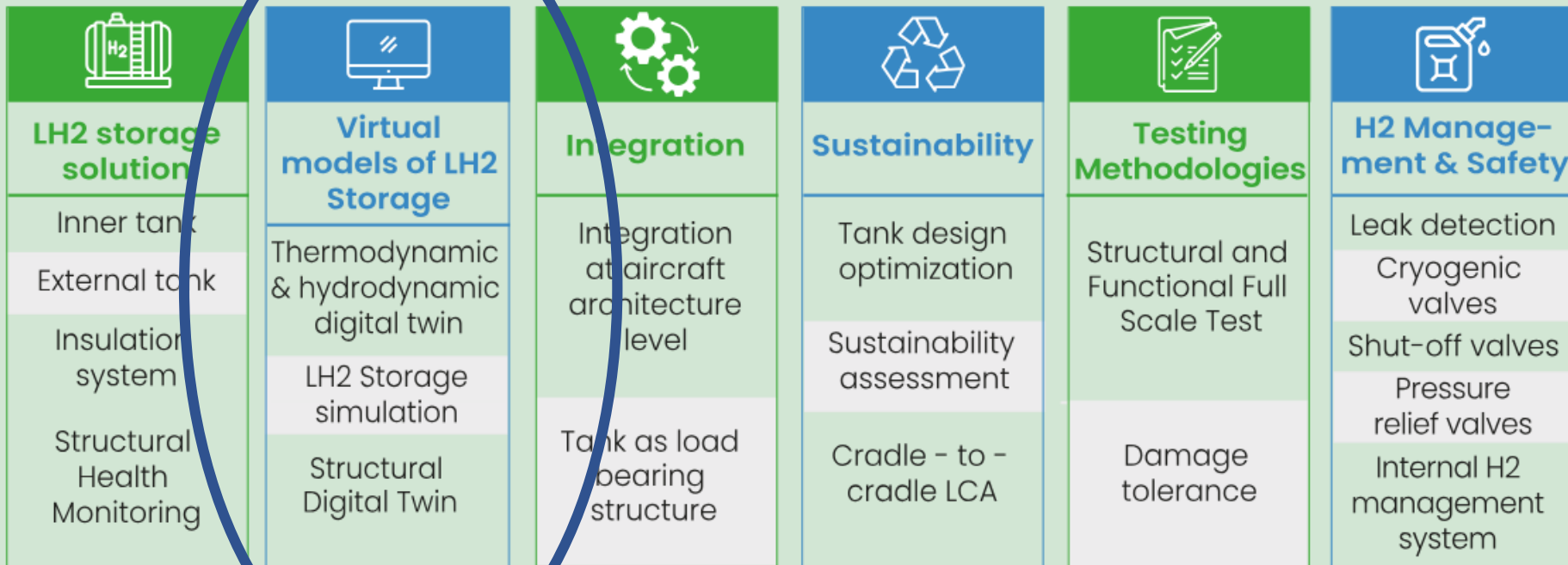
Starting date
01/01/2023



~9.9m €

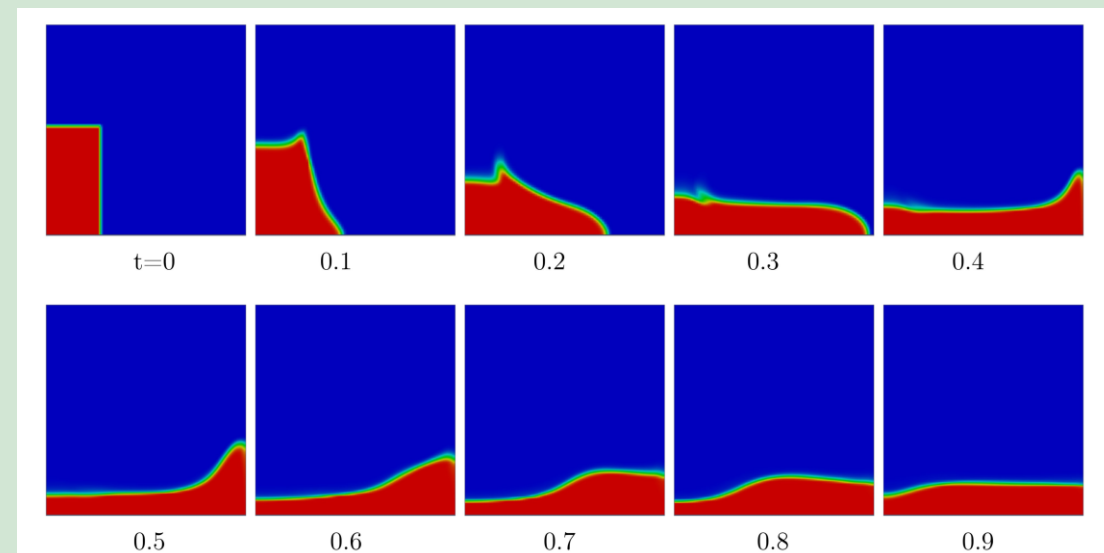


Coordinator
Aciturri

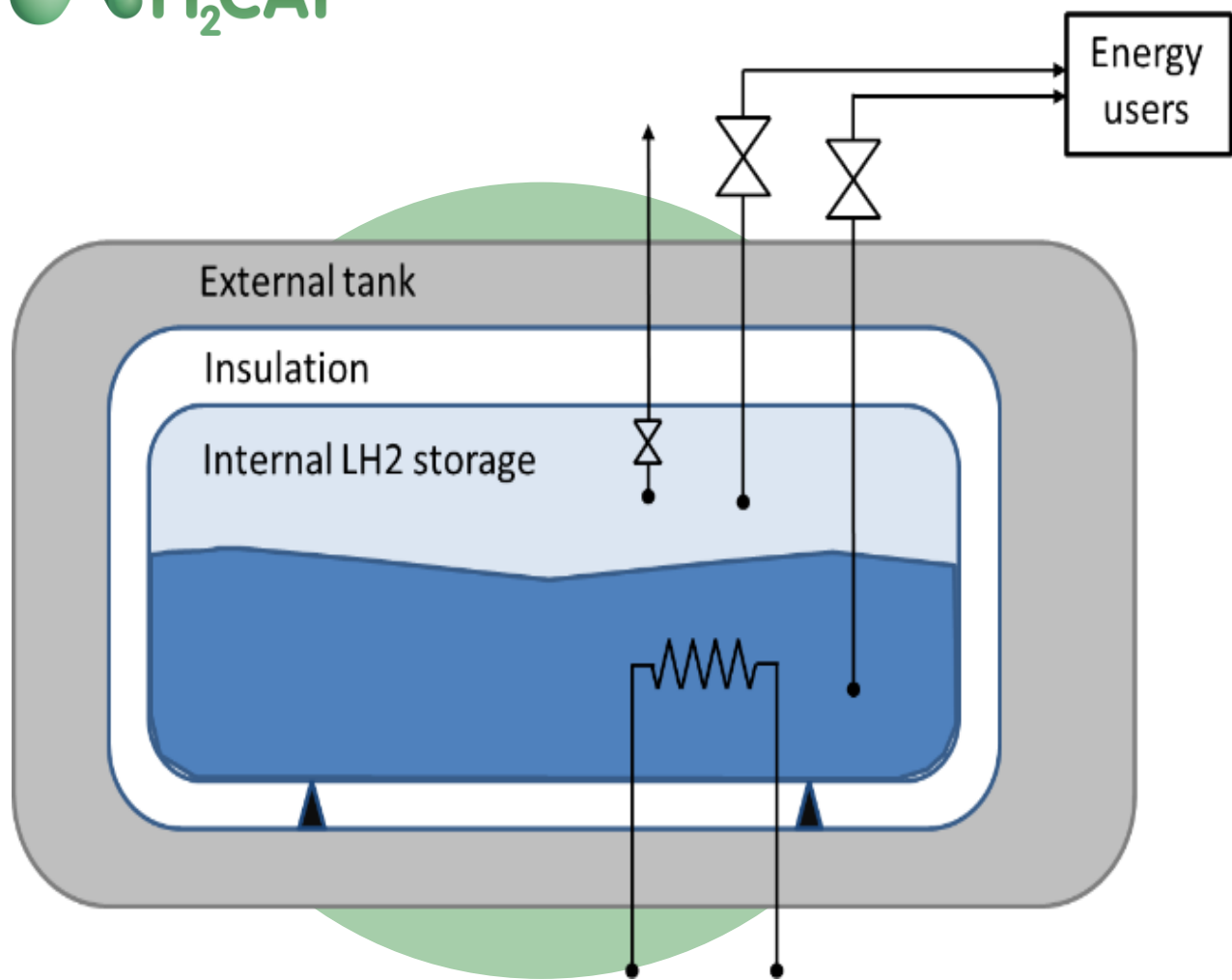


Resolución de la parte térmica y fluidodinámica

The role of UPC will be that of aiding in different design stages using numerical models (detailed CFD and lumped modelling for Digital Twin implementation) combining the analysis of a phase-changing two-phase medium with the heat transfer processes occurring through the external shell and the intermediate insulation space



Hou, X.; Rigola, J. et al. International Journal of Heat and Fluid Flow, vol. 52 pp. 15-27, 2014



Solución aportada

01

Two phase flow

Two fluid model and RANS turbulence modelling
 Volum of Fluid and DNS/LES turbulence modelling

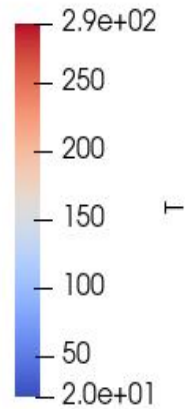
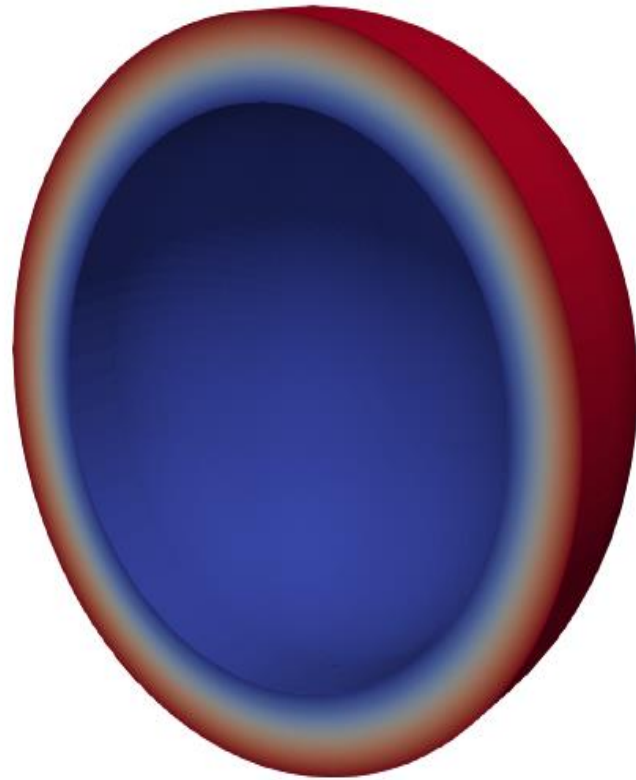
02

Closure relations

Closure models for Momentum and Energy equations. Semi empirical relations adopted:

- Natural convection
- Nuclate boiling
- Pool boiling
- Film boiling

Solución aportada



03

Solid interaction

Conjugate heat transfer:

- Solid external Shell
- Intermediate insulation layer
- Internal tank with two phase flow reservoir

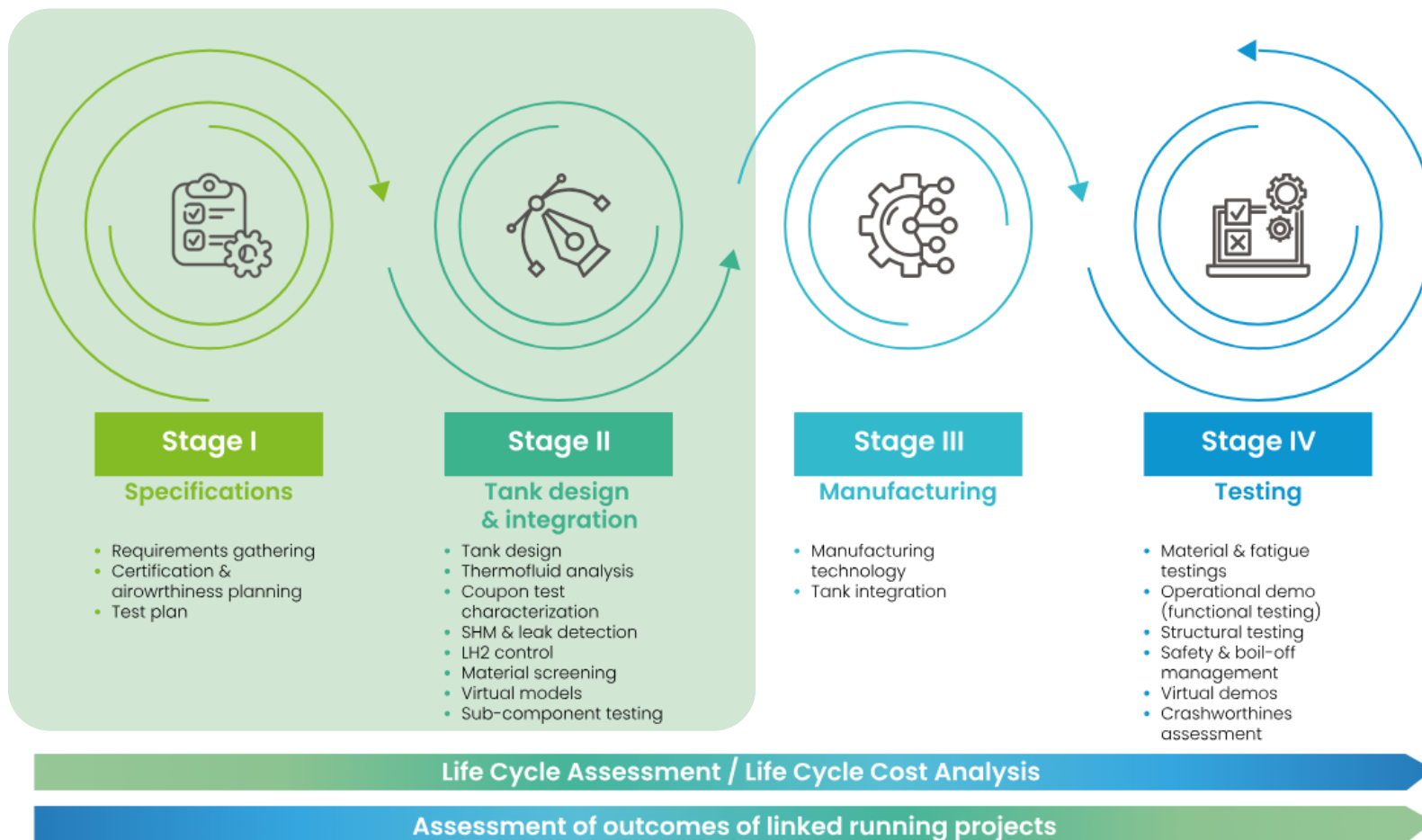
04

Solid Multilayer Simulation

Thermal bridges

- 3D calculation for Digital Twin

Resultado actual / final

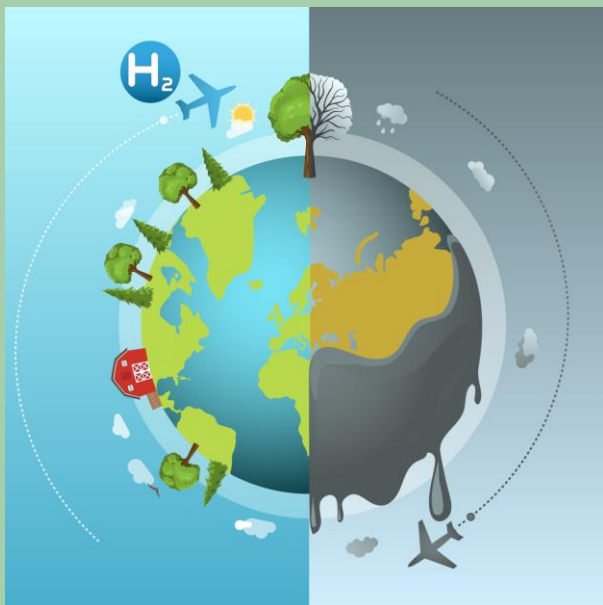


Beneficios de la colaboración



ICONO





Impacto

- De-carbonization and pave the way for hydrogen-powered aircraft.
- Contribute to the advancement of hydrogen storage technology.
- Support the overall goal of achieving climate neutrality in the aviation sector by 2050.
- Accelerate the entry into market in 2035 (or earlier) of a zero-emission aircraft and contribute to the competitiveness of the EU market.
- Allow flight demonstrations are planned for 2026 under the umbrella of CAJU.
- Enable LH2 as fuel in aviation. This reduces 100% of CO2 emissions during operation and up to 90% of GHG impact with a fuel cell powerplant and up to 75% of GHG emissions with H2 combustion powerplant.