

The New Challenges for Aviation

Jornada Materiales e H2 en las Aeronaves - CSIC

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ZEROe

AIRBUS

Airbus

future **ambition**



Offer **100% SAF capability** on our commercial aircraft before **2030**

Be the **1st major manufacturer** to offer a climate neutral commercial aircraft by **2035 (ZEROe)**

Pursue **net-zero CO2 emission** through ATAG roadmap by **2050**

Introducing Airbus ZEROe

EIS by 2035

Airbus Amber

Turboprop



<100
Passengers



Hydrogen
Hybrid Turboprop
Engines (x 2)

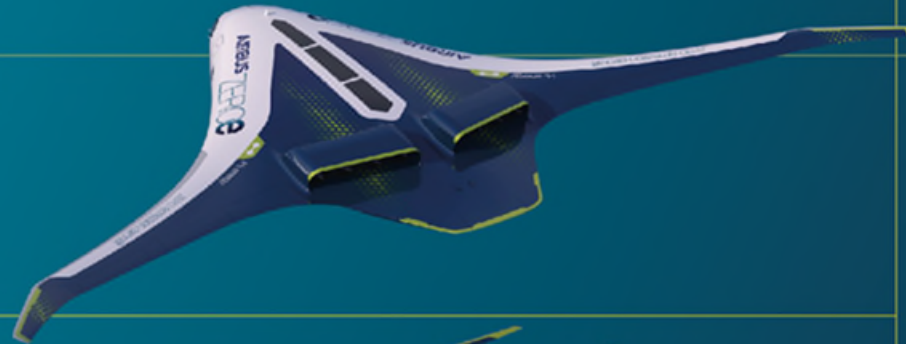


1,000+nm
Range



Liquid Hydrogen
Storage & Distribution
System

Blended-Wing Body



<200
Passengers



Hydrogen
Hybrid Turbofan
Engines (x 2)



2,000+nm
Range



Liquid Hydrogen
Storage & Distribution
System

Turbofan



<200
Passengers



Hydrogen
Hybrid Turbofan
Engines (x 2)



2,000+nm
Range



Liquid Hydrogen
Storage & Distribution
System

Why hydrogen?



Zero emission: H₂ emits no CO₂* and has the potential to reduce non-CO₂ emissions (i.e. NOx) & persistent contrails
(*if generated from renewables via electrolysis)



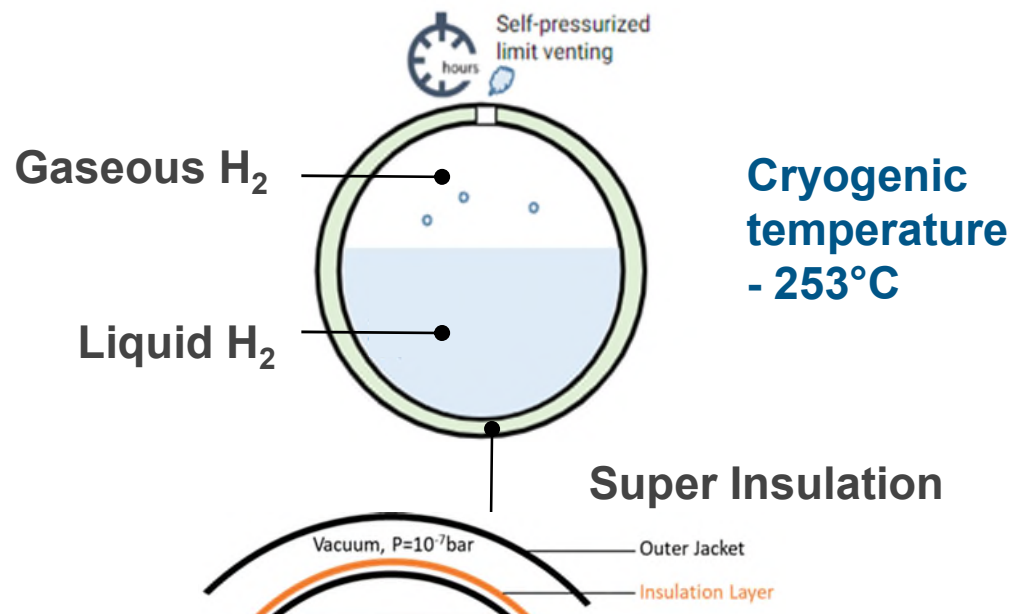
Declining costs: the cost of producing H₂ is likely to decline over the next decades as it gets widely adopted by various industries. This will make zero-emission flying increasingly economical



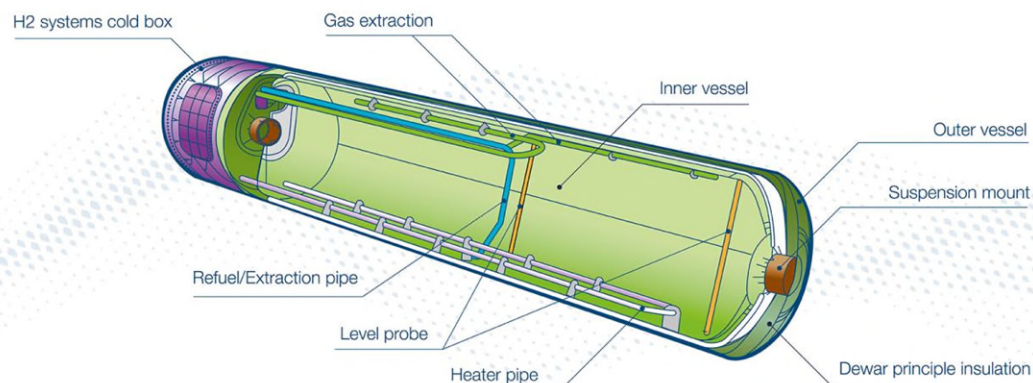
Versatility: H₂ could be used as an ingredient of Sustainable Aviation Fuel* or directly on-board an aircraft through direct combustion or fuel cells
(*combined with captured CO₂ to produce Power-to-Liquid synthetic fuel)



How to store H₂ in an aircraft ?



Liquid H₂ tank



ZERO-EMISSION AIRCRAFT

Airbus Amber

Challenges to H₂ adoption



Technology compatibility: bringing weight & cost down, e.g. LH2 storage!



Regulatory: standardisation (technology & rules)



Infrastructure: step-by-step transition and long term plan ('Hydrogen Hubs at airports')



H₂ availability & cost: growth of renewable electricity and hydrogen
Ecosystem (supply/demand) - Airbus is partnering worldwide!

ZEROe Hydrogen combustion demonstrator

Airbus Amber



A380 multimodal test platform
with its capacity to store large hydrogen tanks



Hydrogen combustion engine
located along the rear fuselage



4 liquid hydrogen tanks
stored in a caudal position



Liquid hydrogen distribution system

AIRBUS

ZEROe Fuel Cell demonstrator



A380 multimodal platform
to test and demonstrate all our hydrogen technologies



Megawatt power class



A fuel cell engine
located along the rear fuselage



Cryogenic liquid hydrogen tank
stored in the fuselage



Gaseous hydrogen distribution system



January 2023 Export Control Free

AIRBUS

ZEROe Demonstrators

Flight tests expected by mid of the decade
(around 2026)

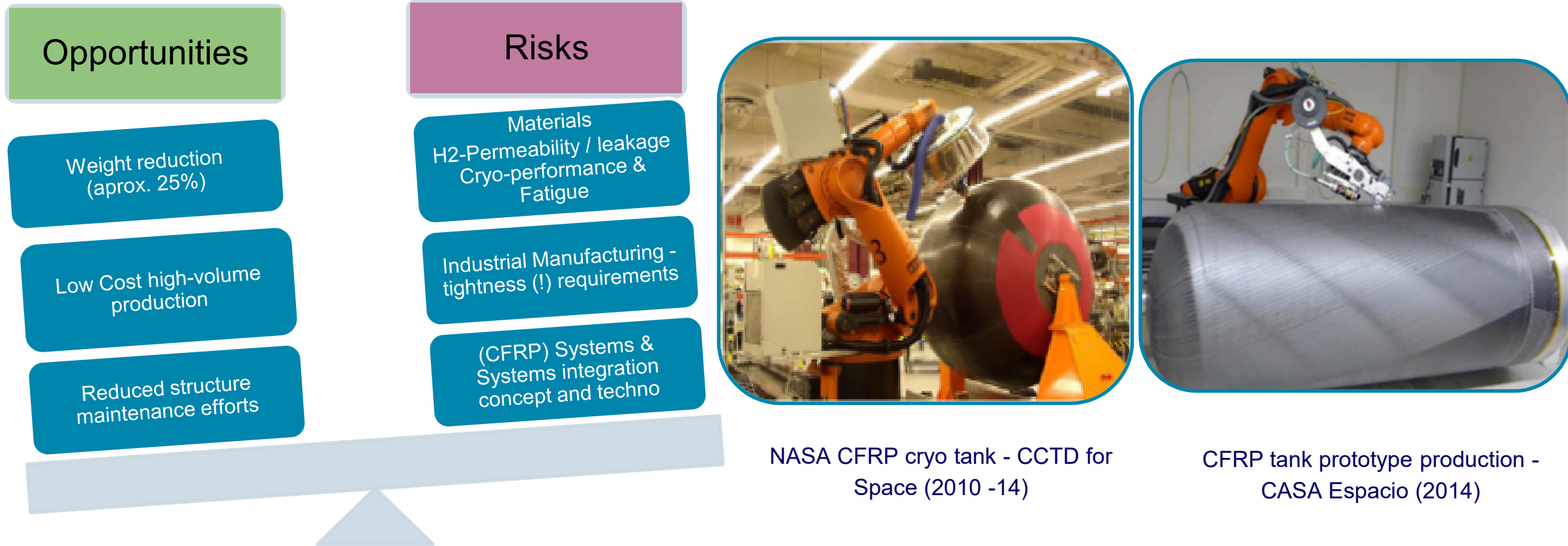
Airbus hydrogen-powered zero-emissions engine
(Airbus Summit 2022)



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- Composite / CFRP LH2 tank: weight saving **vs. metal baseline** but increased development risks
- Space: NO CFRP cryo-tanks have been implemented, no SoA application of LH2 Composite tank for long durability
- Airbus is working on the exploration and de-risking of a CFRP LH2 tank

Conclusions



- Great challenge for aviation: decarbonization of the sector, Net Zero Emissions in 2050!
- Airbus ambition: lead aviation decarbonization
- The journey has started: SAF*, incremental electrification, Hydrogen & ZEROe Aircraft
- Advanced Materials are key enablers for this ambition

“We Pioneer Sustainable Aerospace for a Safe and United World”

Leading the way in the decarbonisation of aviation

Thank you for your attention.

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