CLEAN AVIATION

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Clean Aviation
& its strategic cooperation with Regions

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Aviation: Huge economic impact

13.5 million Jobs in Europe

Massive social & economic value to Europe

Source : ATAG

4.4% of the European GDP

Sector generates substantial economic benefits

Highly **innovative** sector

High level of technical & engineering skills

Investing in **aviation** is investing in the **long term**

Aviation is key for Europe's competitiveness, industrial leadership & technological sovereignty

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Clean Aviation is a European private-public partnership

Aircraft Entry into Service **2035**

75% Fleet replacement by 2050

Targeted aircraft concepts:

Ultra-efficient **Regional** aircraft

-30% CO_2*

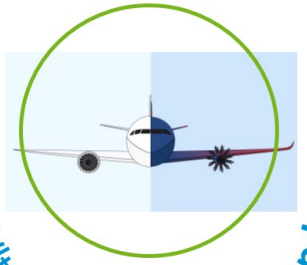
-90% CO_2* incl. **SAF**

SAF

Hydrogen powered aircraft

-100% CO_2*

H2



Ultra-efficient **Short and Medium Range** aircraft

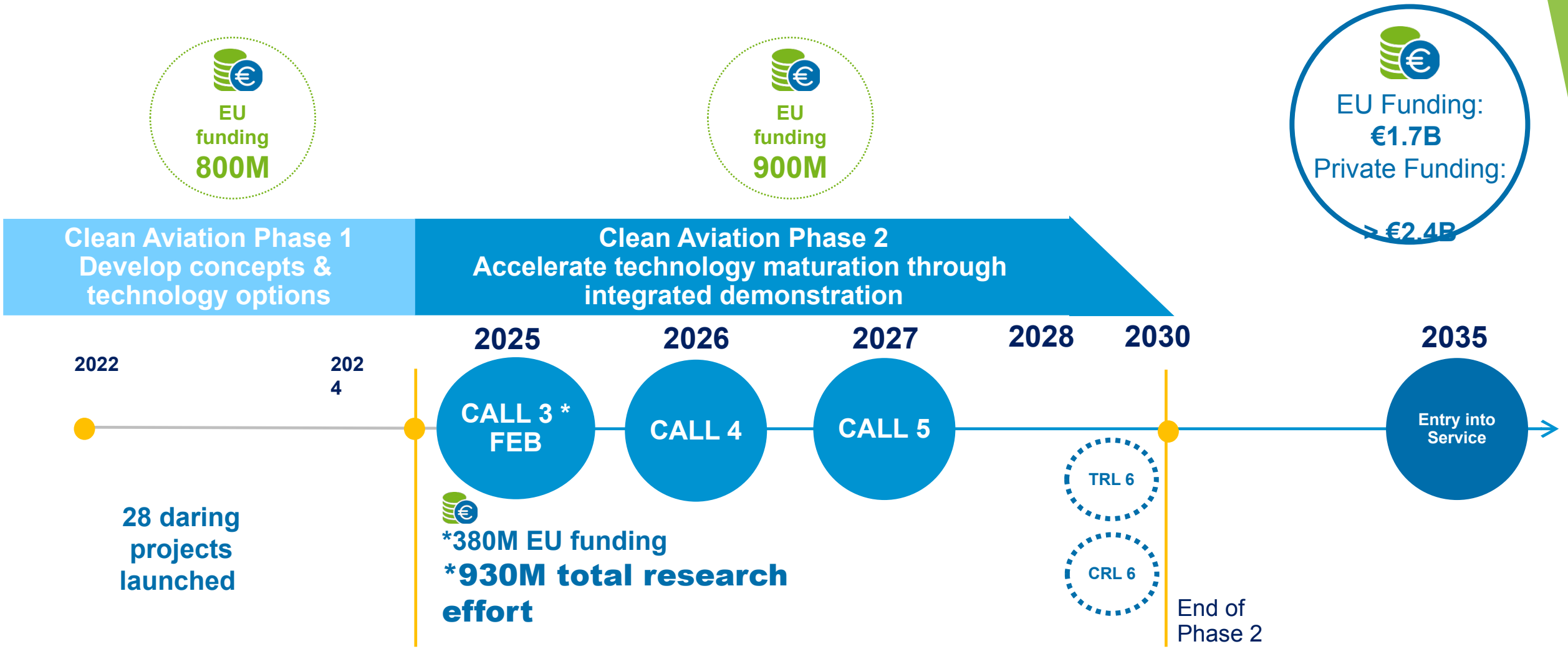
-30% CO_2*

-90% CO_2* incl. **SAF**

SAF

* non-CO_2 effects not yet quantified

Accelerating maturation & demonstration



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INTEGRATION, CERTIFICATION & PERFORMANCE ASSESSEMENT
15 M€

SAF

EASA

-30% CO_2*

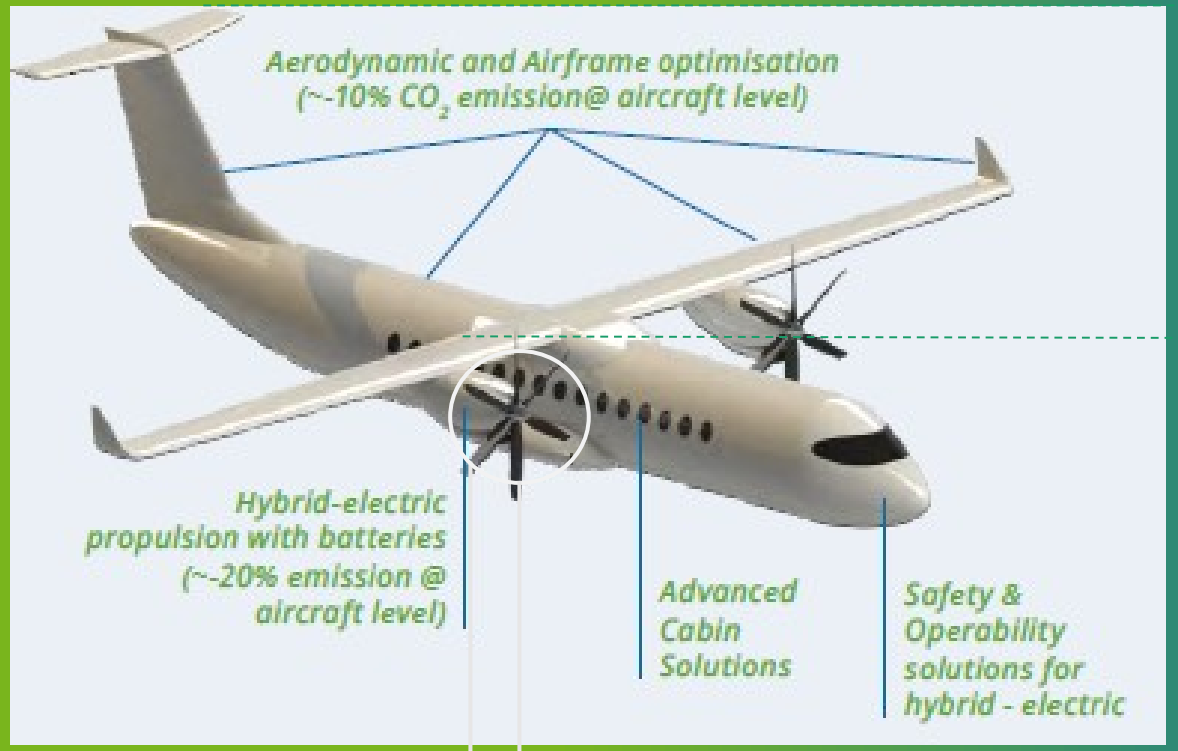
-90% CO_2* incl. SAF

Up to TRL6 / CRL6 for critical technologies by 2030

Regional Aircraft: main tech challenges ahead

EIS timeframe by 2035

Flight Test Demonstration of Hybrid-Electric Propulsion – 35 M€



FAST TRACK AREAS

- **Design and Integration of a High-Performance Battery System** on a Hybrid-Electric Regional aircraft – 5 M€
- **Advanced Concepts for Reliable Power Electronics Conversion and Distribution** in Aviation – 5 M€

Multi-MW Hybrid Electric Propulsion Systems – 70 M€

Demonstration of a Hybrid-Electric Propulsion System, including Pylon and Nacelle Integration and modification

Electrical Distribution, Thermal and Energy management systems - 40 M€

Demonstration of On-board Systems relevant for hybridization

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SMR Aircraft: main tech challenges ahead

Timeframe 2035

INTEGRATION, CERTIFICATION & PERFORMANCE ASSESSEMENT
15 M€

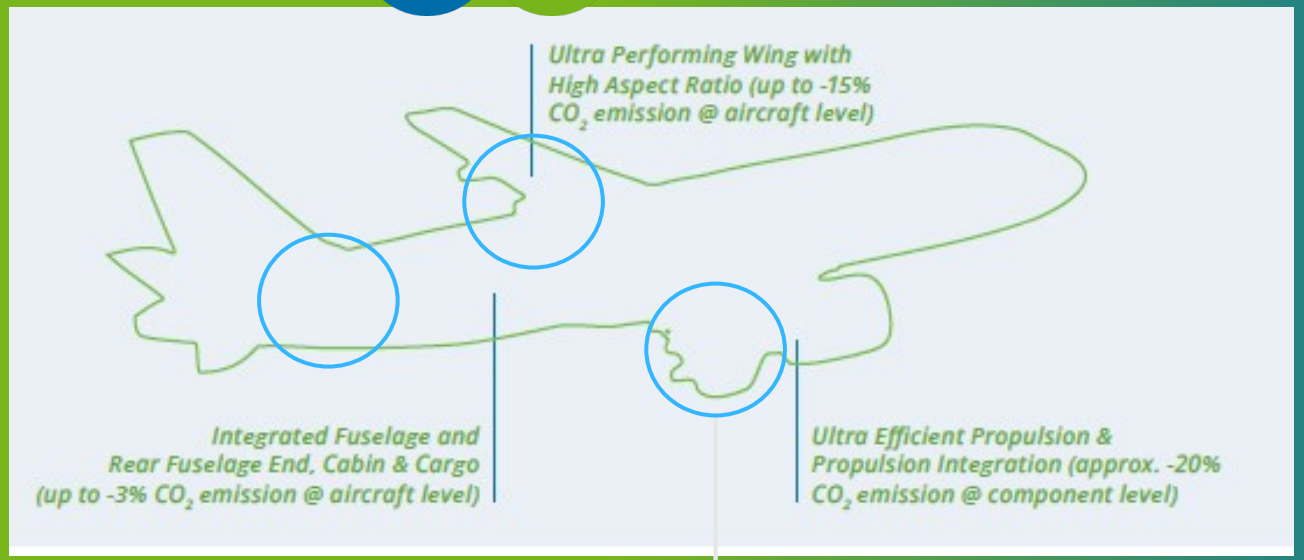
SAF

EASA European Aviation Safety Agency

-30% CO_2*

-90% CO_2* incl. **SAF**

Up to TRL6 / CRL6 for critical technologies by 2030



Propulsion concepts

- **Ground Test Demonstration and Preparation of Flight Test** of an Ultra High Bypass Ratio **Ducted** Geared Turbofan Engine – **70 M€**
- **Flight Test Demonstration** of an Unducted Engine Architecture – **100 M€**

Electrical Distribution & Thermal management

Ground Test Demonstration up to TRL5 of **On-Board NPE Systems** Architecture – **35 M€**

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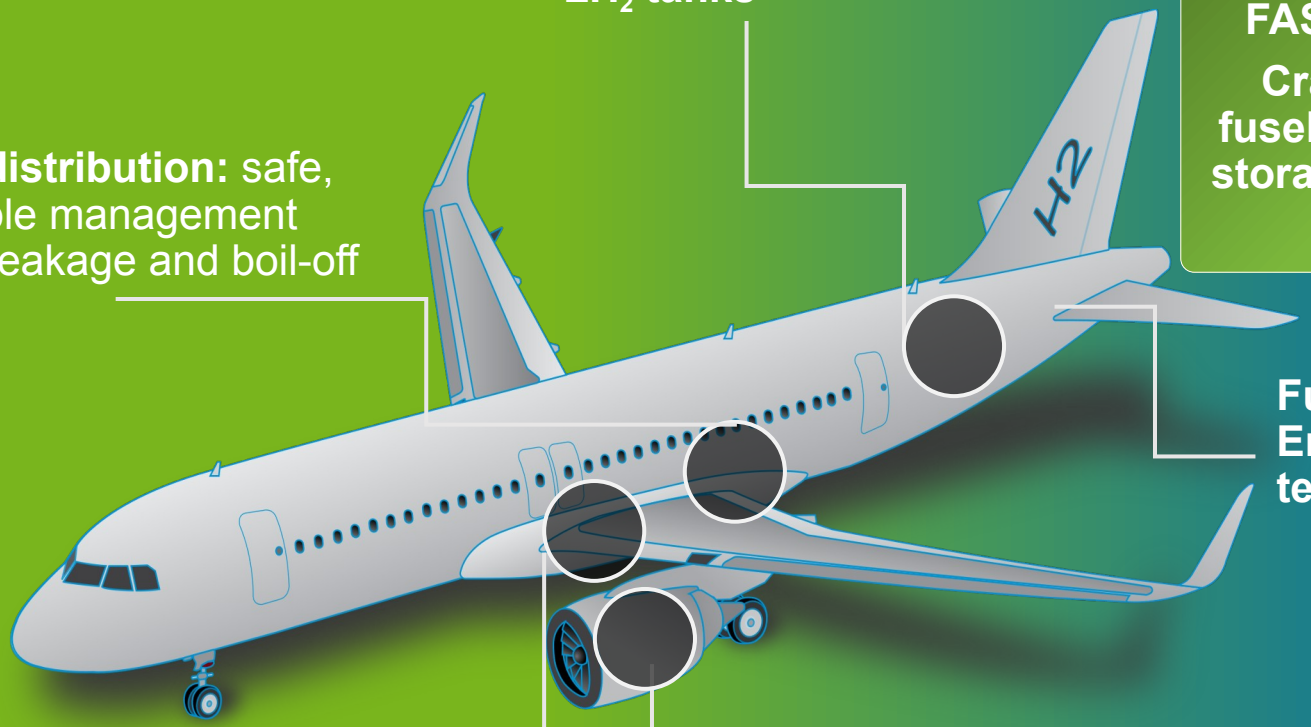
H2

TRL4 by 2026
TRL5/6 by 2030

Hydrogen aircraft: main tech challenges ahead

Timeframe 2035



LH_2 tanks

LH_2 distribution: safe, reliable management incl. leakage and boil-off

Fuselage & Empennage technologies

Fuel cell system: 2-3x higher power density (2kW/kg), high life-time

H_2 turbines: high efficiency and low NOx emissions

FAST TRACK AREAS

Crashworthiness of fuselage integrated LH2 storage solutions – 5 M€

Europe’s collective effort towards climate-neutral aircraft
Need for a more integrated synergies framework

sesar JOINT UNDERTAKING

Clean Hydrogen Partnership

EASA European Aviation Safety Agency

BATT4EU Batteries European Partnership

ALLIANCE FOR ZERO-EMISSION AVIATION

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REGIONE PIEMONTE

Federal Ministry for Economic Affairs and Climate Action

REGIONE CAMPANIA

CORAC

La Région Occitanie Pyrénées - Méditerranée

AEROSPACE TECHNOLOGY INSTITUTE

HAMBURG CITY

GOBIERNO DE ESPAÑA MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES

CDTI INNOVACIÓN

Clean Aviation synergies with Regions

OBJECTIVE: to foster a competitive and sustainable European aviation sector

Expected impact:

- Increased **exploitation** opportunities & **internationalization** for "local" supply chain (incl. SMEs, start-ups)
  - "local" supply chain **increasingly connected** to EU-leading aviation industry
- Additional **capabilities and resources** for sustainable aviation
- Development of new **skills** in loco
- Support **job** creation & European competitiveness

Strong support by

- Clean Aviation members
- EU Commission

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A&DM Torino, November 2023

Clean Aviation synergies with Regions

Key elements for impactful cooperation with Regions

- **Strong strategic/technical alignment**
  - Smart Specialization Strategy & Clean Aviation SRIA
  - Joint technical roadmap
- **Regions's commitment to align ambitious investments**
  - Regional Funding (e.g. Cohesion Funds/ERDF)
- **Memorandum of Cooperation (MoC)**
- **Connect to the largest number of Aeronautic Regions**
- **Connecting regional projects to Clean Aviation ecosystem**

  e.g. HYDROLAB

Joint technical roadmap between Campania Region & Clean Aviation JU

- **Developed by Region and Clean Aviation JU**
  - Key technical inputs from
    - Leonardo, Avio, Politecnico di Torino
    - DAP - Distretto Aerospaziale Piemonte

- **Defines technical areas of interventions**

AIRCRAFT TECHNOLOGIES

INFRASTRUCTURE & OPS

SUSTAINABLE FUELS

- **Contributions enabling technologies, e.g.:**

IA & digital

Batteries

H2

Advanced Materials

Advanced manufacturing

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JOINT UNDERTAKING

REGIONE PIEMONTE

Strategic cooperation plan on Net-Zero Aviation between Piemonte Region and Clean Aviation JU

- related to the Memorandum of Cooperation signed on 28th November 2023 by Piemonte Region and the Clean Aviation JU

1. Context

The Clean Aviation Joint Undertaking (CAJU) is the European Union's (EU) leading research and innovation programme for transforming aviation towards a sustainable and climate-neutral future, in line with the European Green Deal. It is a European public-private partnership between the European Commission through Horizon Europe (HE), the EU research and innovation programme, and the European aeronautics industry. It has a budget of €4.1 billion divided into €1.7 billion in EU funding and no less than €2.4 billion in private funding. The programme's disruptive clean aviation technologies will help reduce the greenhouse gas emission footprint of Short-Medium Range (SMR) aircraft by no less than 30% and 50% for regional range aircraft compared to 2020 state-of-the-art aircraft. The technological and industrial readiness of the Clean Aviation technologies will

3rd Call for Proposals

10 topics
- 20 Feb: Call opening
- 4 March 2025: Info Day (Brussels and online)

Total Research Effort
€930M

EU Funding
€380M

REGIONAL

- **Demonstration of a Hybrid-Electric Propulsion** System, including Pylon and Nacelle Integration and modification
- **Demonstration of On-board Systems** relevant for hybridization
- **Flight Test Demonstration** of Hybrid-Electric Propulsion for Regional aircraft

€ 145 M

SHORT-MEDIUM RANGE

- **Ground Test Demonstration and Preparation of Flight Test** of an Ultra High Bypass Ratio Ducted Geared Turbofan Engine
- **Flight Test Demonstration** of an Unducted Engine Architecture
- **Ground Test Demonstration** up to TRL5 of **On-Board NPE Systems** Architecture

€ 205 M

FAST TRACK AREAS

- **Design and Integration of a High-Performance Battery System** on a Hybrid-Electric Regional aircraft
- **Crashworthiness of fuselage integrated** LH2 storage solutions
- **Advanced Concepts for Reliable Power Electronics Conversion and Distribution** in Aviation

€ 15 M

 # AIRCRAFT CONCEPT INTEGRATION & IMPACT **€ 15 M**

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CLEAN AVIATION ANNUAL FORUM 25

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18 & 19 MARCH 2025 BRUSSELS

MASTERING THE SHIFT

#CAAF2025

Thank you