



Co-funded by
the European Union



Clean Aviation: The Ticket to Zero-Emission Flight

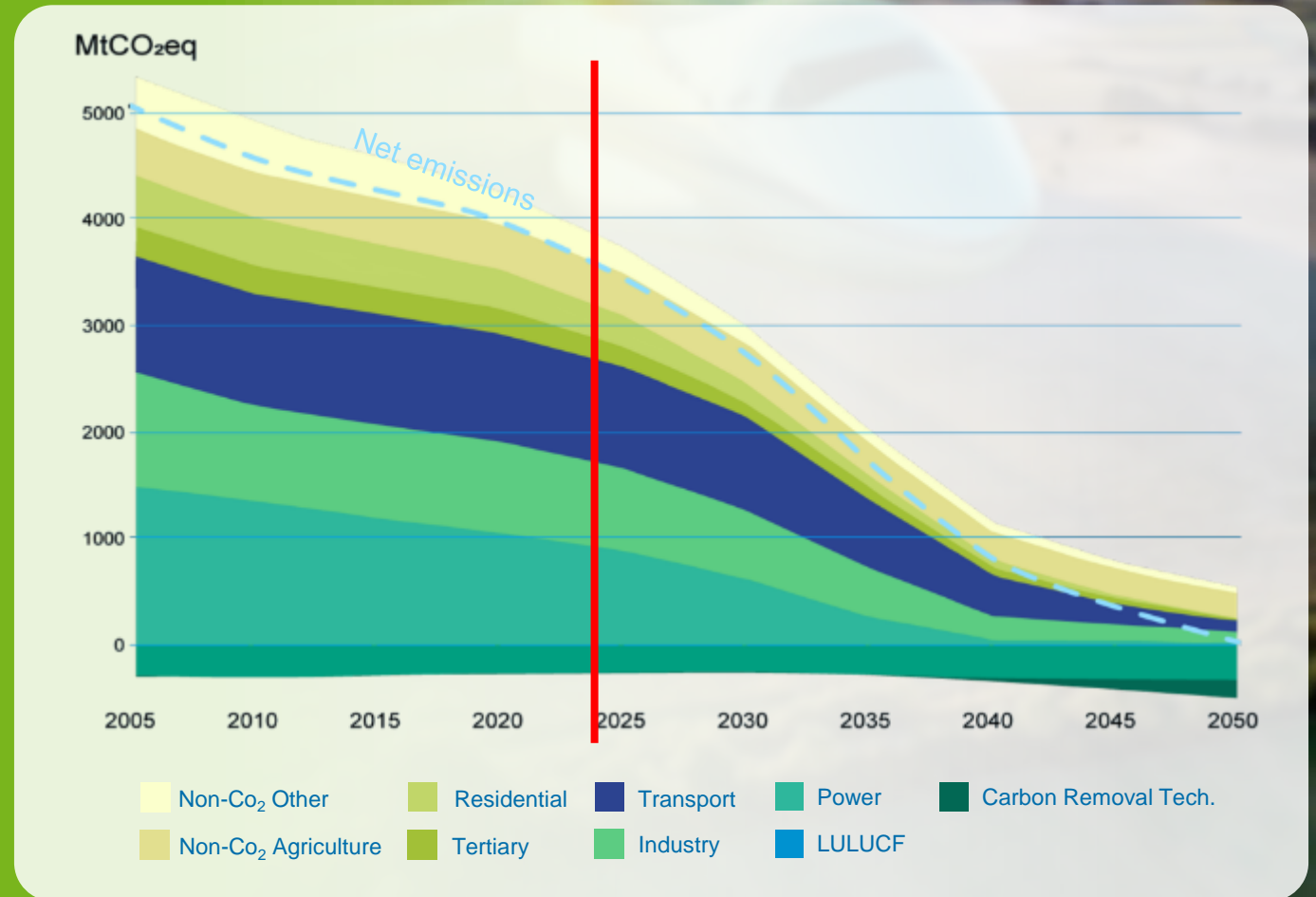


Axel KREIN
Executive Director

EASN CONFERENCE | 5 SEPTEMBER 2023 | SALERNO, ITALY

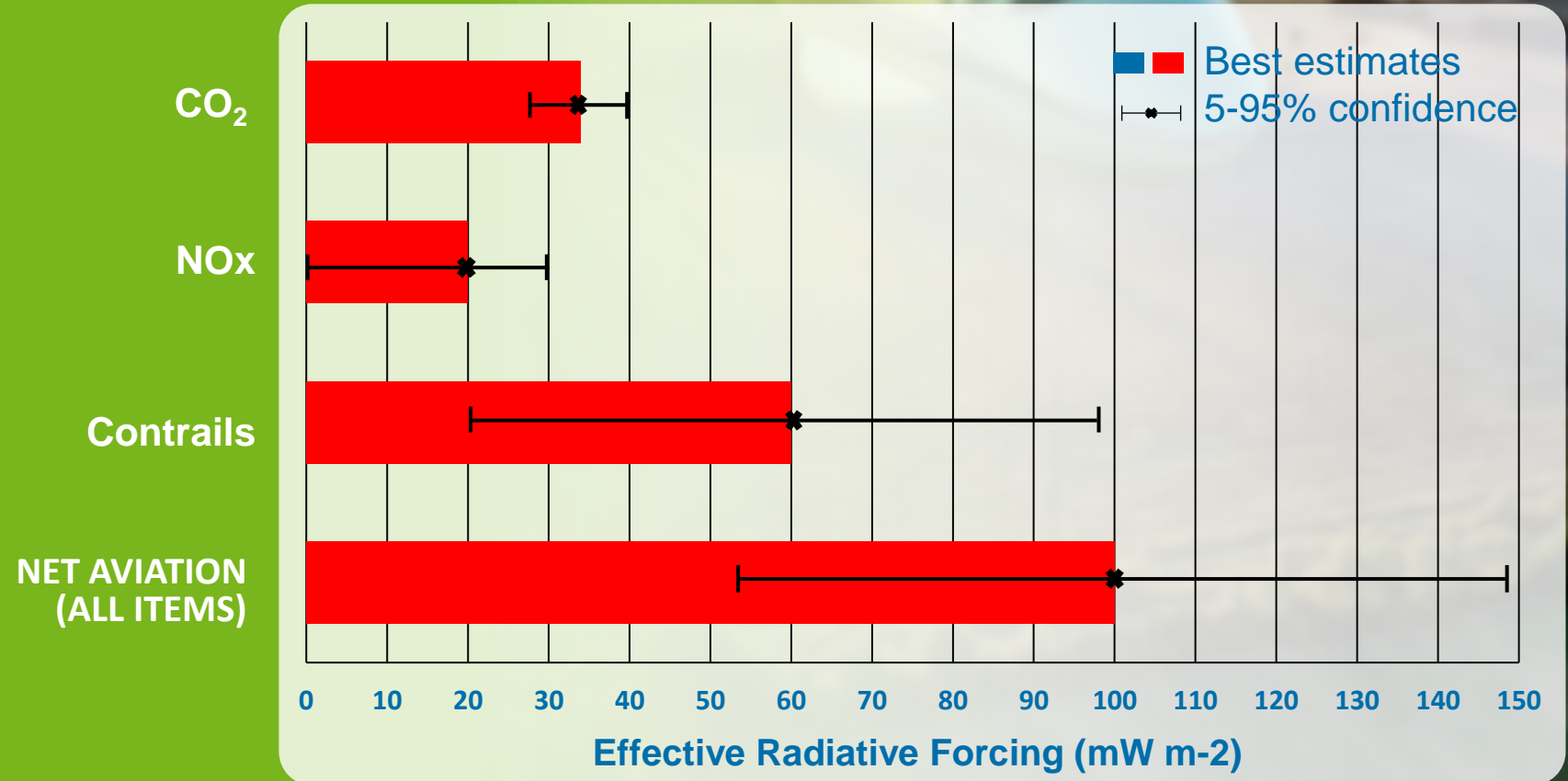
Towards a Net Zero society by 2050!

European commitment to
climate neutrality

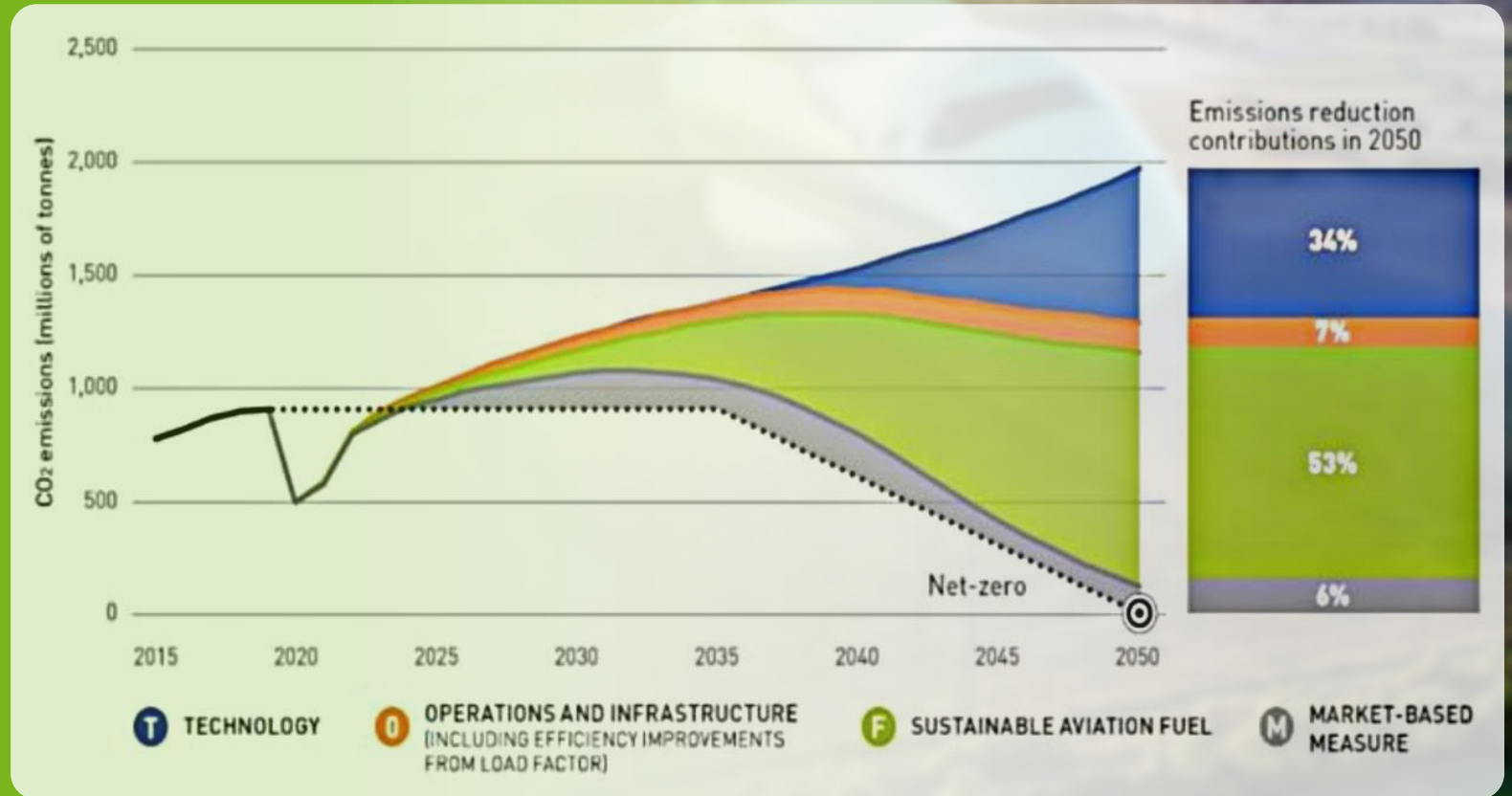


Climate impact is **NOT ONLY** about CO₂

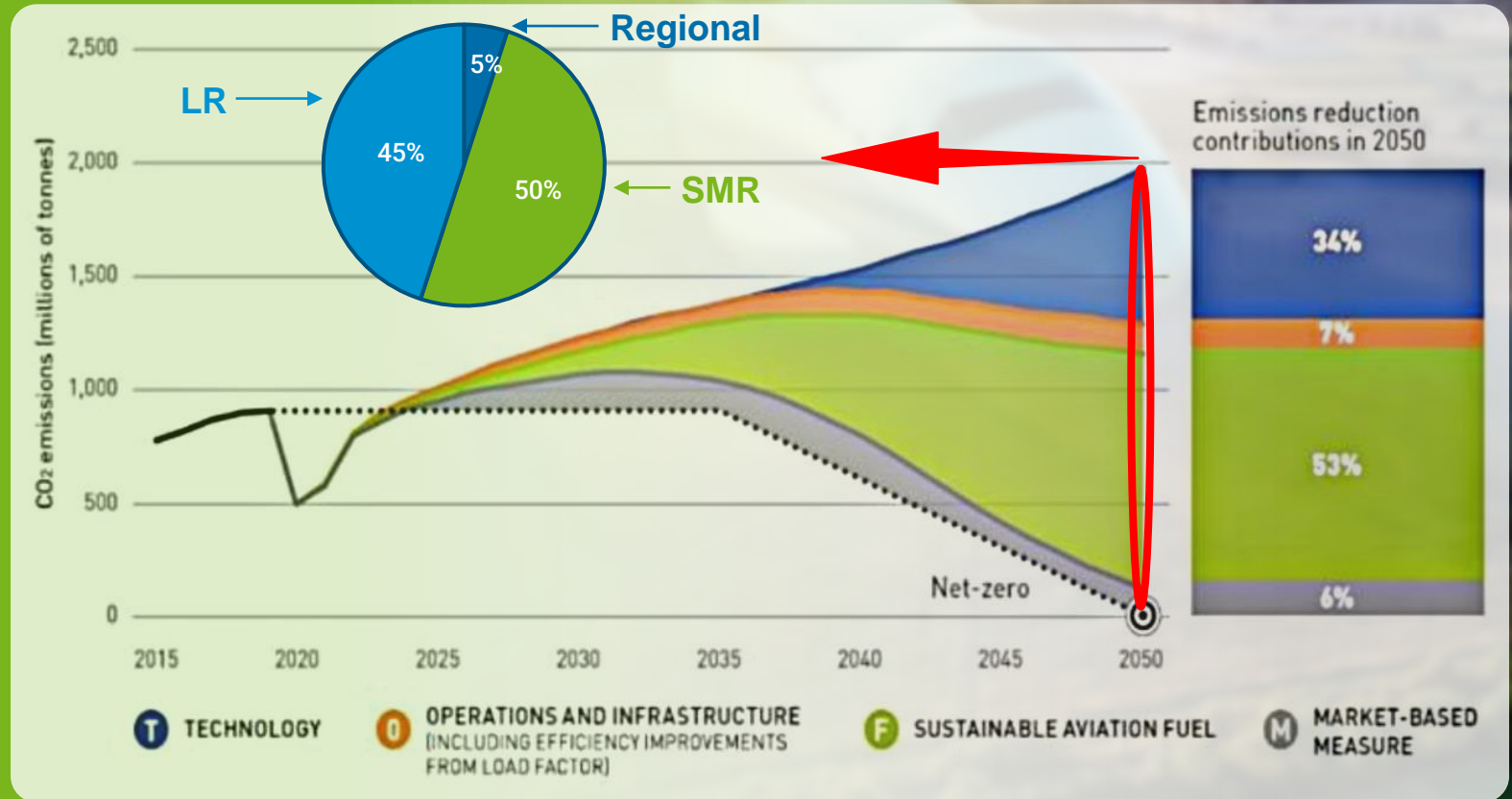
GLOBAL AVIATION EFFECTIVE RADIATIVE FORCING (ERF) TERMS (1940 TO 2018)












Technology & SAF (PtL & H₂) together will trigger disruption



Technology & SAF (PtL & H₂) together will trigger disruption



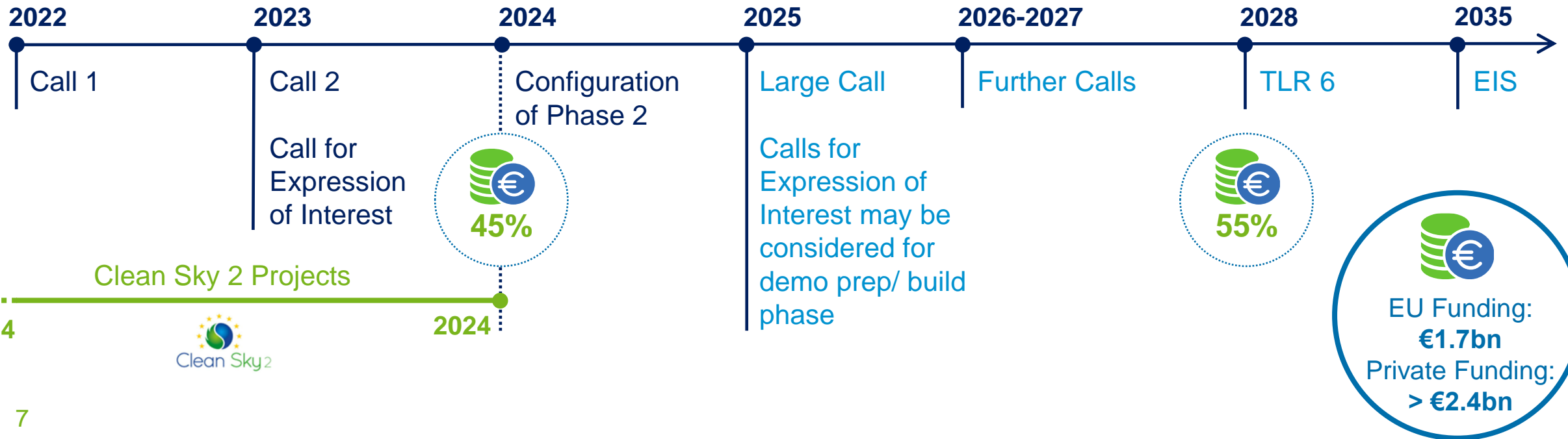
PtL SAF and H2 vs kerosene

	Environmental IMPACT			Cost		Sust. Energy Demand
	CO ₂ 	NOx 	Contrails 	 Fuel price from 2035	 Aircraft & Airports	
 PtL SAF	Net 0	=	↓	↑	=	↑ ↑
 H2 Direct burn	0	=	?	↓	↑ ↑	↑
 H2 Fuel Cell	0	0	?	↓	↑ ↑	↑

Clean Aviation: 2 Phases

Phase 1: Develop concepts, technology options and trade studies

Phase 2: Accelerate technology maturation through integrated demonstration

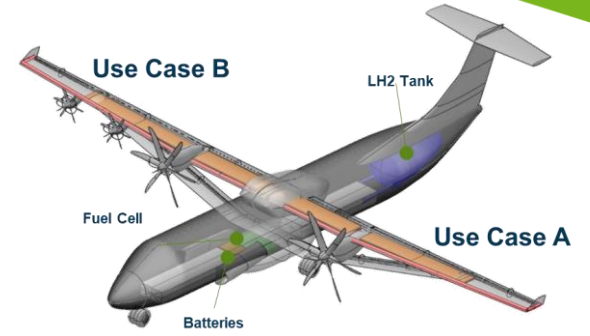


HER Clean Aviation concepts

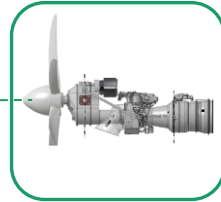


TRL3 by 2024
TRL4 by 2026

-50%
Block Fuel



PROPULSION



HE-ART



AMBER



NEWBORN

WING

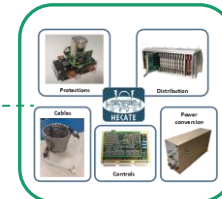


HERWINGT

SYSTEMS



THEMA4HERA

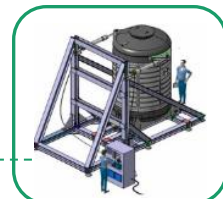


HECATE

CERTIFICATION & DIGITALIZATION



LH2 STORAGE



H2ELIOS

SMR ACAP Clean Aviation concepts



-30%
Energy
eff

TRL3 by 2024
TRL4 by 2026



-15%
Energy
Eff

TRL2 by 2024
TRL3 by 2026



PROPULSION



HEAVEN



SWITCH



OFELIA



CAVENDISH



HYDEA

WING



UPWING

FUSELAGE



FASTER H2



H2ELIOS

LH2 STORAGE

CERTIFICATION





Hybrid Electric

HE-ART



ROLLS-ROYCE

Hybrid Electric
Power Train
(up to ~3MW)

AMBER



GE AVIO

Hybrid Electric
Power Train
(Multi-MW class)

THEMA4HERA



HONEYWELL

Thermal
Management

HECATE



COLLINS

Electrical
distribution

HERWINGT



AIRBUS DS

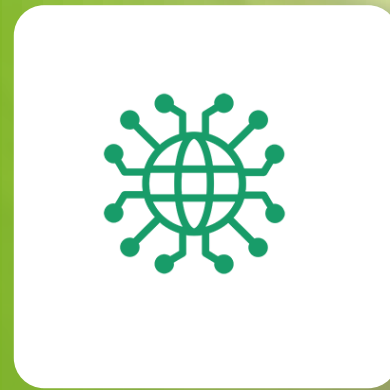
Innovative
Wing Design

**Call 1
contributing
projects**

Hybrid Electric



**Innovative
Fuselage/Empennage
Design**



**Open Platform
for Hybrid-Electric Regional
Design**

**Call 2
proposals**



Short Medium Range

HEAVEN



ROLLS-ROYCE

UltraFan –
Hydrogen & hybrid
gas turbine design

SWITCH



MTU AERO

Sustainable
Water-Enhanced-
Turbofan (WET)

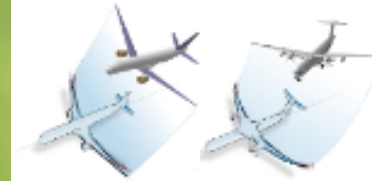
OFELIA



SAFRAN

OpenFan
engine
demonstrator

UP WING



AIRBUS

Ultra
performance
wing

FASTER-H2



AIRBUS

Fuselage H2
integration & Ultra
efficient empennage

Call 1
contributing
projects



Short Medium Range

SWITCH

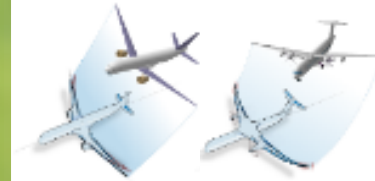


+

OFELIA



UP WING



High-TRL Flight demonstration means
for Ultra Efficient Propulsion Systems

Ultra
performance
wing
technologies
&
integration

Call 2
proposals

H₂ Hydrogen Powered Aircraft

CAVENDISH



ROLLS-ROYCE

Direct H₂
combustion
propulsion
hydrogen
powerplant

HYDEA



GE AVIO

Direct H₂
Combustion
propulsion

NEWBORN



HONEYWELL

Multi-MW
Fuel Cell
Propulsion

H2ELIOS



ACITURRI

Liquid H₂
Storage full
Scale ground
demonstrator

FLHYing Tank



PIPISTREL

Flight
demonstration
of LH₂ in
unmanned
cargo platform

HYPoTrade



PIPISTREL

Integrated Fuel
Cell power train
ground demonstrator

Call 1
contributing
projects

H₂

Hydrogen Powered Aircraft

HYDEA



**Integrated H₂
engine/aircraft fuel
systems ground test
and flight test
demonstrator
preparation**



**Multi-MW Fuel
Cell Propulsion
System for
Hydrogen-
Powered Aircraft**

**Call 2
proposals**

Powering partnerships and synergies in Europe

FROM CLEAN SKY 2

TO CLEAN AVIATION



18
MOUS



12
SYNERGY
LABELS



52
PILOTS
PROJECTS



> € 50M
FUNDING



Clean Hydrogen
Partnership



The region of Occitanie,
France



The region of Campania,
Italy

Meet our High Five Ambassadors



**AMELIA
GILCHRIST**

**Mechanical Engineering
student**

Durham University



**JEAN-CHRISTOPHE
LAMBERT**

**Co-founder
& CEO**

Ascendance Flight
Technologies



**TINE
TOMAŽIČ**

**Director of Engineering
& Programs**

Pipistrel Aircraft



**CHRISTIANE
VOIGT**

**Head of Department
Cloud Physics**

German Aerospace
Center (DLR)



**HENRI
WERIJ**

**Dean Faculty of Aerospace
Engineering**

Delft University of Technology

Call to Action

Mobilise
youth

Keep delivering
on
current
project portfolio

Identify
other **tech options**
for fast track injection
into
Clean Aviation
Phase 2





Co-funded by
the European Union

Thank you

www.clean-aviation.eu

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