

From barriers to breakthroughs: tackling aviation's top challenges

Competitiveness | Performance
Sustainability | Technology



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The Competitiveness Challenge

How does aviation create impact in Europe?



13.5 million jobs
4.4% of EU GDP



58% market share
of new civil aircraft
47% of global order
book
**70% of global
airspace** managed
with European ATM
technology

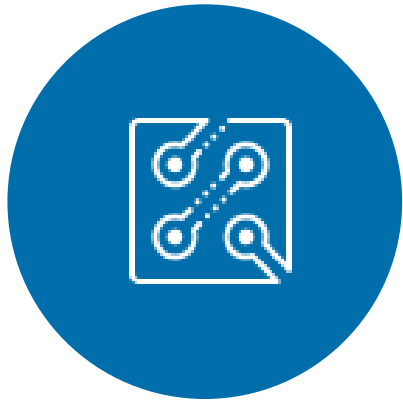


Strengthens
European **trade** and
strategic autonomy
**Advanced
technology** driven



Enables **mobility**,
education & research
Connects regions,
supporting EU
integration
& cohesion

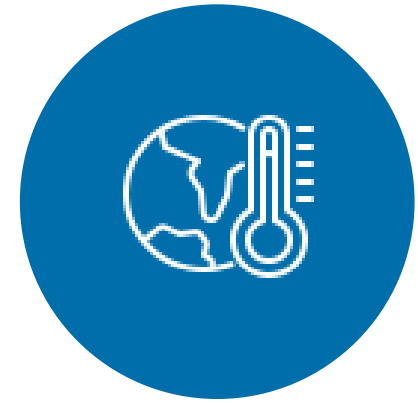
Aviation's challenges ahead



**Significant
technological
shifts**



**A complex
geopolitical
landscape**



**The challenge of
climate change**

EU vs global competitors: from leading to chasing?

USA  & CHINA 

- Aggressive public **investment in R&I** (incl. aircraft demonstrator platforms) outpacing EU by wide margins
- **Energy prices 2–5x lower** than EU, boosting industrial competitiveness
- Leading in **AI, digitalisation, batteries, hydrogen and advanced manufacturing**

TAKE AWAY: EU's position is fragile unless EU boldly invests in R&I & support to market uptake

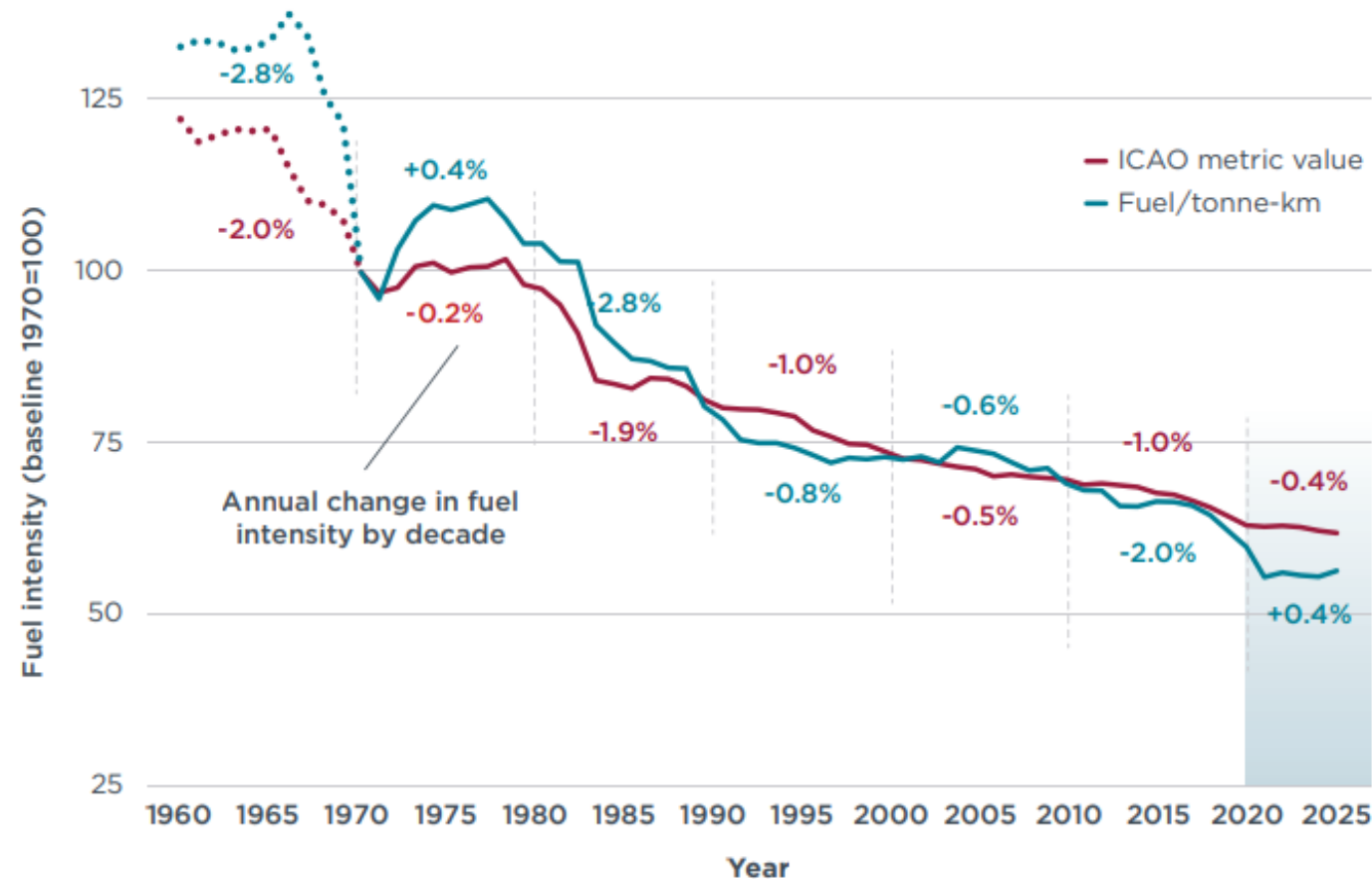


The Performance Challenge

Fuel burn trends for new commercial aircraft

Performance improvements are dependent on the introduction of newer aircraft models

Fuel burn trends for new commercial jet aircraft, 1960-2024



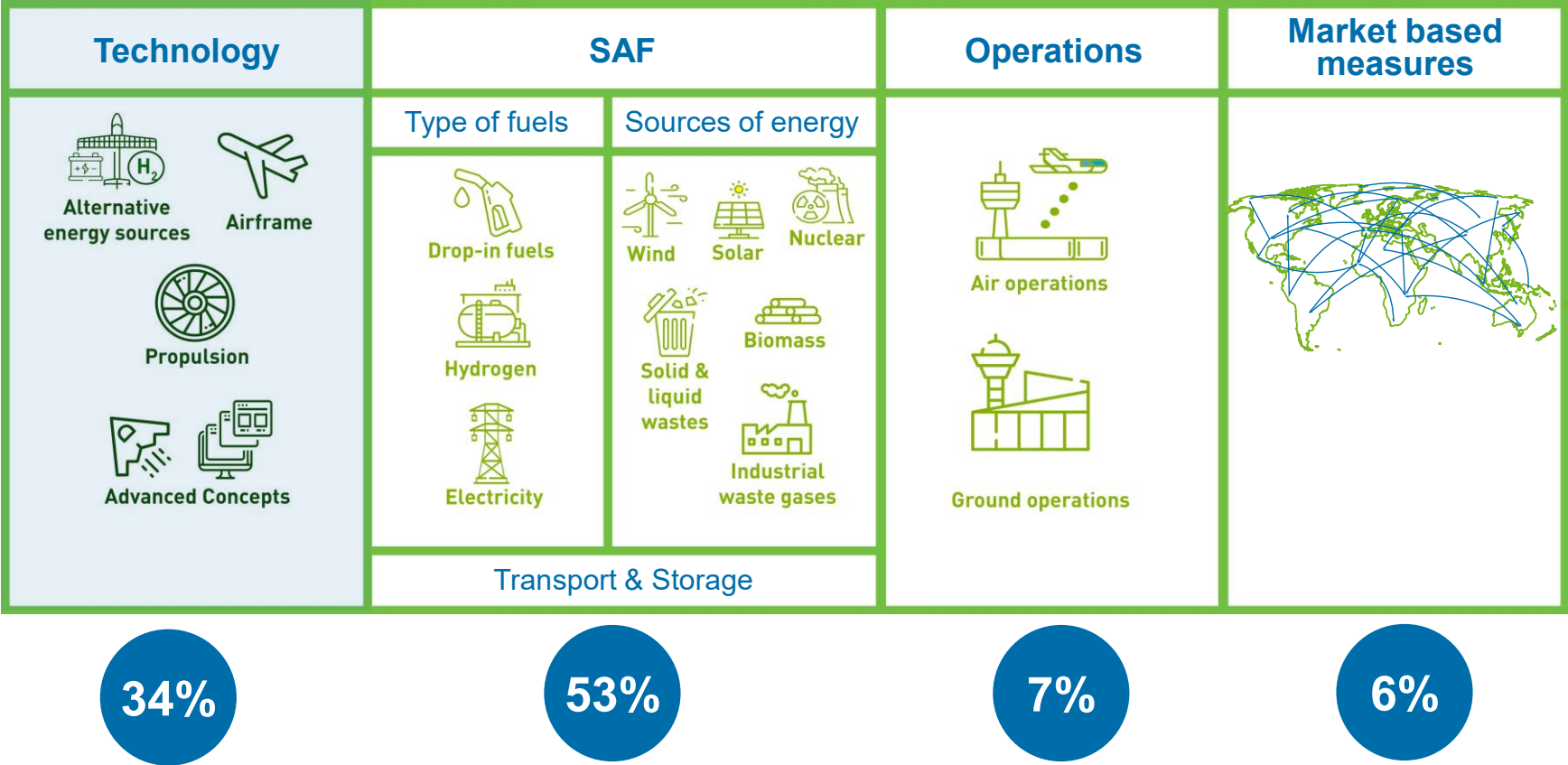
ICCT January 2025

The Sustainability Challenge

The CO₂ contribution reduction panorama by 2050

ICAO WORK ON LONG-TERM ASPIRATIONAL GOAL

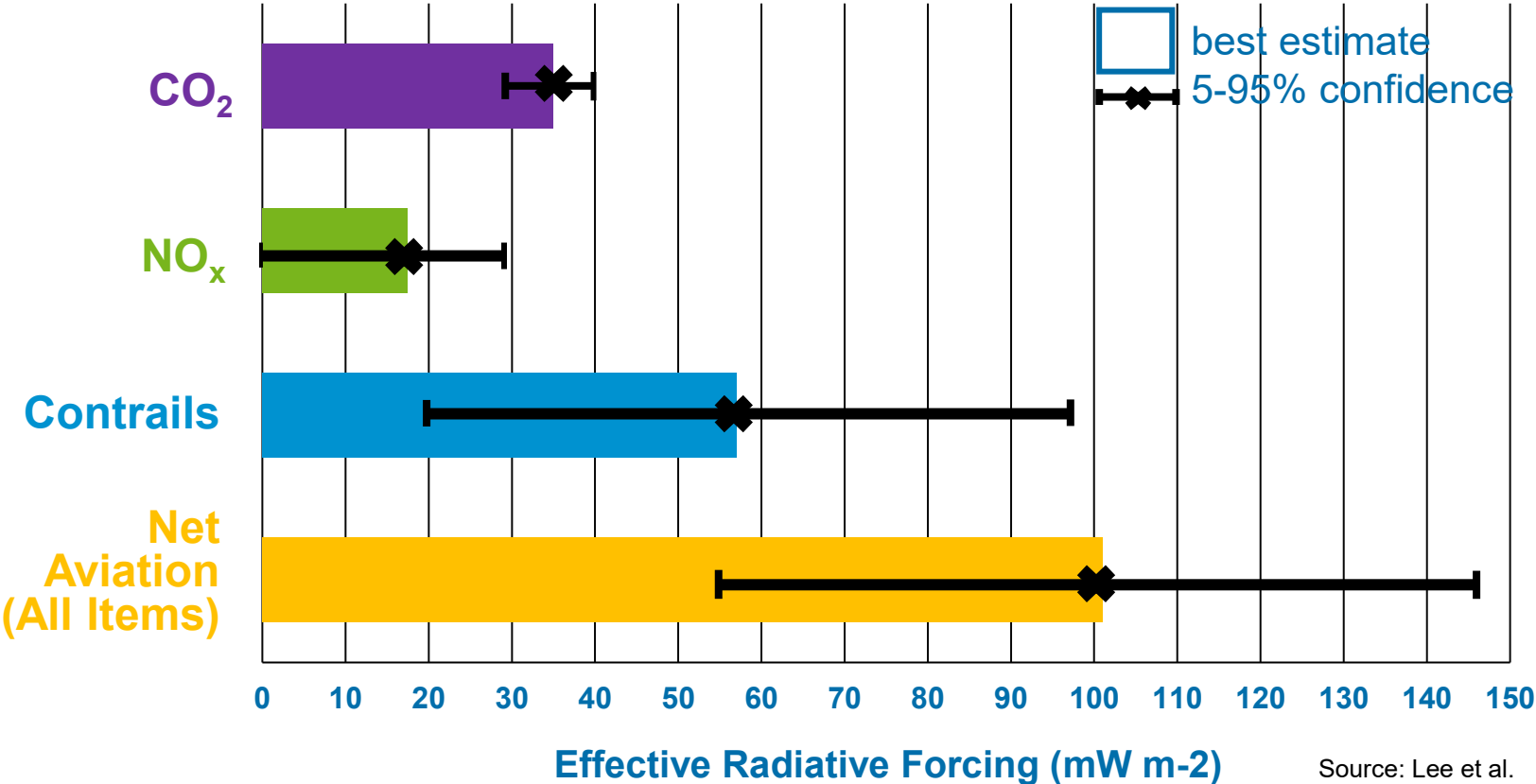
Breakthrough in CO₂ reduction will be triggered by disruptive technologies & SAF



ATAG Waypoint 2050 (2021), Scenario 3: aspirational and aggressive technology perspective

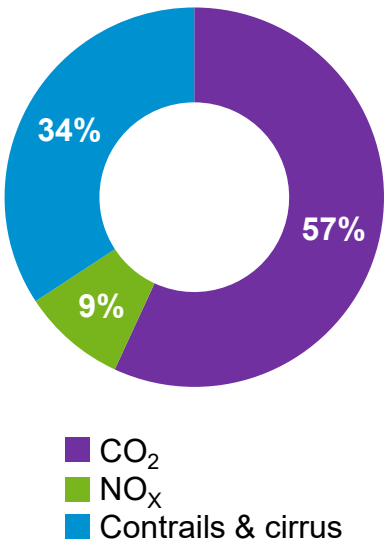
Climate Impact is NOT only about CO₂

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



GLOBAL WARMING POTENTIAL

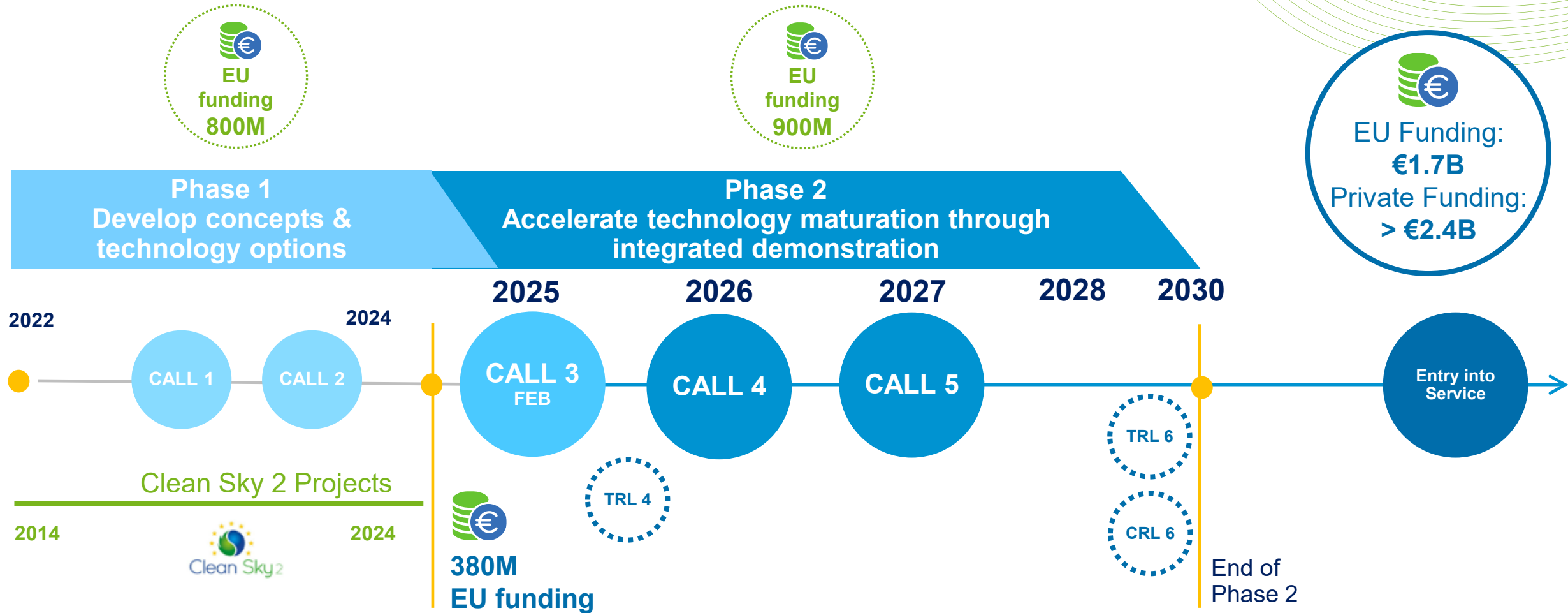
After 100 years



The Technology Challenge

Clean Aviation programme outlook and overview

Accelerating maturation & demonstration



Call 3: 12 projects with New Fast Track Areas



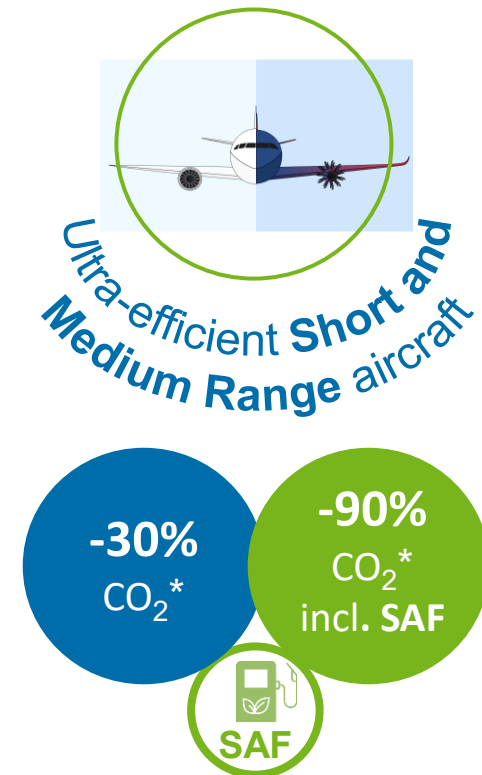
EU € 380M Private € 570M

 ULTRA-EFFICIENT SHORT-MEDIUM RANGE AIRCRAFT	 ULTRA-EFFICIENT REGIONAL AIRCRAFT	 FAST-TRACK AREAS	 AIRCRAFT CONCEPT INTEGRATION & IMPACT ASSESSMENT
TAKE OFF Technology And Knowledge for European Open Fan Flight <i>SAFRAN AIRCRAFT ENGINES</i>	PHARES Powerplant Hybrid Application for REgional Segment <i>PRATT & WHITNEY CANADA CORP.</i>	CRYOSTAR Certification Roadmap to Yield an Optimal and Safety methodology of crashworthiness for an integrated cryogenic Tank for liquid hydrogen storAge on board of future aircraft <i>UNIVERSITA DEGLI STUDI DELLA CAMPANIA LUIGI VANVITELLI</i>	HERACLES Hybrid Electric Regional Aircraft Concept for Low EmissionS <i>AVIONS DE TRANSPORT REGIONAL</i>
LEIA Large scale Integration demonstrator of hybrid electrical Architecture <i>AIRBUS OPERATIONS GMBH</i>	DEMETRA Demonstrator of an Electrified Modern Efficient Transport Regional Aircraft <i>AVIONS DE TRANSPORT REGIONAL</i>	MODABAT Modular, scalable and technology-Open Design for future Aviation BATteries <i>FRAUNHOFER GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG EV</i>	ACI&I Short Medium Range - Aircraft Configuration Integration and Impact <i>AIRBUS OPERATIONS GMBH</i>
UNIFIED Ultra Novel and Innovative Fully Integrated Engine Demonstrations <i>ROLLS-ROYCE PLC</i>	OSYRYS On-board SYstems Relevant for hYbridization of Regional aircraftS <i>SAFRAN ELECTRICAL & POWER</i>	POWER4AIR Arc Fault Detection, low EMI and Reliability for Power Electronics in Electric Aircrafts <i>SKYLIFE ENGINEERING SL</i>	
		LIME Lithium based Innovation for Modular Energy <i>ASCENDANCE FLIGHT TECHNOLOGIES</i>	



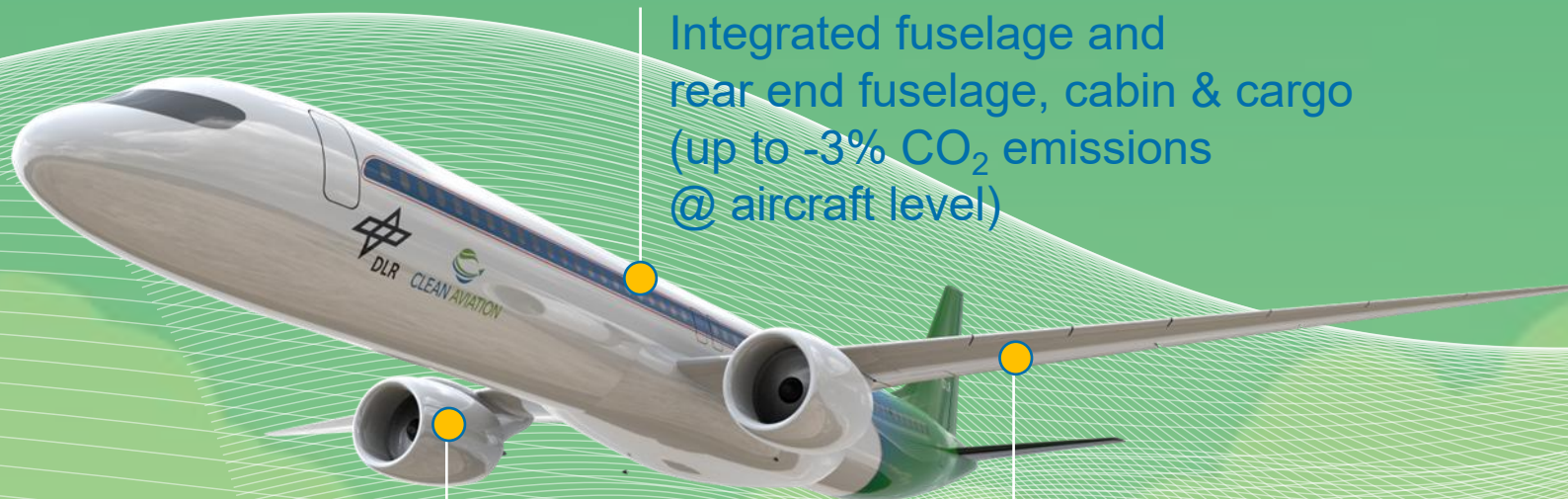
Clean Aviation results & outlook

Clean Aviation's aircraft concepts



* non-CO₂ effects not yet quantified

SMR Aircraft: Main tech challenges



Integrated fuselage and
rear end fuselage, cabin & cargo
(up to -3% CO₂ emissions
@ aircraft level)

Ultra Efficient Propulsion &
Propulsion Integration
(approx. -20% CO₂ emissions
@ component level)

Ultra performing wing with
high aspect ratio
(up to -15% CO₂ emissions
@ aircraft level)

Small Medium Range Technology Roadmap



Reference:
State of the Art
2020

2023 2024 2025 2026 2027 2028 2029 2030 EIS 2035

PROPULSION

Unducted Engine
Concept



Ducted Engine
Concepts



-20%
CO₂

Small Medium Range Technology Roadmap



Reference:
State of the Art
2020

2023

2024

2025

2026

2027

2028

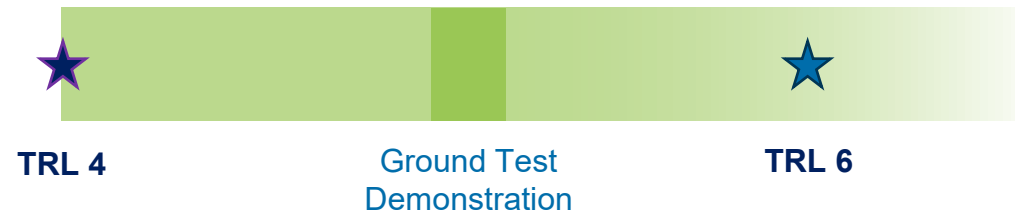
2029

2030

EIS 2035

SYSTEMS

On Ground Demonstration
of a Non-Propulsive Energy
Systems Platform



On Ground Demonstration of
a Optimized System Platform



AIRFRAME

Ultra-efficient RFE &
Industrial Systems



Enabler
for
MEA

2% CO₂
reduction at
AC level

High rate
Industrial
system
@100p/m

Regional Aircraft: Main tech challenges

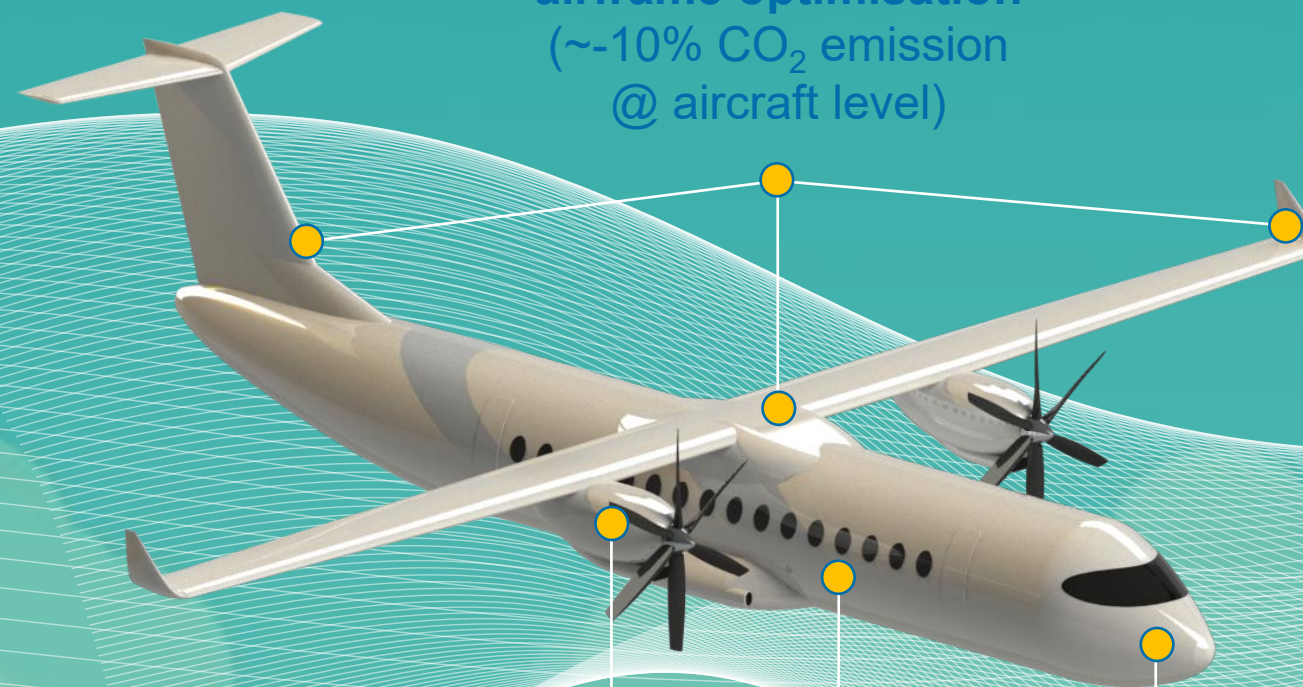


**Aerodynamic and
airframe optimisation**
(~10% CO₂ emission
@ aircraft level)

**Hybrid-electric
propulsion with batteries**
(~20% emission
@ aircraft level)

**Advanced
cabin
solutions**

**Safety &
operability
solutions**



Ultra-Efficient Regional Technology Roadmap

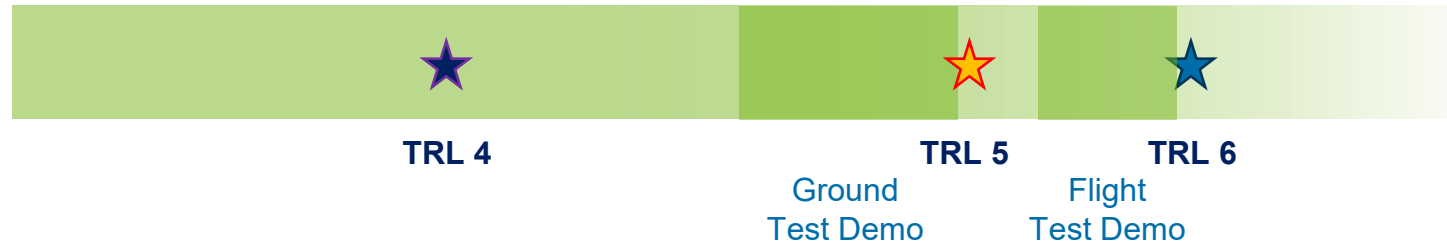
Reference:
State of the Art
2020

2023 2024 2025 2026 2027 2028 2029 2030

EIS 2035

PROPULSION

Hybrid-Electric
Propulsion System
(HEPS)



SYSTEMS

Electric
distribution
& thermal
management
Systems



AIRFRAME

Advanced Airframe
(and enabling
systems)



-20%
CO₂

-10%
CO₂

Hydrogen aircraft: Main tech challenges



Fuselage & empennage technologies:
safe installation of tank,
compliance with safety
(crashworthiness)

LH₂ storage:
2x higher energy density
(12 kWh/kg or gravimetric
index of 35%)

LH₂ distribution:
safe, reliable
management incl.
leakage

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

H₂ turbines:
high efficiency
and low NO_x
emissions



Hydrogen Powered Aircraft Technology Roadmap

H₂

2020

2023

2024

2025

2026

2027

2028

2029

2030

EIS 2040+

H₂ combustion
propulsion system



TRL 4

Ground Test
1st Gen Demo

TRL 4

Ground Test
2nd Gen Demo

H₂ fuel cell
propulsion system



TRL 4

Ground Test
1st Gen Demo

TRL 4

Ground Test
2nd Gen Demo

H₂ refuelling,
storage,
and distribution



TRL 4

Ground Test
Tank Demo

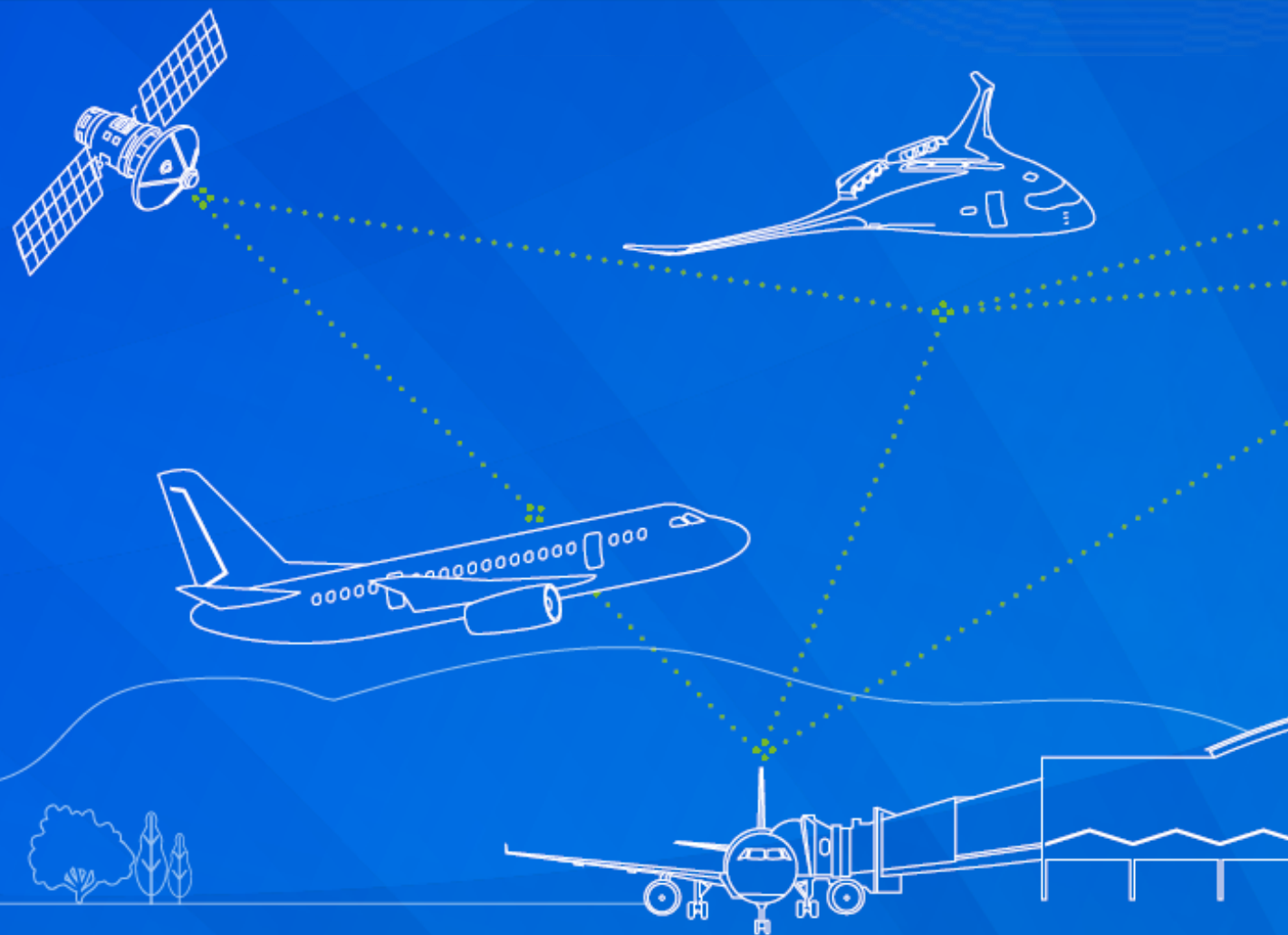
TRL 4

Ground Test Full
System Demo

-100%
CO₂

AVIATION RESEARCH & INNOVATION STRATEGY

A pathway to competitive and
sustainable aviation supporting
Europe's sovereignty



ARIS handover to the EC

AVIATION RESEARCH & INNOVATION STRATEGY

A pathway to competitive and sustainable aviation supporting Europe's sovereignty

- ARIS handover to Commissioner Apostolos Tzitzikostas
- Paris Airshow, 16 June 2025
- +100 contributors



ARIS: key recommendations



Three key areas for R&I investment covering the full innovation chain (from TRL 0 to 6+) and all aircraft segments

- Aircraft Technologies: Developing competitive, more efficient, and zero emission aircraft technologies
- Air Traffic Management: Establishing the Digital European Sky
- Transforming Enablers: Enhancing European manufacturing, maintenance, digitalisation and workforce upskilling.

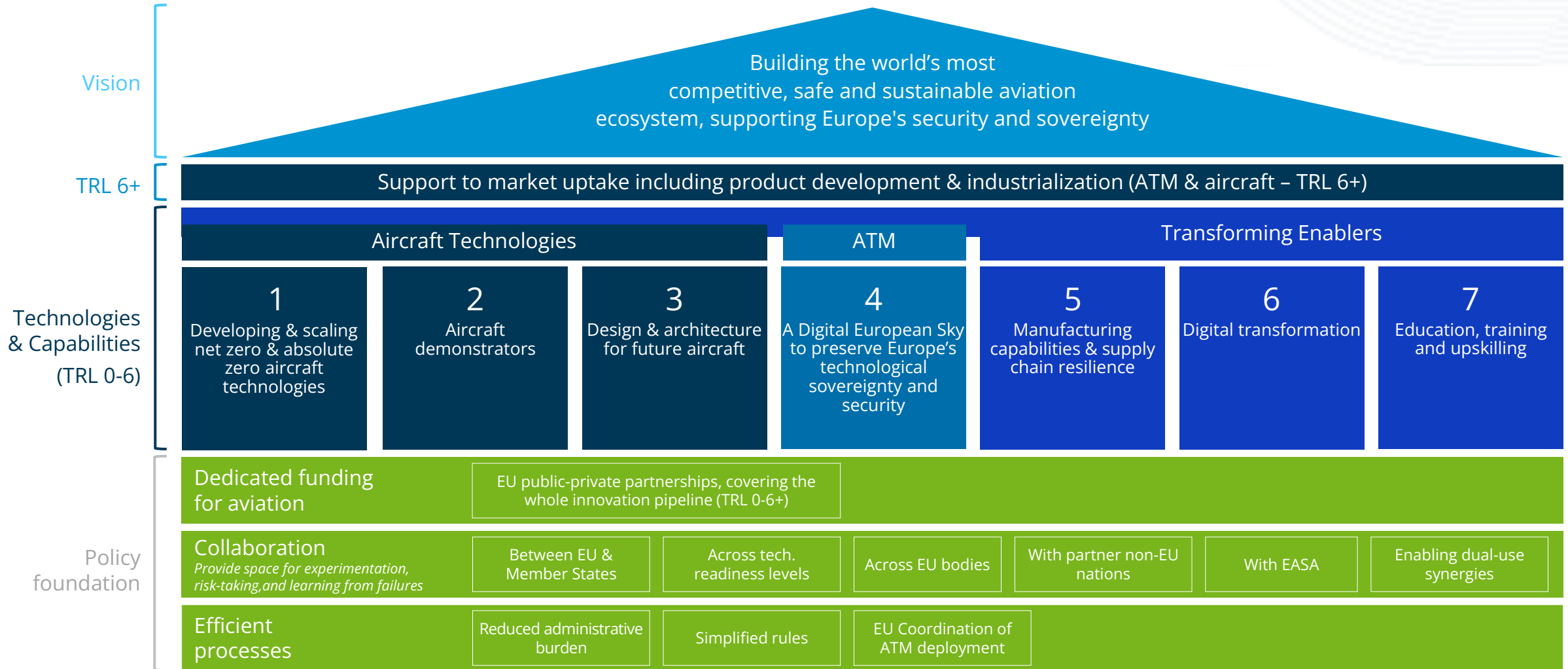


Collaboration is key: a Europe-wide R&I strategy and coordination at EU level, leveraging public and private investments is essential for Europe's competitiveness and to achieve global decarbonisation goals.



The next EU Multiannual Financial Framework (2028-2034) needs a focused investment of approximately EUR 66 bn (of which EUR 22.5 bn is required at EU level) in EU aviation R&I and support to market uptake to meet competitiveness, sustainability and EU strategic autonomy objectives.

A new framework for action on European aviation



Clean Aviation: a moonshot project made for impact



Clean aviation listed as a “Moonshot project” in the European Commission's proposal for the next EU budget (which includes the new Horizon Europe):

- These projects are aimed at moving from research to demonstration and real-world deployment.
- They should receive funding from EU (the new Horizon Europe and the European Competitiveness Fund), national, public, and private sources.

This recognition is a first milestone for the implementation of ARIS and a very positive signal from the European Commission.

The way forward



➤ **Public & private sectors to establish a common European aviation roadmap**



➤ **EU and Member States to increase the support to aviation R&I and market uptake substantially**



➤ **Private aviation sector to deliver on its commitments**



I Thank you