How will emerging technologies influence future aviation?

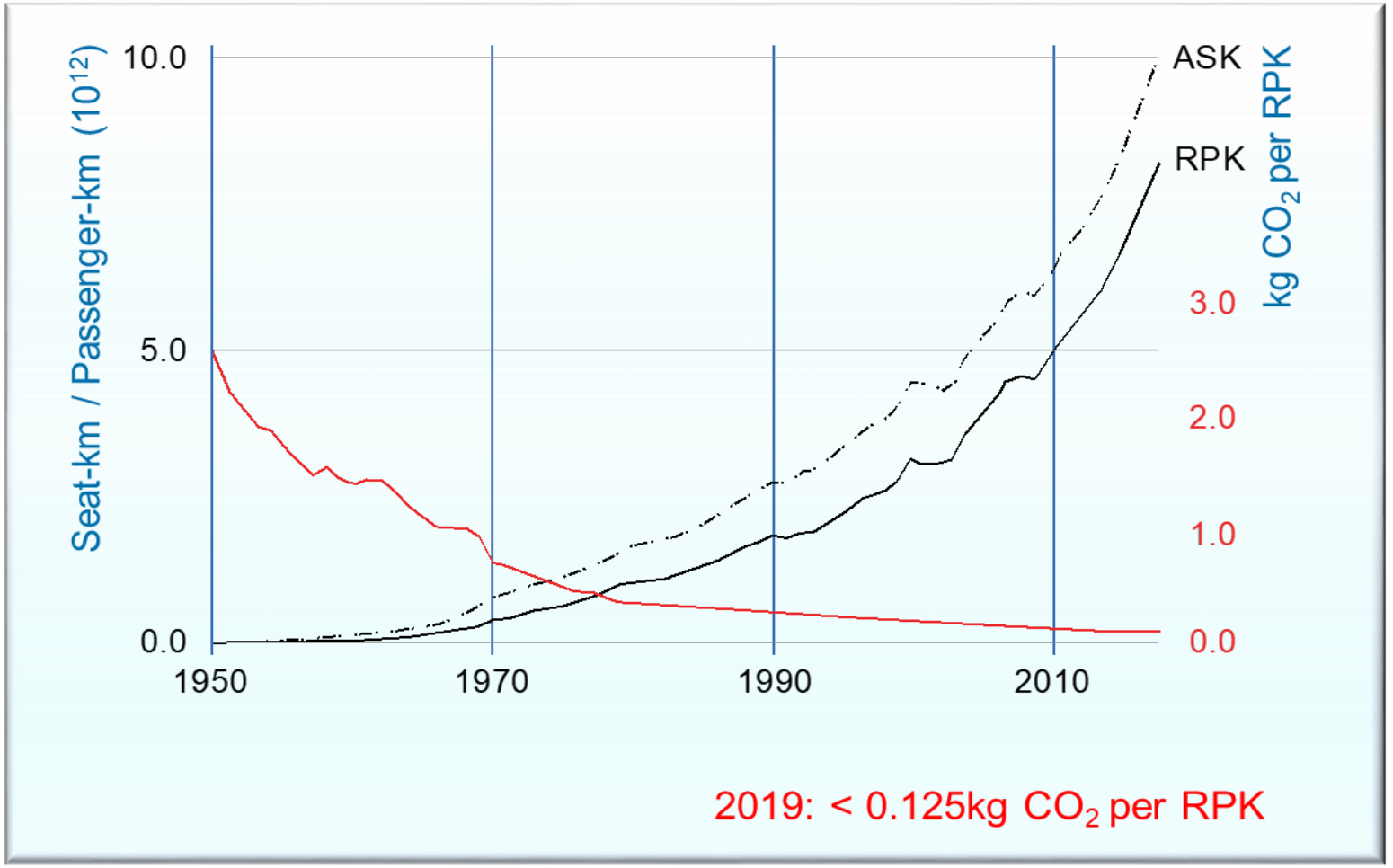
The Dutch National Aviation R&I Programmes

Ron van Manen – Executive Director
Luchtvaart in Transitie

AVIATION FORUM AUSTRIA
Vienna, 28-29 Sept. 2023

WHY DO WE NEED EMERGING TECHNOLOGIES?

- **1969-2019:**
  - +80% fuel efficiency
- **1989-2019**
  - RPKs quadrupled
  - Emissions doubled

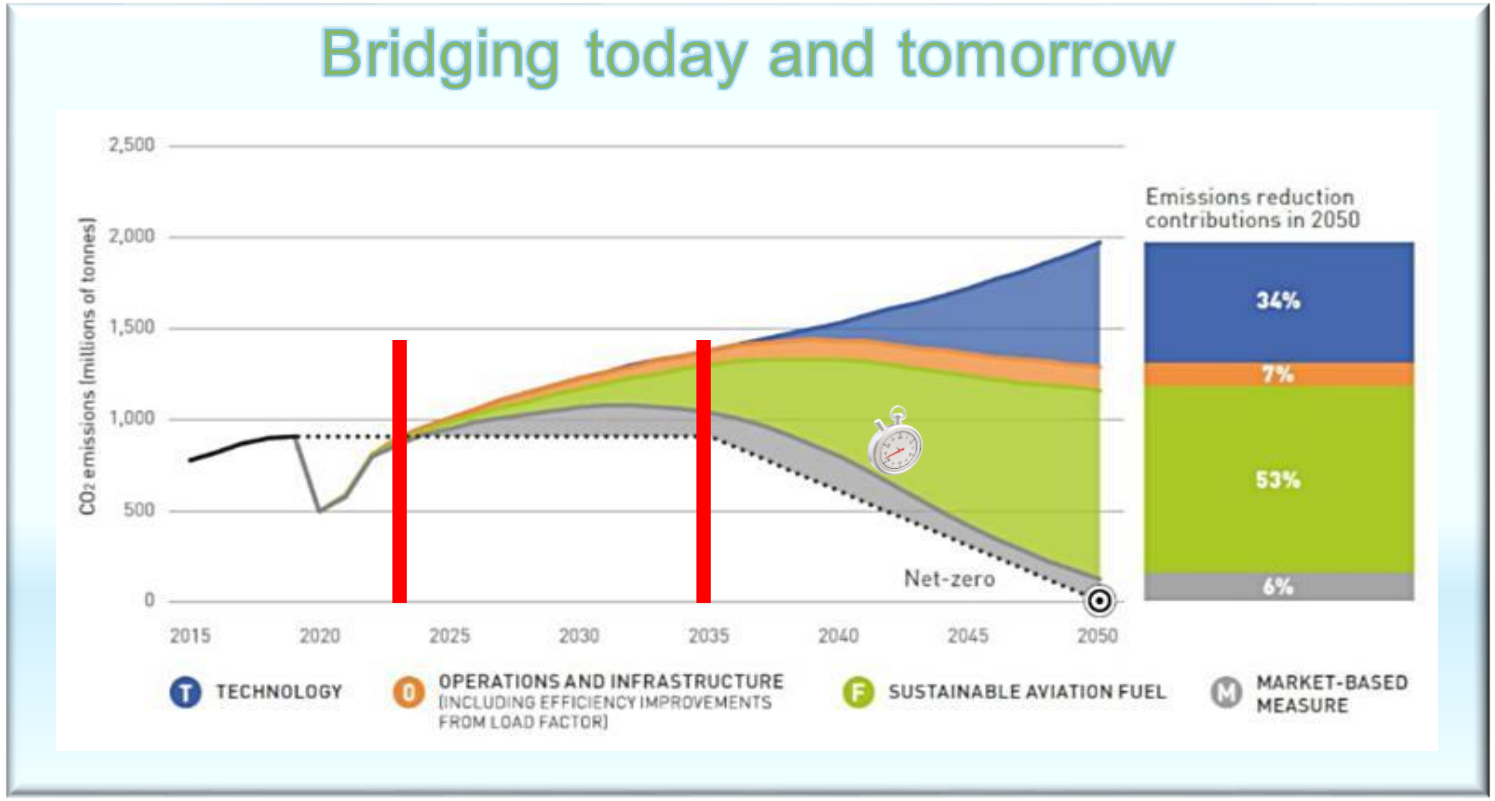


…not the *only* technology opportunity but aviation's *existential challenge*

LUCHTVAART in transitie

WHY DO WE NEED EMERGING TECHNOLOGIES?

- **ATAG Waypoint 2050**
- **Destination 2050**
- **ACARE *Fly the Green Deal***
- **ICAO LTAG resolution**



…the clock is ticking. Emerging technologies will be critical to the journey

LUCHTVAART in transitie

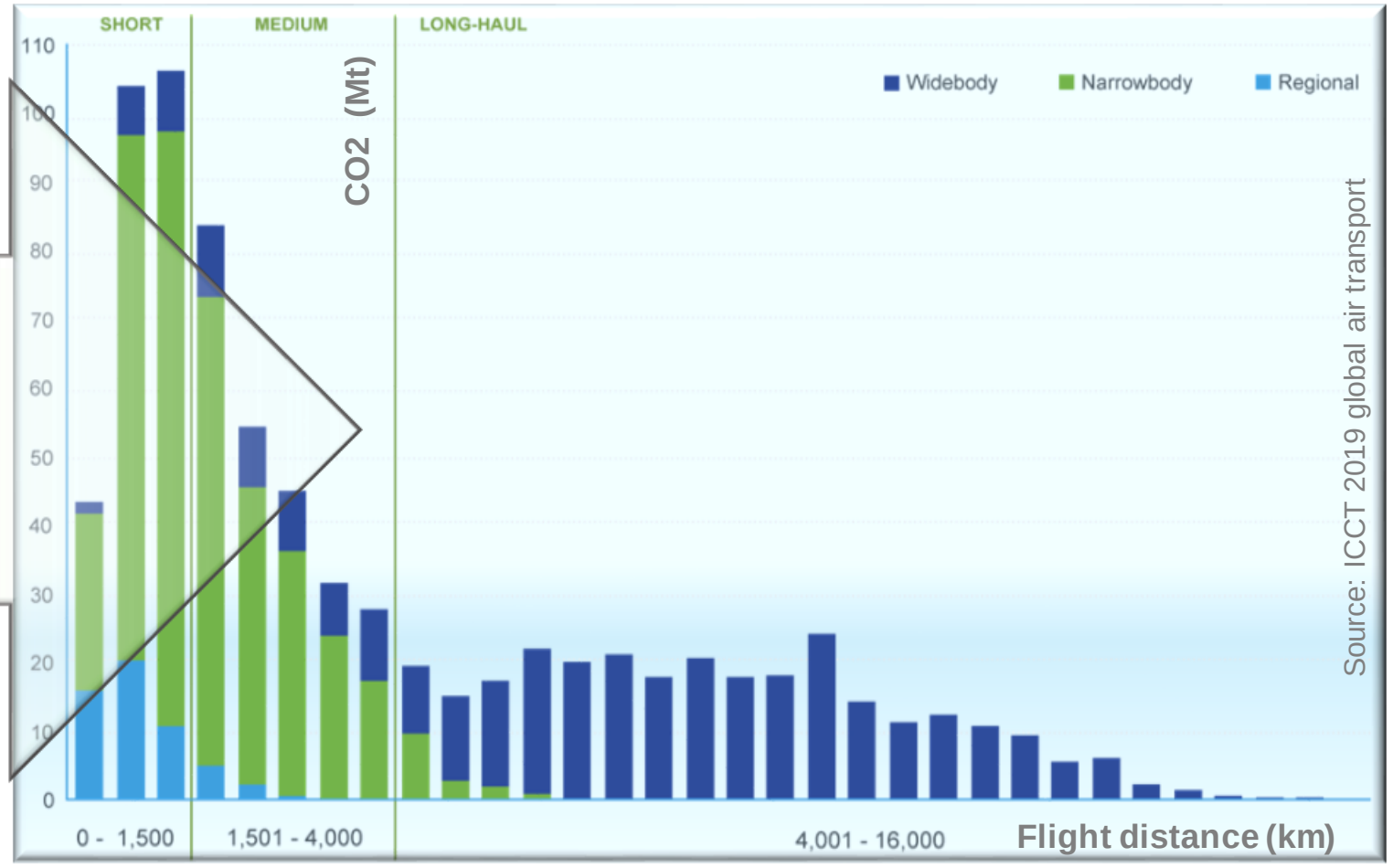
SYSTEM-OF-SYSTEMS CHALLENGE

- Reduce energy consumption → “use the **least** fuel/energy possible”
- Reduce the carbon/climate footprint → “use the **right** fuel/energy source”
- Aligning **infrastructural investment** and roll-out to fleet roll-over
- **Timely and affordable certification** for disruptive new technology/aircraft:
- **Accelerated EIS** and “out of the box” high **production rates** (R100!)
- Production cost ←→ fleet acquisition cost: **the business case and the capital**?

LUCHTVAART in transitie

THE GLOBAL AVIATION SYSTEM: EMISSIONS

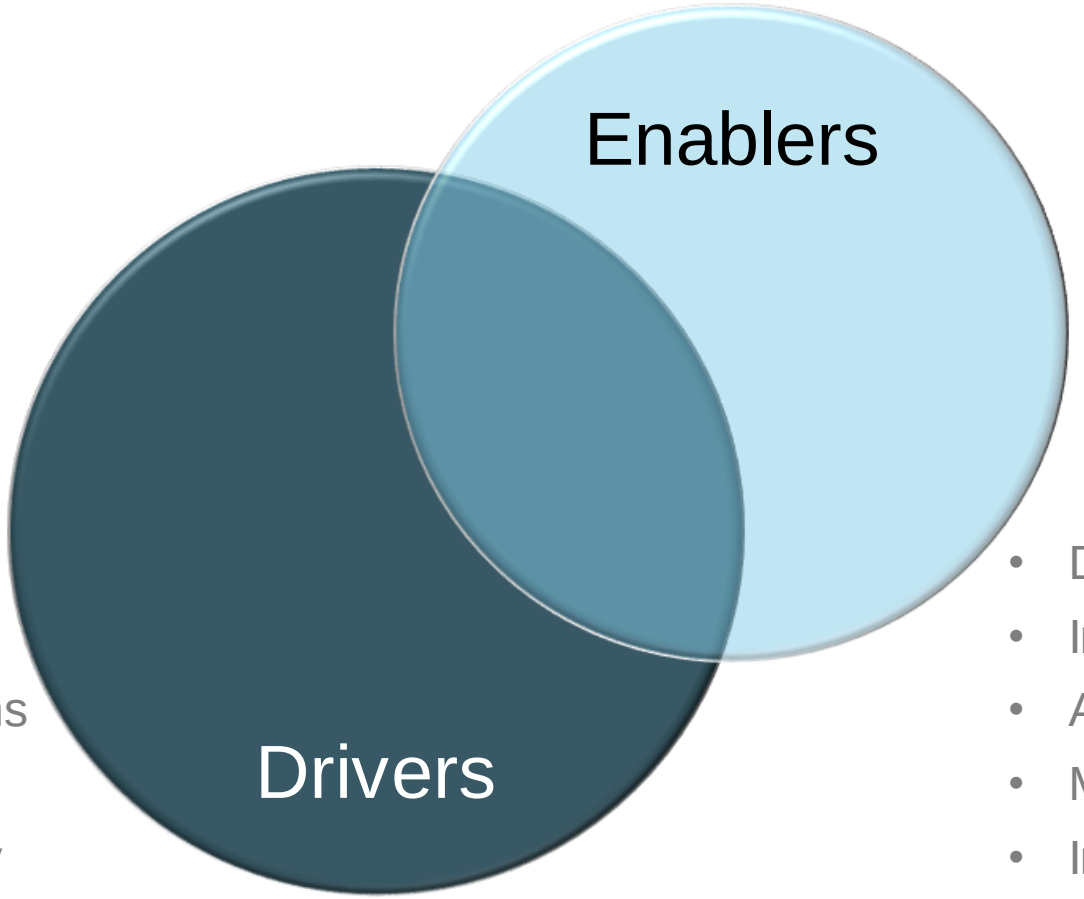
Disruptive propulsion/ energy solutions will enter the system from lower end



…scalability will be key for maximum impact

LUCHTVAART in transitie

SHAPING THE FUTURE OF AVIATION



- Core aeronautical sciences
- New propulsion architectures
- Non-drop in energy/fuel options
- Electrical architectures
- Fuel Cell & Battery technology
- Thermal management

- Digitalisation
- Innovative certification
- AI & Quantum tech
- MBSE / Simulation
- Industry 4.0
- Space based digital CNS

LUCHTVAART in transitie

EU AND NATIONAL LEVEL EFFORTS NEEDED

- Safe, Reliable, Affordable, **Sustainable** (Air) Mobility

Paris Agreement

Green Deal
- Fit for 55
- ReFuelEU
-ETS

Digital Europe
- Digital Sky

Strategic Autonomy
- IPCEIs etc.

NL CO_2 Ceiling

Innovation & Growth Strategy

Sustainable Aviation Accord/ Roundtable

Horizon Europe
Clean Aviation JU
Sesar 3 JU
Clean Hydrogen JU
InvestEU / EIC etc

R&I Funds
Nat'l Growth Fund
Regional Funds
InvestNL etc

LUCHTVAART in transitie

WHY NL PUBLIC INVESTMENT IN AVIATION R&I?

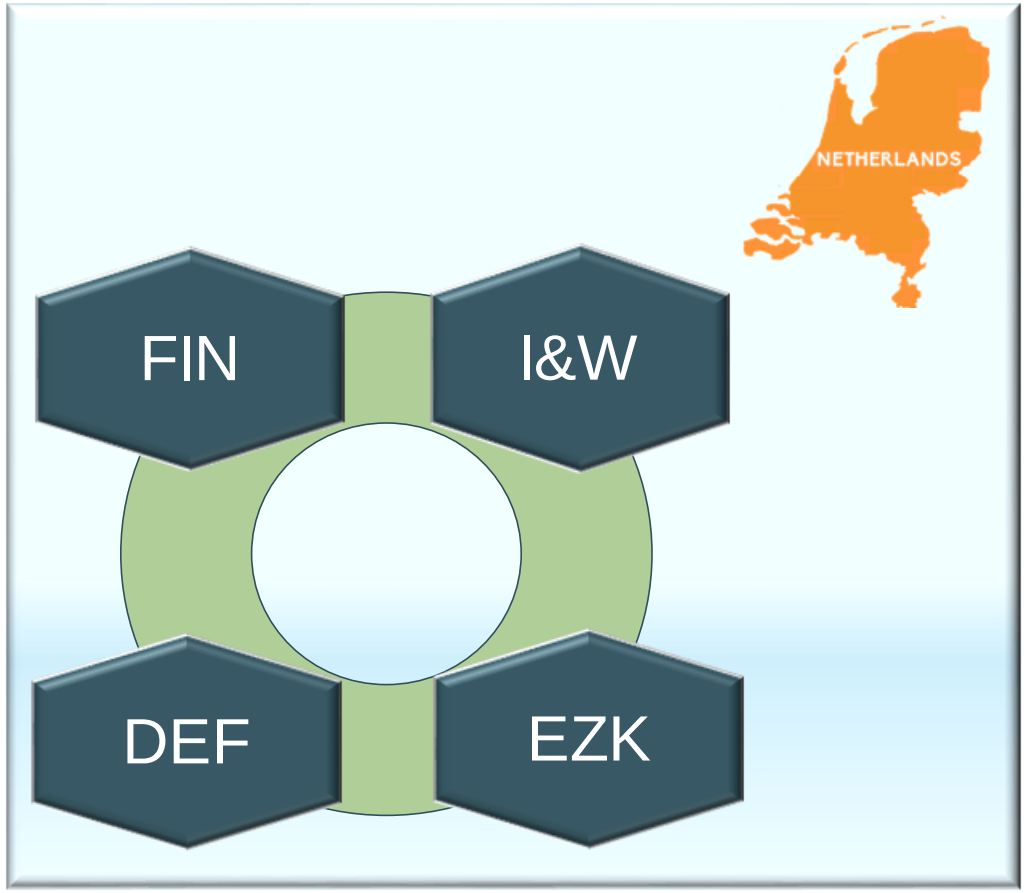
- **Global connectivity** essential for our open economy
- **World leading home carrier & hub** AF/KLM & Schiphol
- **Over 2x EU average** aviation contribution to CO_2 (>6%)
- Increasing social and **environmental concerns**
- Leverage **institutional/industrial knowledge base**

- **Confidence in earning capacity of the sector**

…if we aren't prepared to lead, who will?

LUCHTVAART in transitie

BRIDGING TODAY AND TOMORROW – NL POLICIES



Direct effects within aviation	**Sustainable flights** • SAF • Technological innovation
Direct effects outside of aviation	**Offsetting/Carbon pricing** • EU ETS • CORSIA
Uncertain indirect effects	**MBM and modal shift** • Behavioural change • Substitution by rail • Taxation • Regulation

LUCHTVAART in transitie

LUCHTVAART IN TRANSITIE
(AVIATION IN TRANSITION)

ROUGHLY 70% OF CURRENT NL AVIATION R&I

LUCHTVAART in transitie

LIT (AVIATION IN TRANSITION) GOALS

- Co-lead transformation of aviation towards climate neutral flight by 2050
- Accelerate the development and uptake of disruptive technologies
- Create a breeding ground for start-ups and scale-ups to break through
- Secure key positions in global supply chains for next generation aircraft
- Increase earning capacity and attract talent, capital and inward investment

…key window of opportunity in this decade

LUCHTVAART in transitie

CREATING MOMENTUM

Selection of key technologies
Pre-selection of **key partners**

~2028 launch new a/c programs

~2035 EIS of new generation a/c

2050

2035

2030

2028

2025

Today

Start LiT projects

LiT proposal

End LiT program

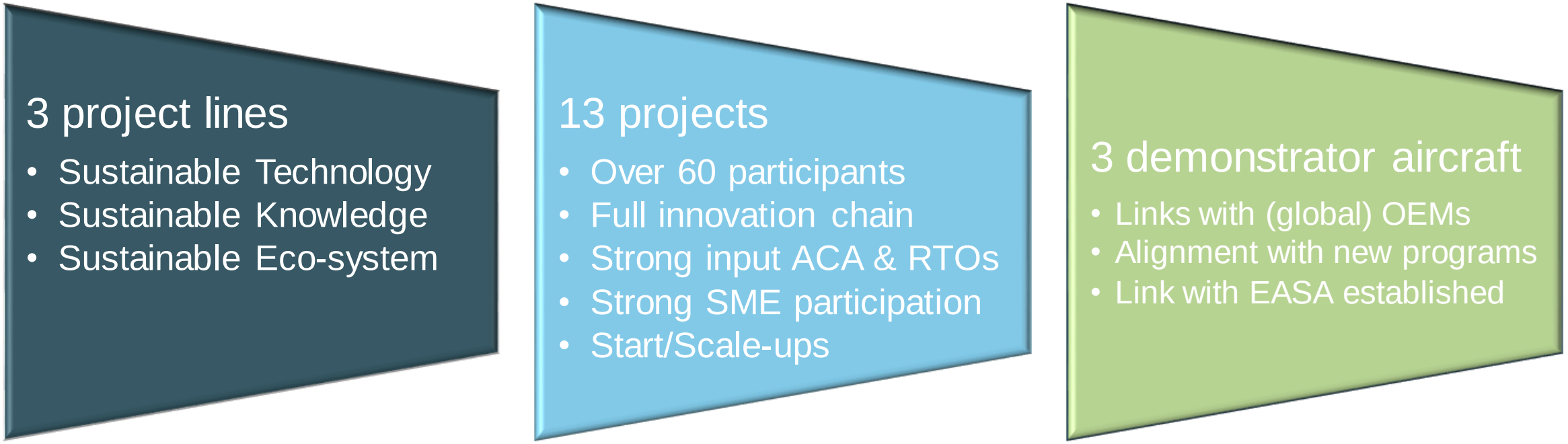
ambition:
Climate Neutral

70% of key (Tier 1) suppliers already engaged in joint R&I programs

LUCHTVAART in transitie

PARTNERSHIP APPROACH

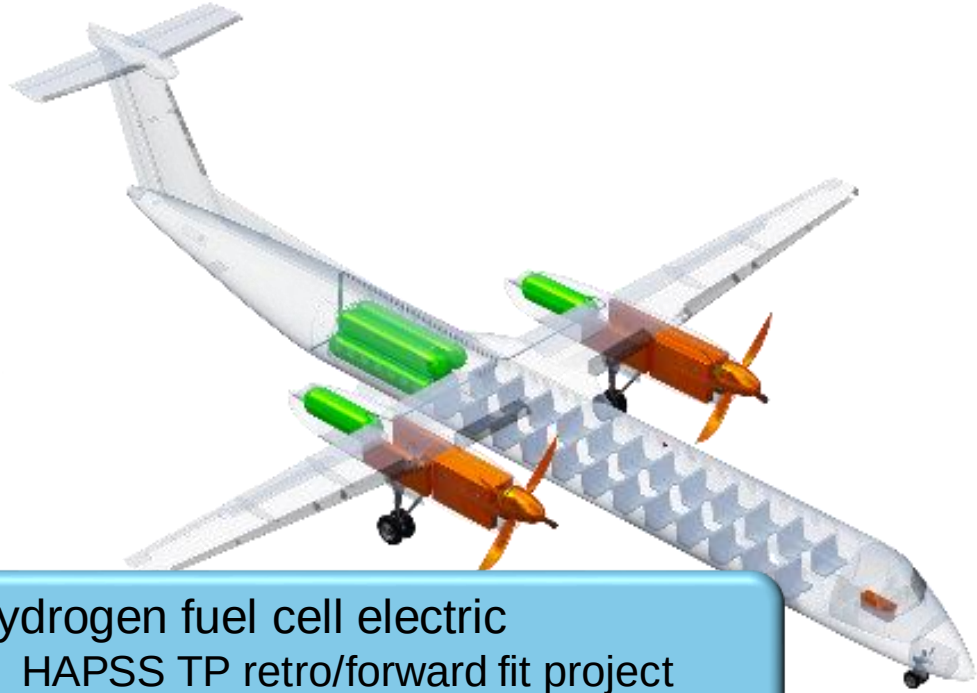
- 8-year programme (2023-2030)
- Total investment nearly €750m of which €383m from National Growth Fund (NGF)
- Strong links to EU, European cross-border and international efforts



LUCHTVAART in transitie

SUSTAINABLE TECHNOLOGY

Hydrogen combustion powered aircraft
- HOT Fokker NextGen project



Hydrogen fuel cell electric
- HAPSS TP retro/forward fit project
- EMBRAER FTD project

Electrical and thermal systems
- Electrical high power and data distribution
- Thermal and pneumatic systems

Materials, production technologies and structures

LUCHTVAART in transitie

INTERNATIONAL COLLABORATION

- Specific instrument & budget in NL EZK “TSH” program
- Opportunities via LiT through (shared) participants and project alignment

…EU and bilateral European level, plus specific non-EU opportunities

LUCHTVAART in transitie

LUCHTVAART
in transitie

Nationaal Groeifonds

Thank You