

Accelerating towards

Climate Neutral Aviation through
disruptive hydrogen-based innovations

Luchtvaart in Transitie

(Aviation in Transition)

The Dutch National Aviation Programme

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Why Aviation in Transition in NL?



- Open economy: global connections essential
- AF/KL a world leading home carrier (DJSI sector winner 12 consecutive years)
- Global hub (Schiphol), but increasing social and environmental concerns
- At 6% over 2 times EU average aviation CO₂ contribution

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



Aviation in Transition Goals

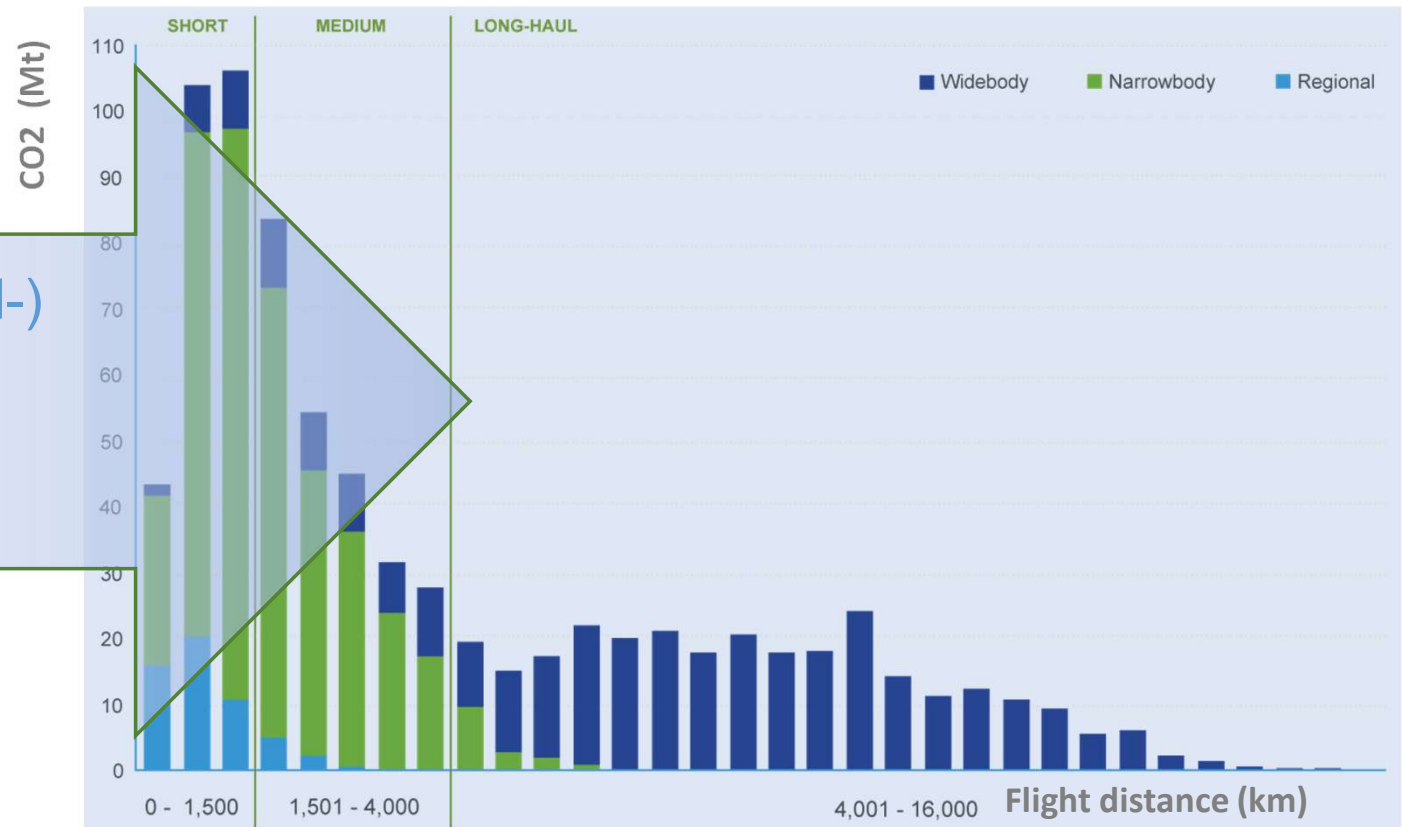


- Co-lead transformation of aviation towards climate neutral flight by 2050
- Accelerate the development and uptake of disruptive technologies
- Create a breeding ground for start-ups and scale-ups to break through
- Secure key positions in global supply chains for next generation aircraft
- Increase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

...keep aviation on the right side of history

The global aviation system – emissions breakdown

Share of passenger CO₂ emissions in 2019, by stage length and aircraft class



Disruptive H₂ and (hybrid-) electric solutions, once proven, will enter the system from lower end.

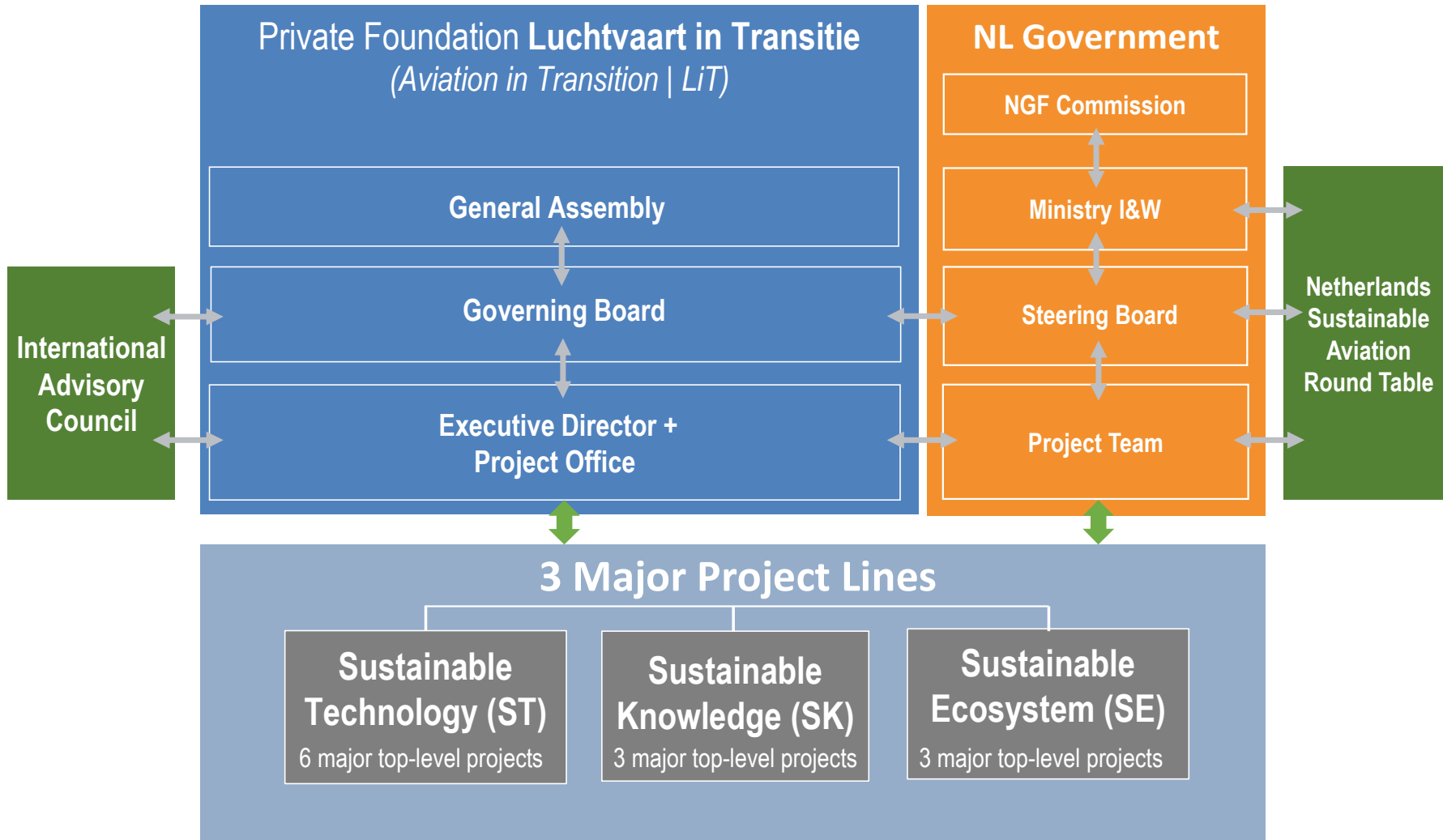
Scalability will determine ultimate share and penetration

Partnership approach



- 8-year programme (2023-2030)
- Dutch **National Growth Fund** (NGF) award of €383m with 50/50 matching
- Dedicated governance organisation and project office
- Strong links to EU, European cross-border and international efforts
- Synergies with other NGF programmes and NL financial instruments
- Structured cooperation between over 60 organisations:
 - Science Base / Academia
 - RTOs
 - SMEs including disruptive technology focused start-ups
 - Tier 2 and Tier 1 suppliers
 - Aircraft/Engine OEMs

Public-Private Governance



Sustainable Technology Project Line



Hydrogen gas turbine powered aircraft (direct combustion)

HOT project led by Fokker NextGen (new regional airliner by 2035)



Hydrogen fuel cell electric powered aircraft

- HAPSS project led by Conscious Aerospace (initial focus Dash8 retrofit)
- Embraer Energia Flight Demo Proposal (under preparation)



Materials, production technologies and structures

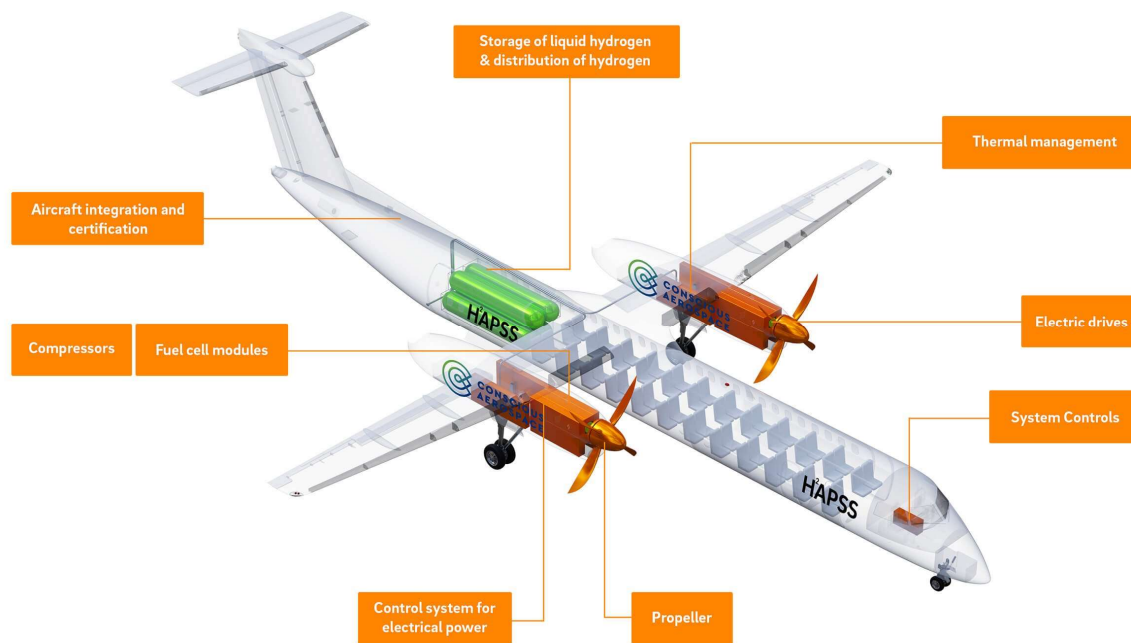
Advanced thermoplastic structures and production technology led bij GKN Fokker



Electrical and thermal systems

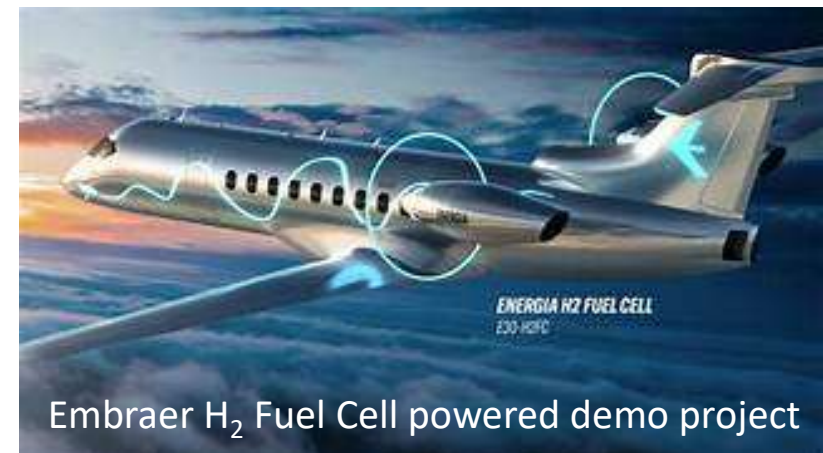
- High Voltage EWIS led by GKN Fokker ELMO
- TePS led by Aeronamic: (thermal/pneumatic systems including fuel cell TMS)

Technology development and demonstration projects towards H₂-powered aviation



HAPSS H₂ Fuel Cell propulsion system project

Images courtesy Conscious Aerospace, Fokker NextGen and Embraer





Thank You

