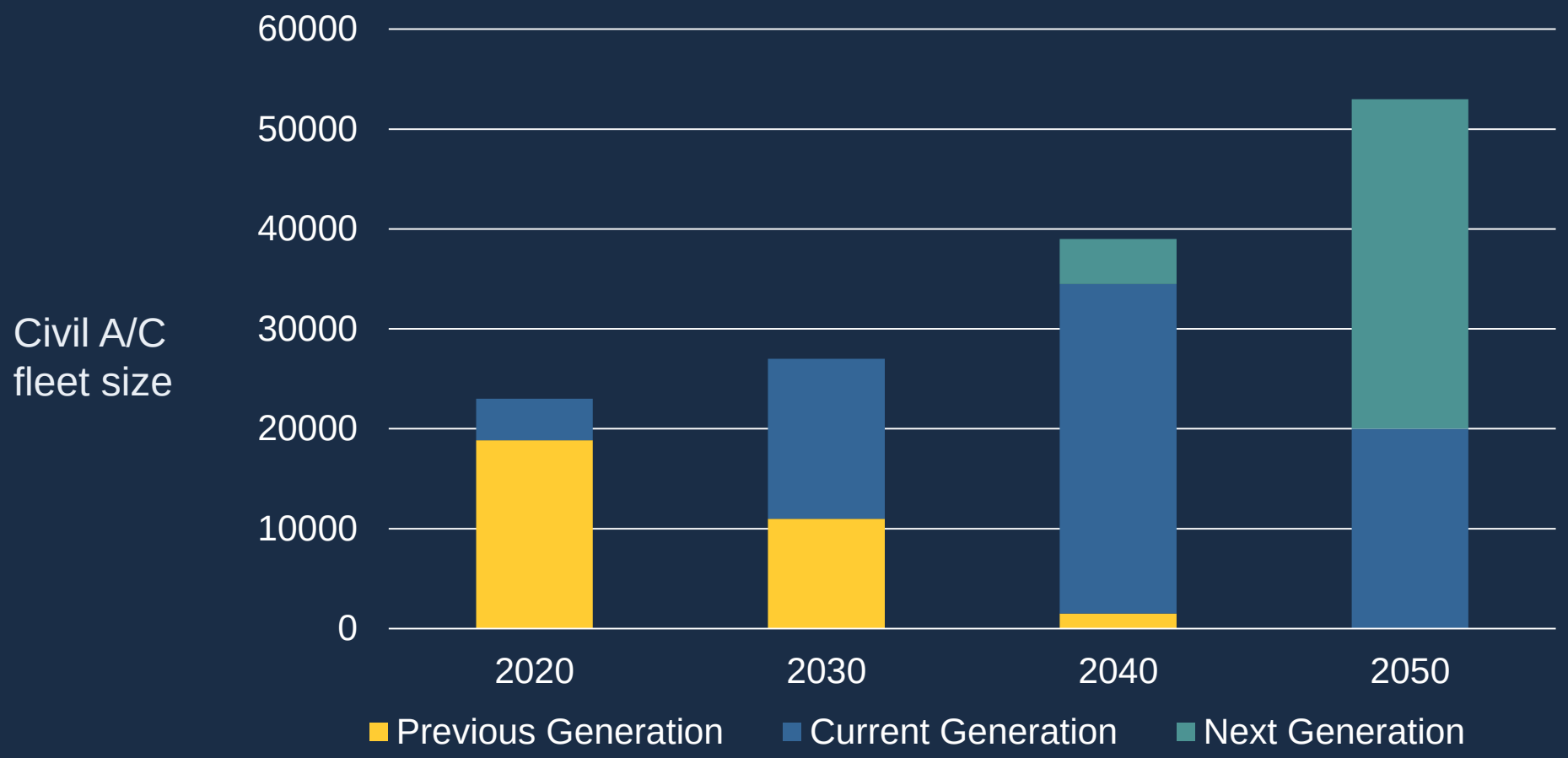
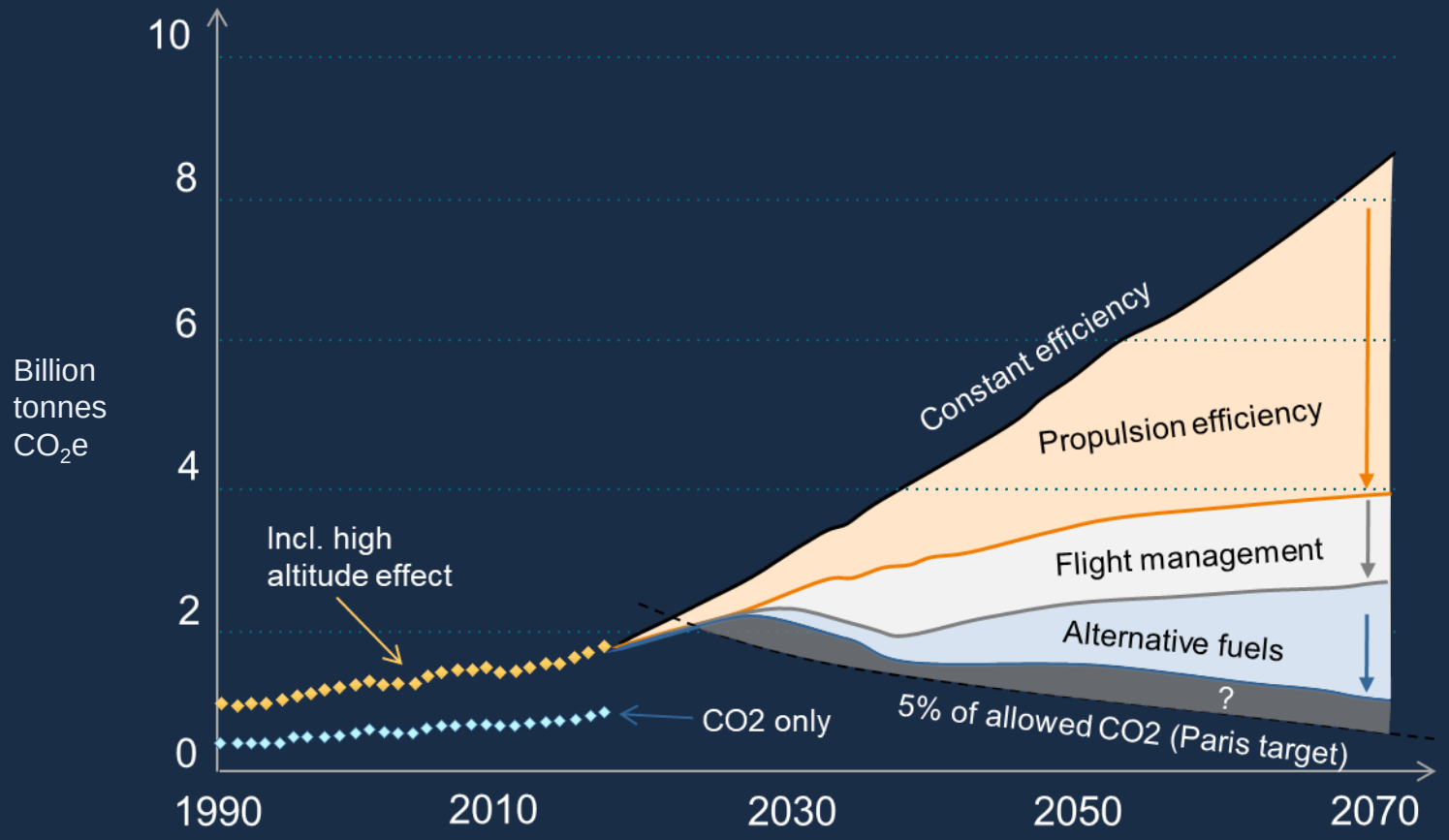
GKN AEROSPACE

The Opportunity



The Challenge



*Ref: NRIA Flyg 2020: Resultaten hittills och vägen framåt

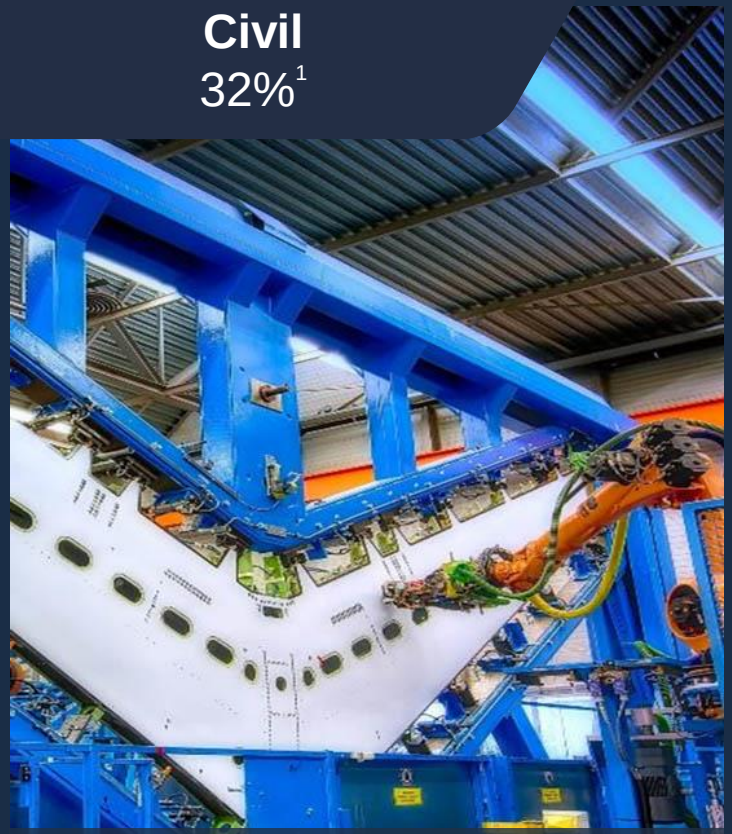
Resan till hållbart flyg via teknologiutveckling av framdrivningssystem

Lars Ellbrant, Director of Technology Strategy, GKN Aerospace

GKN AEROSPACE

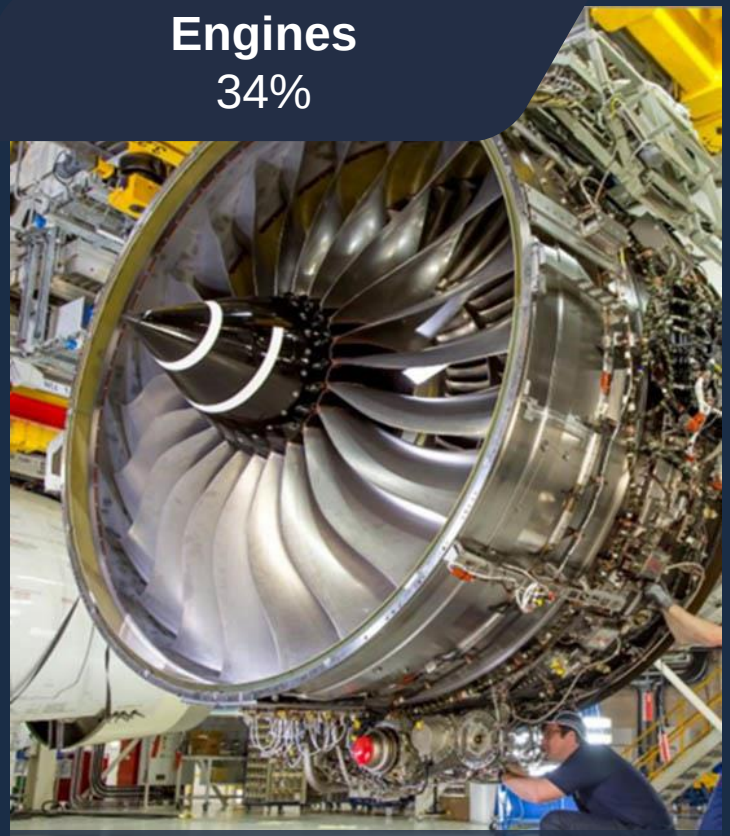
A Focused Business with Three Core Markets

Civil
32%[1]



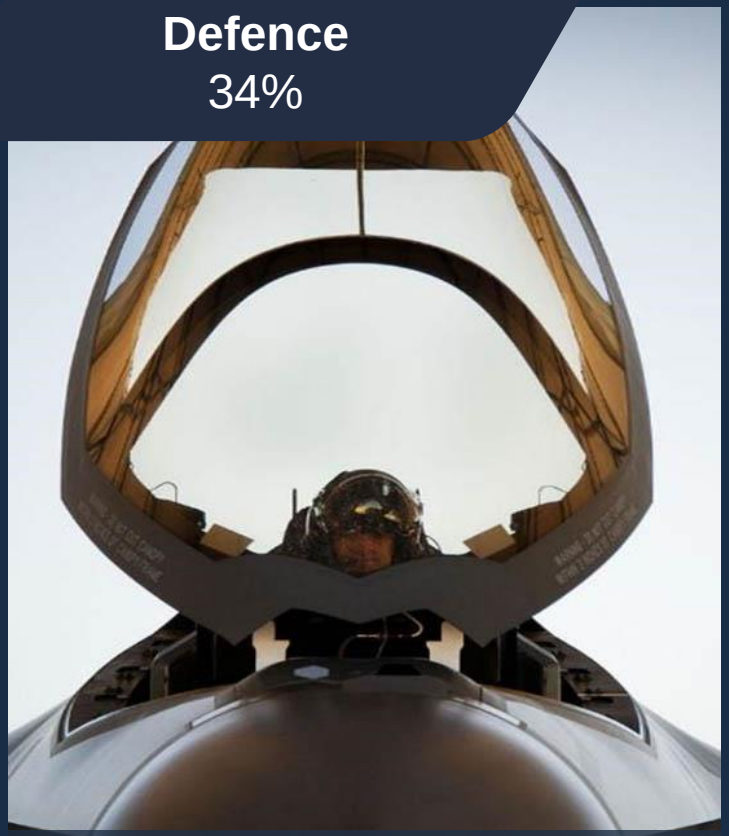
Tier 1 expertise across fuselage, empennage and wing; plus landing gear, wiring and transparencies

Engines
34%



OEM capability for RM12 engine, plus super Tier 1 capability across the entire engine architecture

Defence
34%



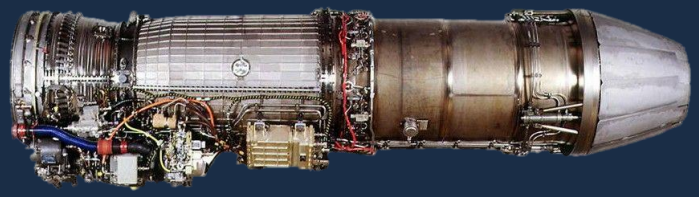
Full structure in place to support positions on leading US and European Defence platforms

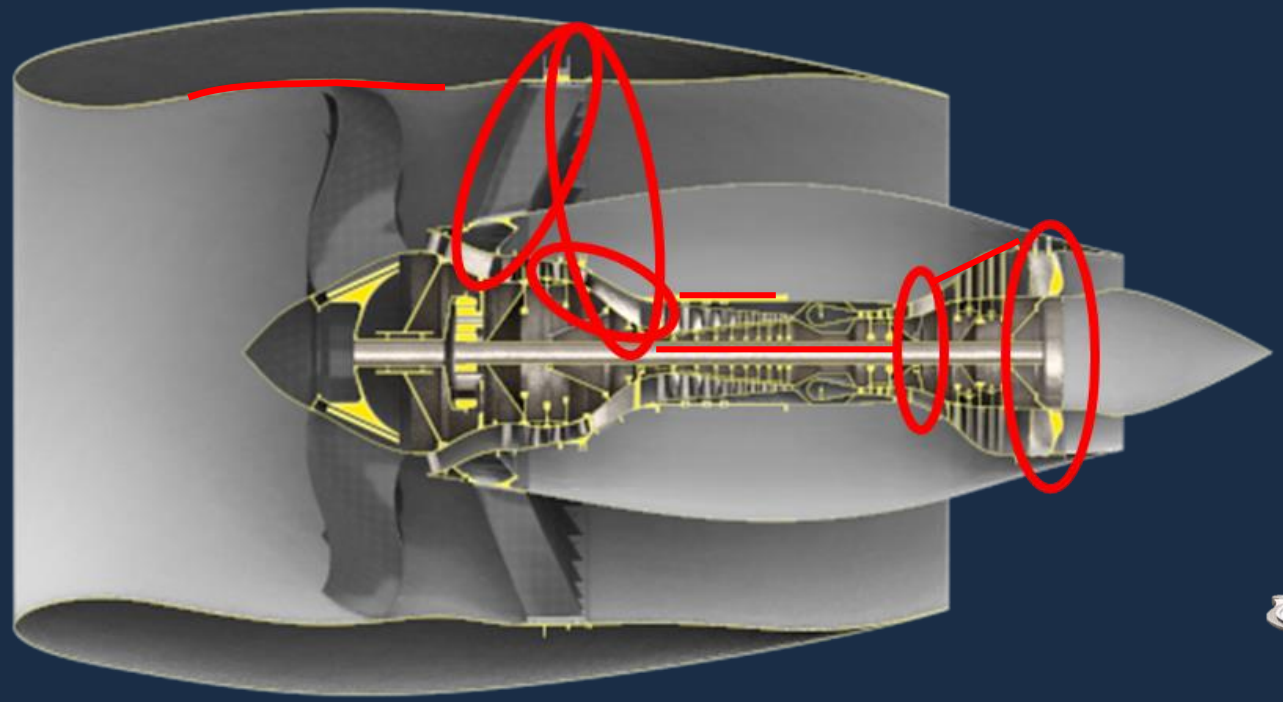
[1] All percentages relate to total company sales at end 2021

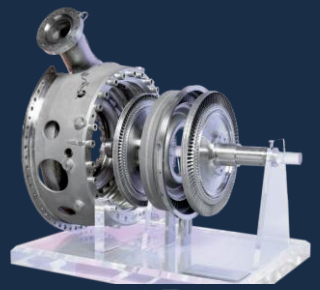
GKN AEROSPACE

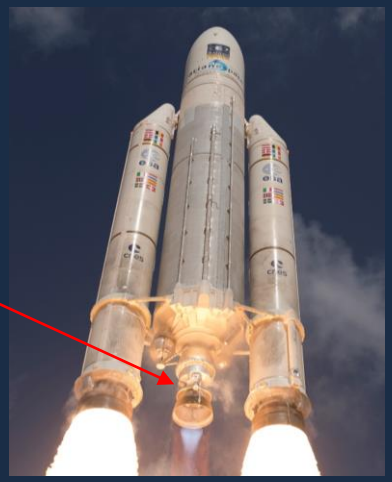
GKN Aerospace Engines focus – The most trusted & sustainable partner in the sky

- Design & build responsibility for Load carrying structure, cases & rotatives
- Prime/OEM on Gripen fighter engine
- Engine aftermarket provide tailored maintenance solutions

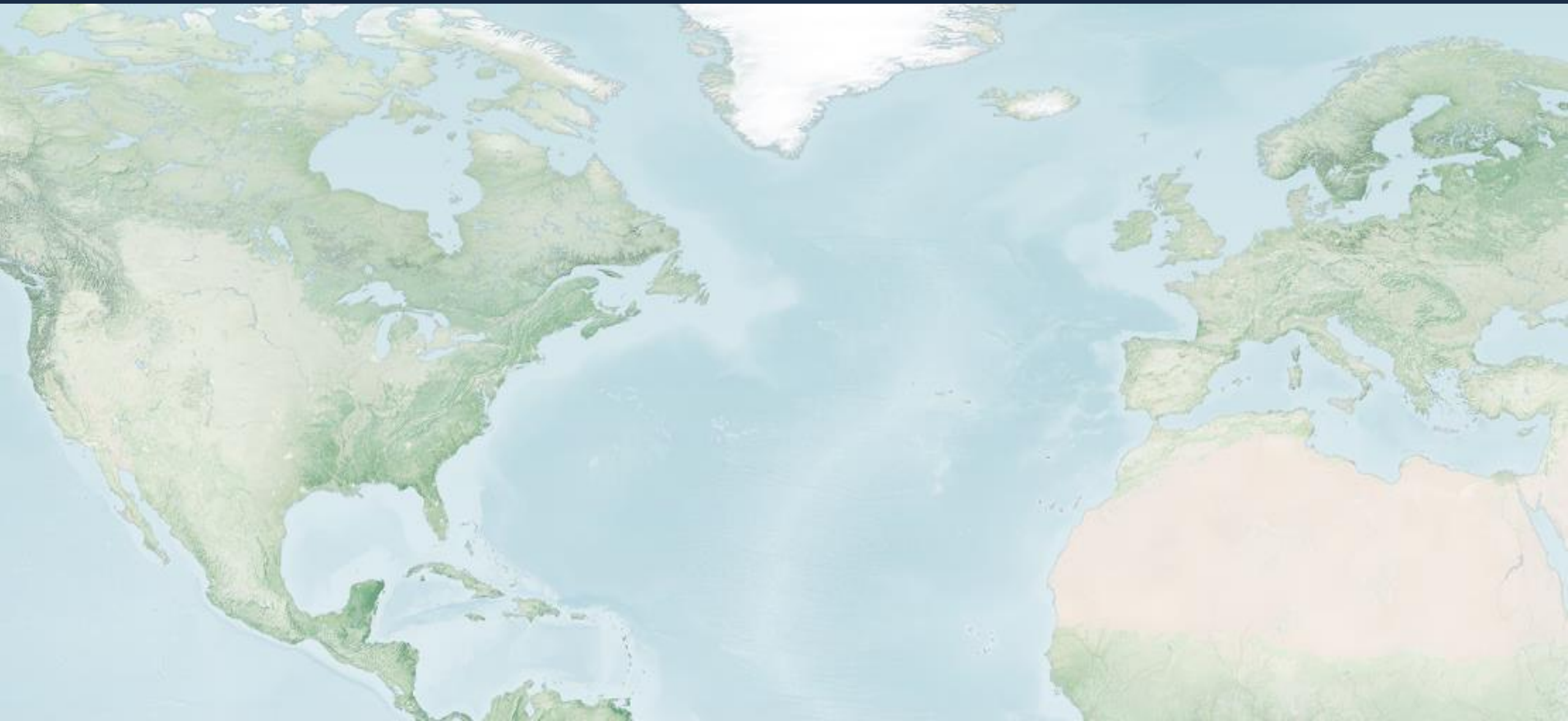








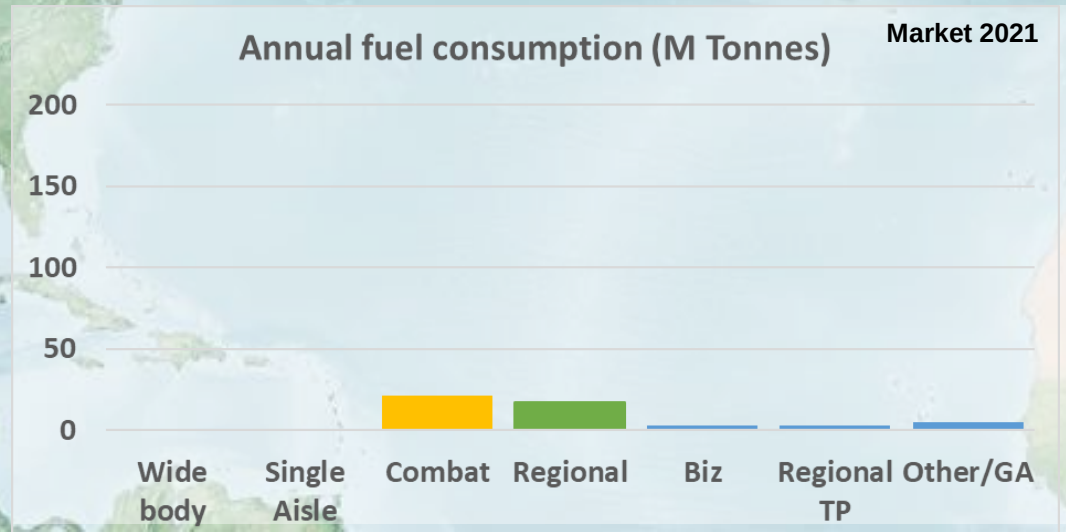
How do we fly in 2050?



How do we fly in 2050?

Bromma-Trollhättan (343 km)
Fuel Cell Electric

Bromma-Visby (190 km)
Battery Electric



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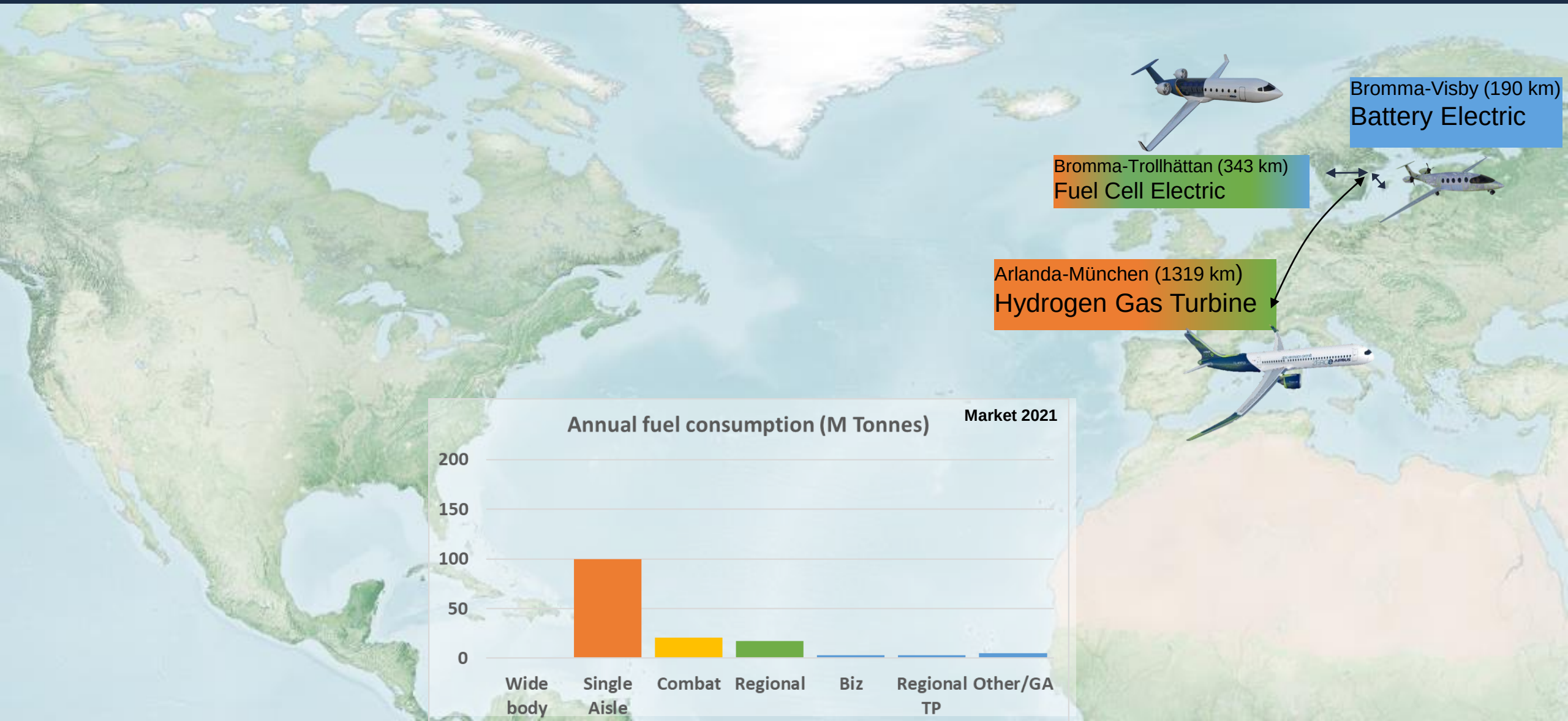
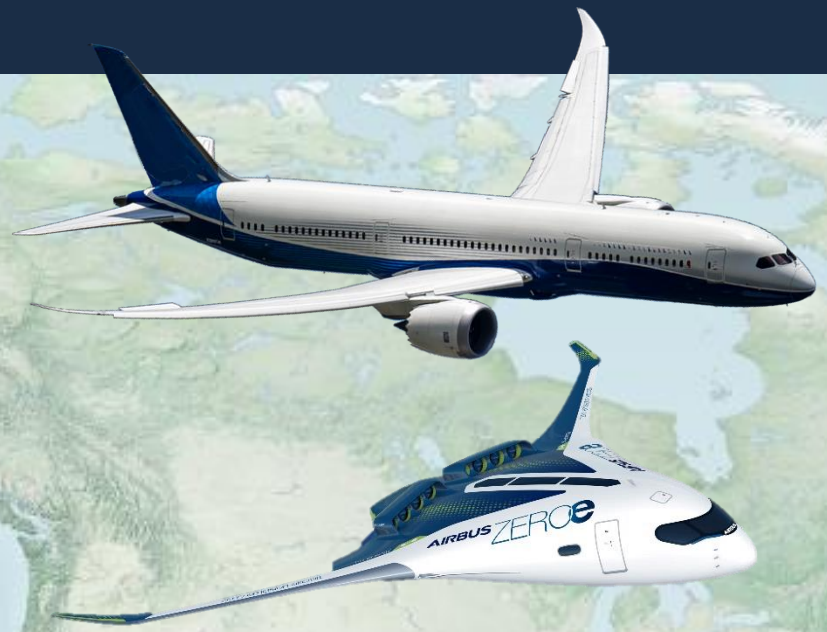


How do we fly in 2050?

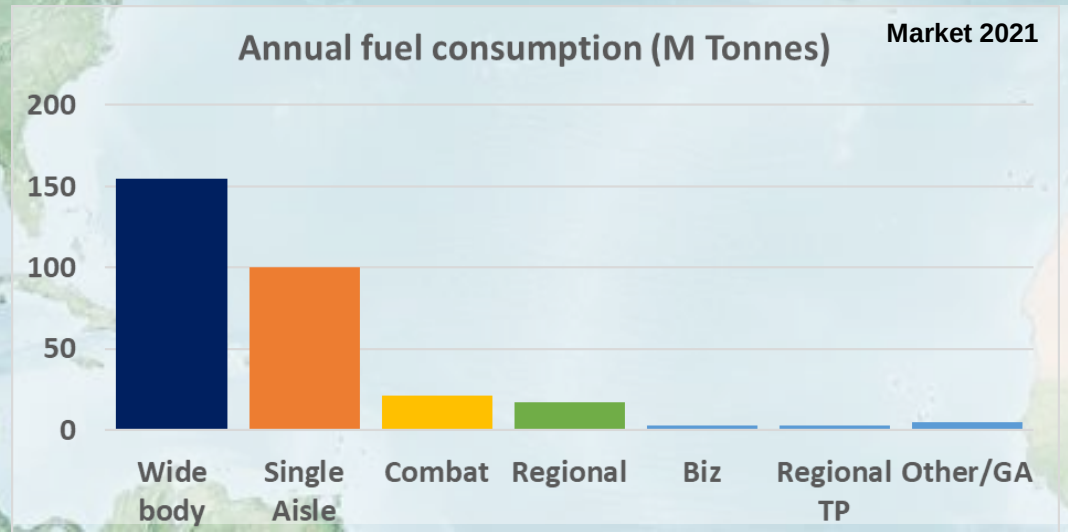


Arlanda-New York (6324 km)
Biofuel / H2 Gas Turbine

Bromma-Visby (190 km)
Battery Electric

Bromma-Trollhättan (343 km)
Fuel Cell Electric

Arlanda-München (1319 km)
Hydrogen Gas Turbine



GKN AEROSPACE

CO2 emission reduction

2000 2010 2020 2030 2040 2050

Previous
Baseline

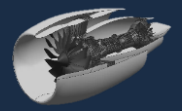
A320ceo / B737
V2500 / CFM56

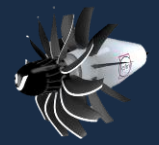
Current
-15% fuel burn

A320neo / B737MAX
GTF / Leap

Next
-35% fuel burn

NSA
GTF Gen2 / RISE





Future
-50% fuel burn

Net Zero Emissions

Propulsion efficiency

Flight management

Alternative fuels

Kerosene

SAF

Hydrogen

Propulsion efficiency

Flight management

Alternative fuels

?

GKN AEROSPACE

CO2 emission reduction

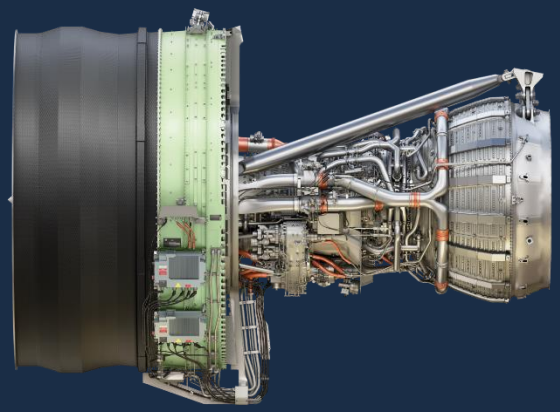
Current
-15% fuel burn

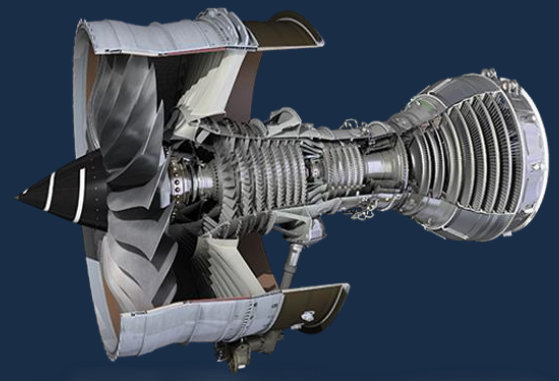
Made possible through:

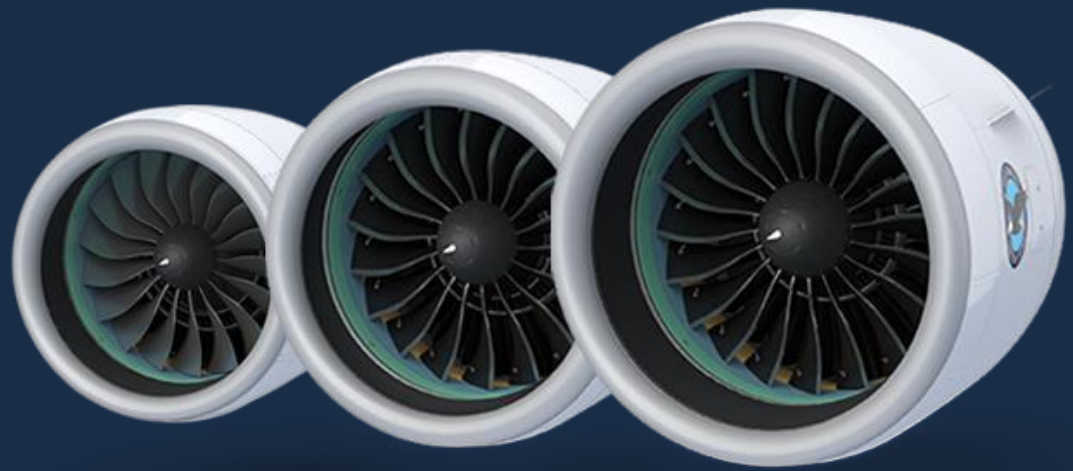
EEFAE + US CLEEN & Swe GF demo

GKN Engines contribution

- Design & make on Light weight load carrying structures in XWB, Genx & PW GTF family
- Technology & capability growth through Swedish VINNOVA/Innovair, EU & US program







GKN AEROSPACE

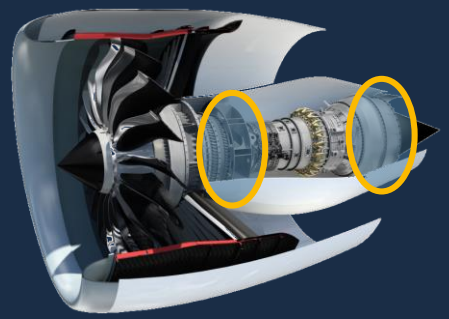
CO2 emission reduction

Next
-25% fuel burn

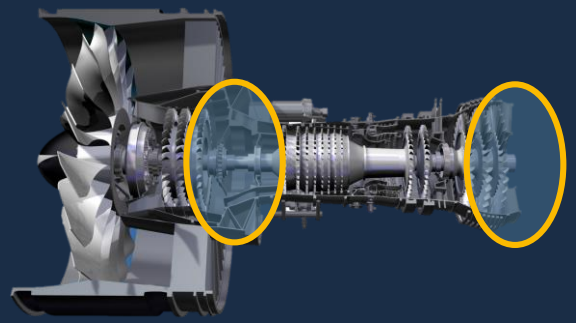
Made possible through:

Clean Sky + Clean Sky2 & SWEDEMO + INTDEMO

Open rotor – Safran (LPA)



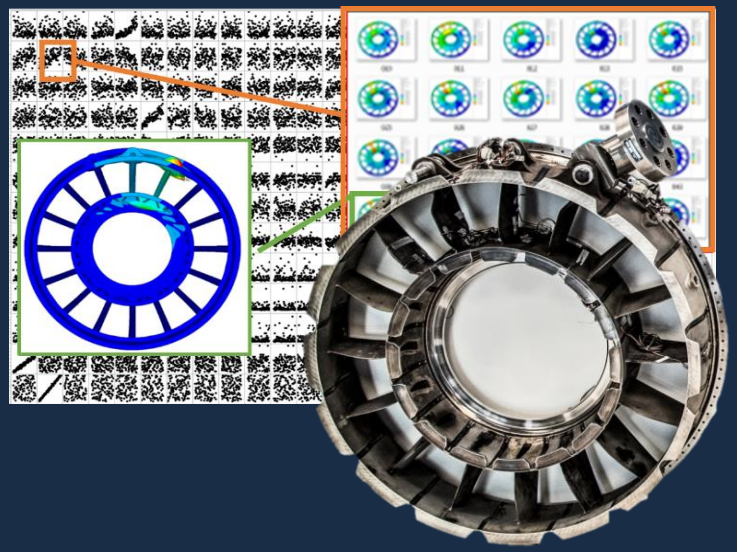
UHBR – Safran (CS2 WP2)

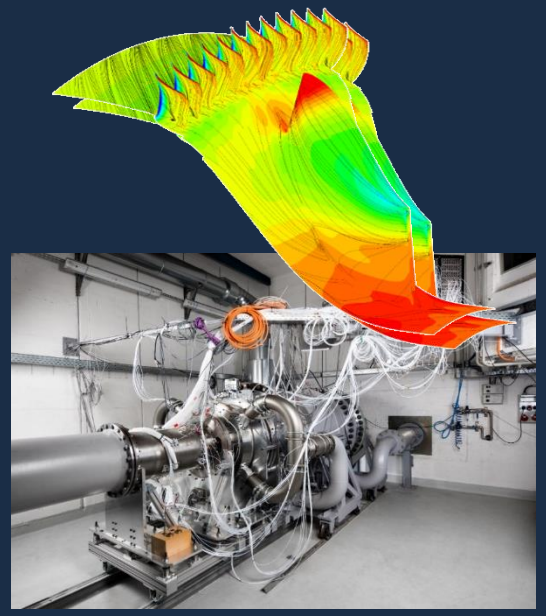


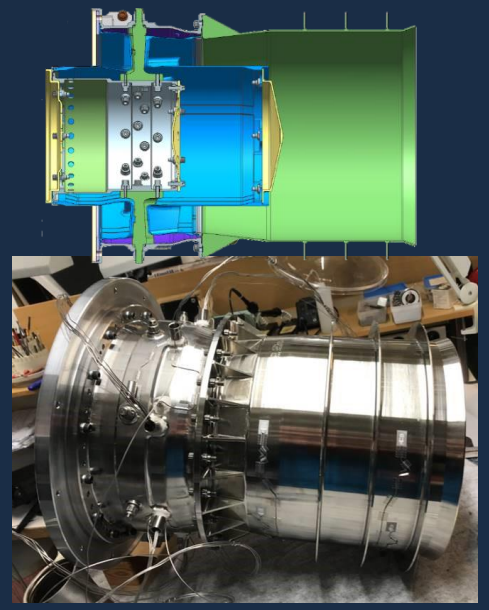
Advanced GTF – MTU (CS2 WP4)

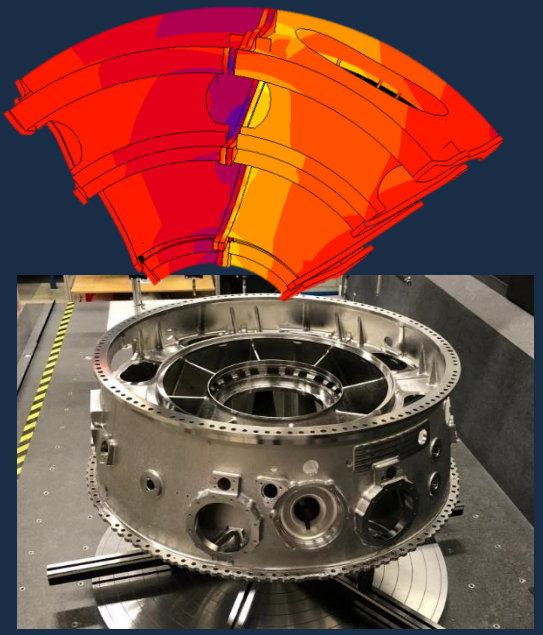
Ultrafan – RR (CS2 WP6)

GKN Engines demonstration of Next generation light weight load carrying structures









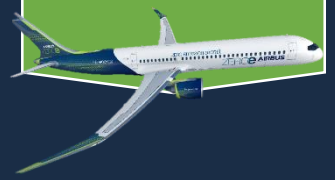
GKN AEROSPACE

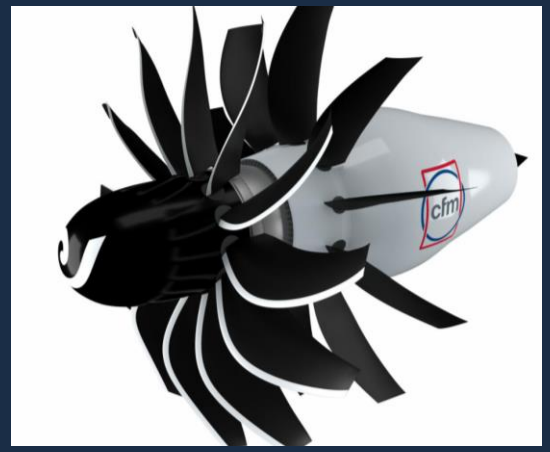
CO2 emission reduction

Made possible through:

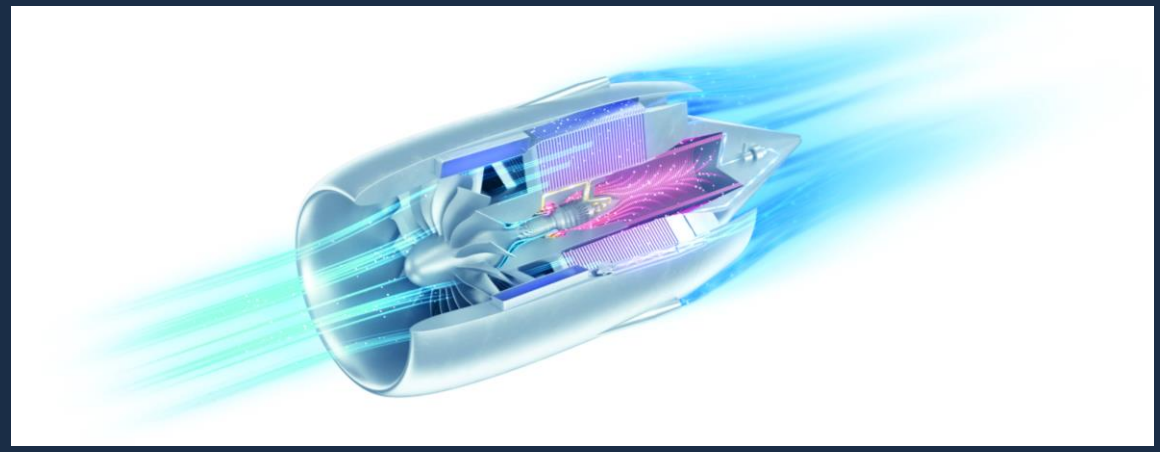
Clean Aviation & INTDEMO + Energimyndigheten

Next
-35% fuel burn





Revolutionary Innovation For Sustainable Engines (RISE) – CFM: GE & Safran



Water Enhanced Turbofan (WET) – MTU

“Clean Aviation’s daring new projects” within Short & Medium Range Aircraft – Ultra Efficient Propulsion Systems

Coordinated by:

- Safran Aircraft Engines
- MTU Aero Engines AG
- Rolls Royce PLC

GKN AEROSPACE

CO2 emission reduction

Aircraft & Engine

New fuels

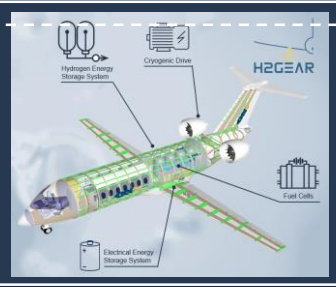
Air Traffic Management

- Need for substantial public & private investments in international collaboration programs.
- Opportunity to export innovation & contribute to the sustainable aviation journey & economic growth

H2GEAR

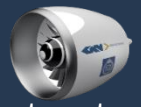
AEROSPACE TECHNOLOGY INSTITUTE

- Ground test demo of Hydrogen electric propulsion
- Fuel cell integration



Elefant/H2JET

Energimyndigheten



- Early concept development
- Hydrogen enablers – Pre-heat system
- Electric propulsion

GKN AEROSPACE

CO2 emission reduction

Aircraft & Engine

New fuels

Air Traffic Management

Sub system demonstration (TRL5)

Integration of pre-heat & cryo-cooled e-machine

- To enable hydrogen fuel

Light weight multi functional structures

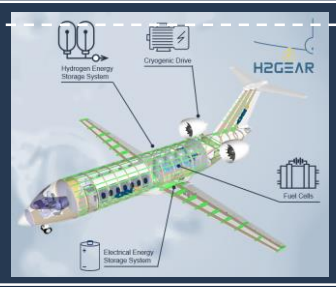
- To enable Ultra efficient gas trubines

H2GEAR

AEROSPACE TECHNOLOGY INSTITUTE

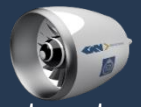
> Ground test demo of Hydrogen electric propulsion

> Fuel cell integration



Elefant/H2JET

Energimyndigheten



> Early concept development

> Hydrogen enablers – Pre-heat system

> Electric propulsion