



The Strategic Research Agenda

The ACARE Environmental Vision

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The Strategic Research Agenda

The challenge of Environment

Winning global leadership



meeting societies needs



Vision 2020

Quality &
Affordability

Environment

Safety

Air Transport
System
Efficiency

Security

The challenge of delivering products and services to airlines, passengers, freight and other customers whilst increasing quality, economy and performance

The challenge of meeting continually rising demand whilst demonstrating a sensitivity to society's needs by reducing the environmental impact

The challenge of sustaining the confidence of both the passenger and society that notwithstanding greatly increased traffic incidence of accidents will reduce

Rising traffic shall not exacerbate congestion, delays and lost opportunities. The challenge is therefore that the efficiency of the whole system must be increased.

The challenge is to devise measures that will improve security, on a global basis, within a highly diverse and complex system and against a strong backdrop of increasing traffic.



Goals

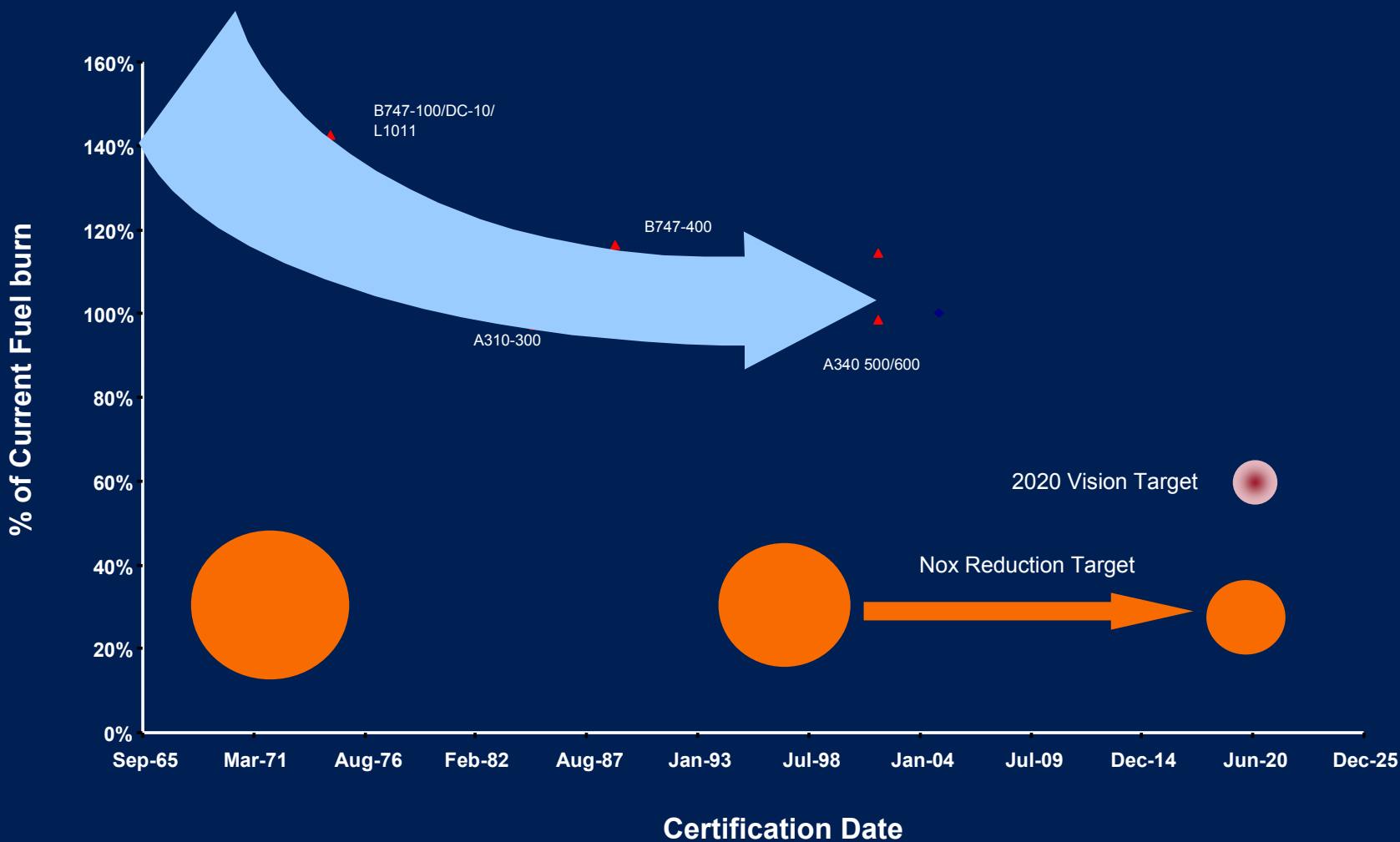
- Reduce CO₂ by 50% per passenger kilometer
(efficient aircraft, efficient engine, ATM of the future, alternative fuels)
- Reduce perceived noise to one half of current average levels
(quiet aircraft, rotorcraft of the future, noise abatement procedures, community impact management)
- Reduce NO_x emissions by 80%
(the clean engine)
- Minimise industries impact on the global environment
(Green MMD)*

* Manufacturing, Maintenance & Disposal



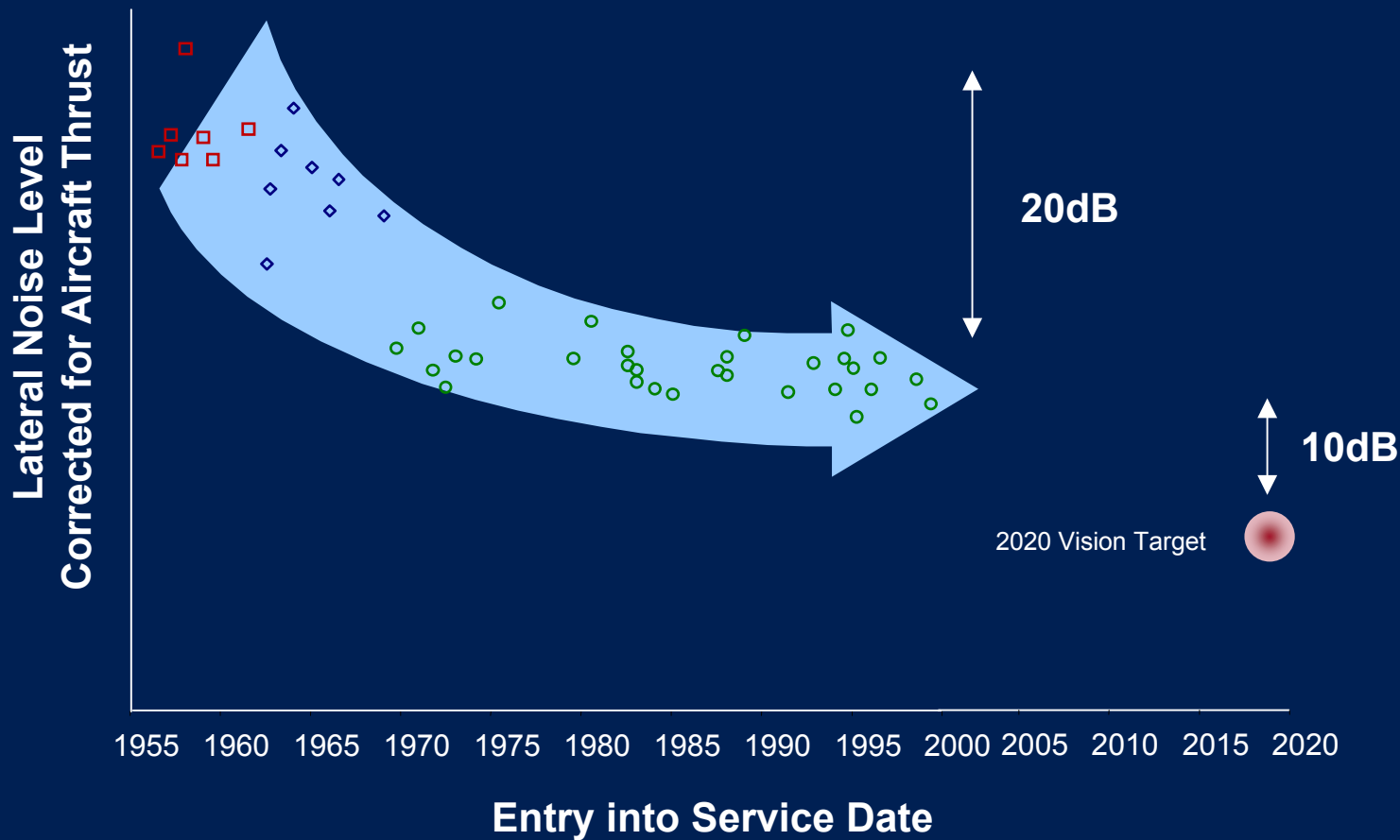


Emissions targets





Noise targets





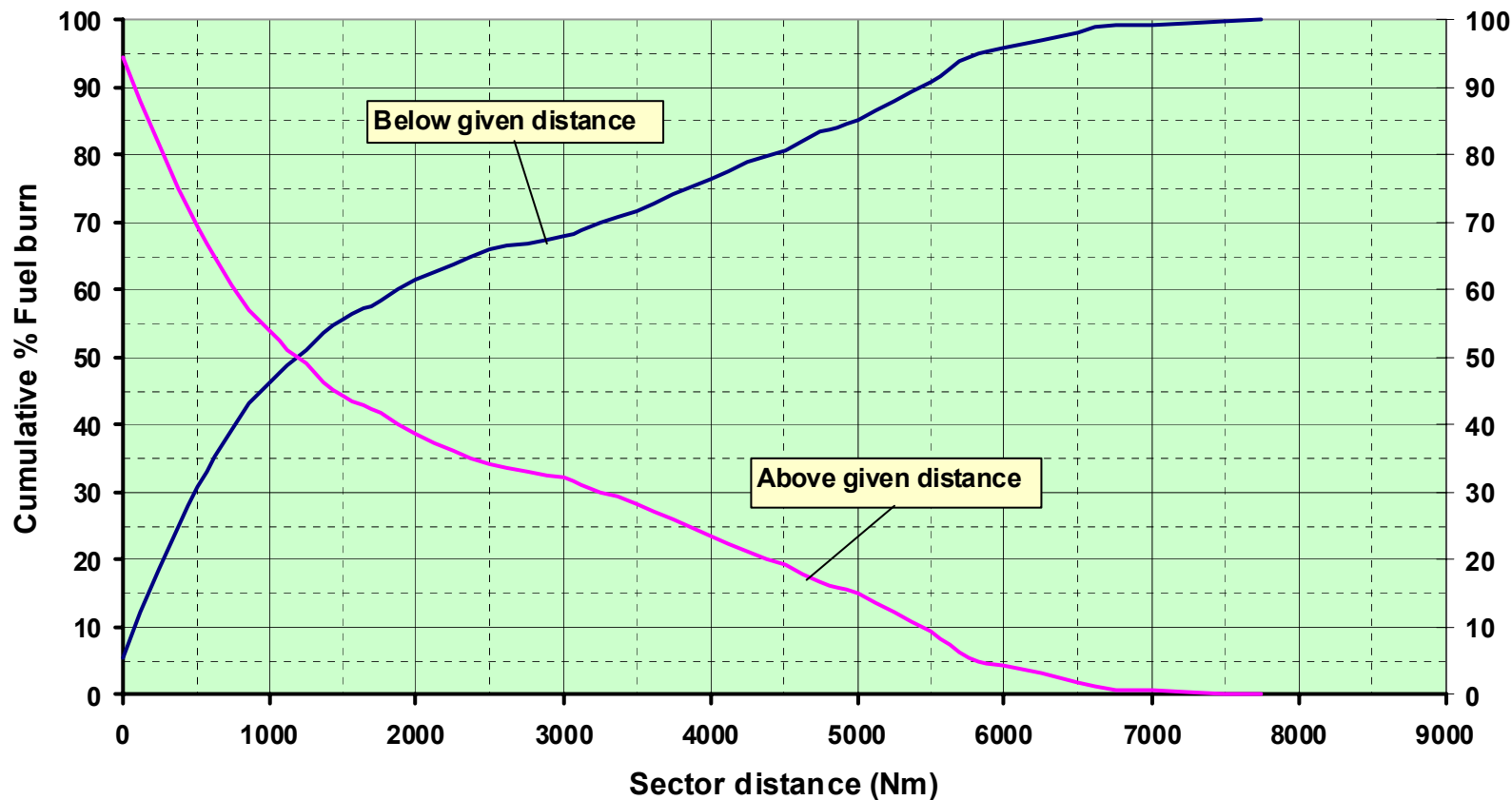
- The environmental challenge is extremely demanding
- Progress in CO₂ reduction needs to be at least twice the historic rate
- Progress in NOx reduction needs to accelerate rapidly
- Substantial noise reduction is required
- Breakthrough Technologies are required to meet the challenge
- Will require the efforts of the whole European Community to be successful



Global fuel consumption breakdown

Fuel Consumption Breakdown by sector

Based on 1998 data (jet flights)





Climate change

Influences

- CO₂ is not the whole story
- NO_x at cruise also has a significant effect
- Effects of contrails and increased cloudiness are uncertain and may be very significant
- Overall effect of zero carbon fuel may not be significantly better than kerosene

Impacts

Aircraft design

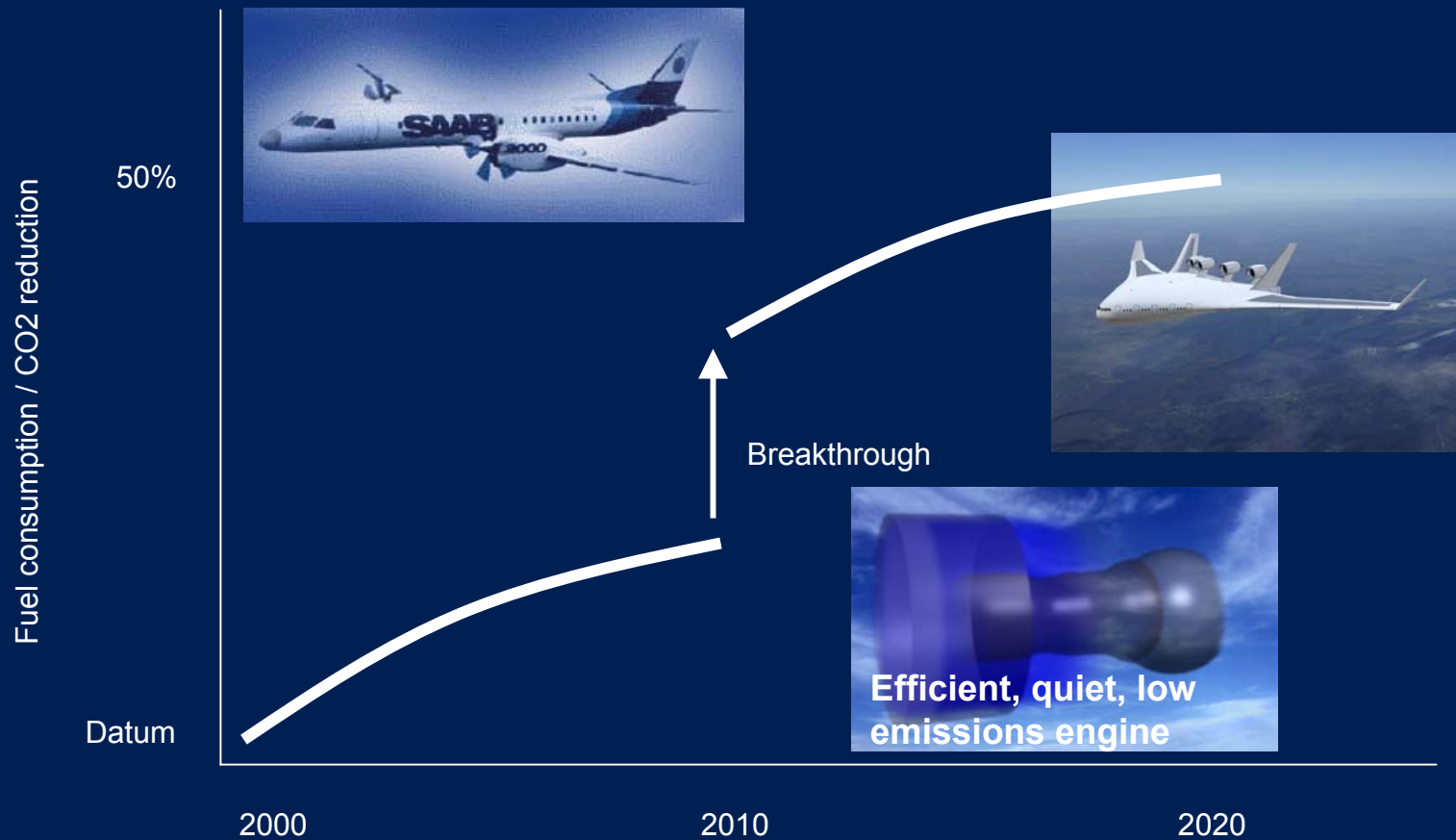
- Altitude
- Range
- Speed

More atmospheric understanding required

The above issues were fully discussed in the **Greener by Design** report, published by RASoc journal in February 2002



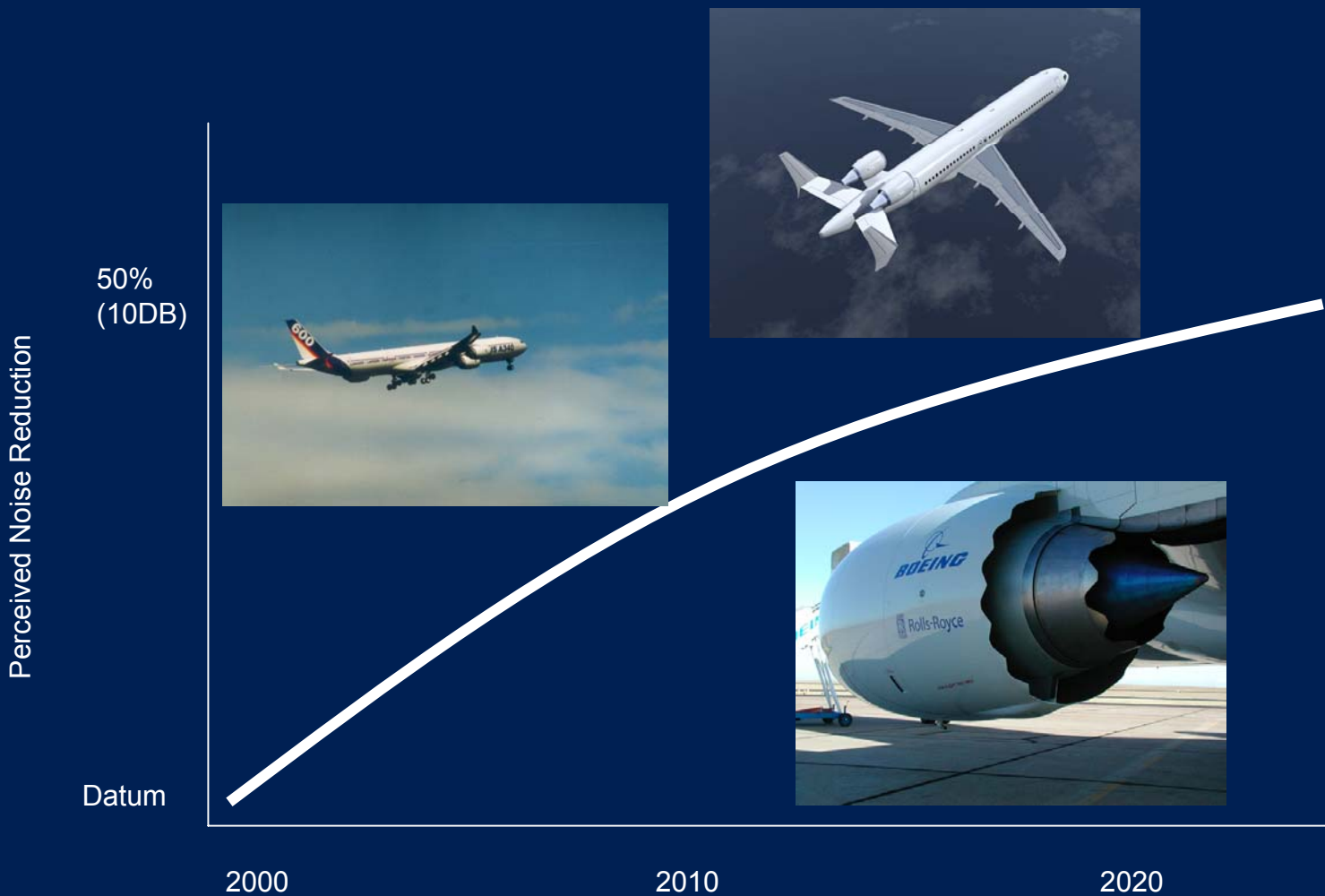
The path to 50% CO₂ reduction





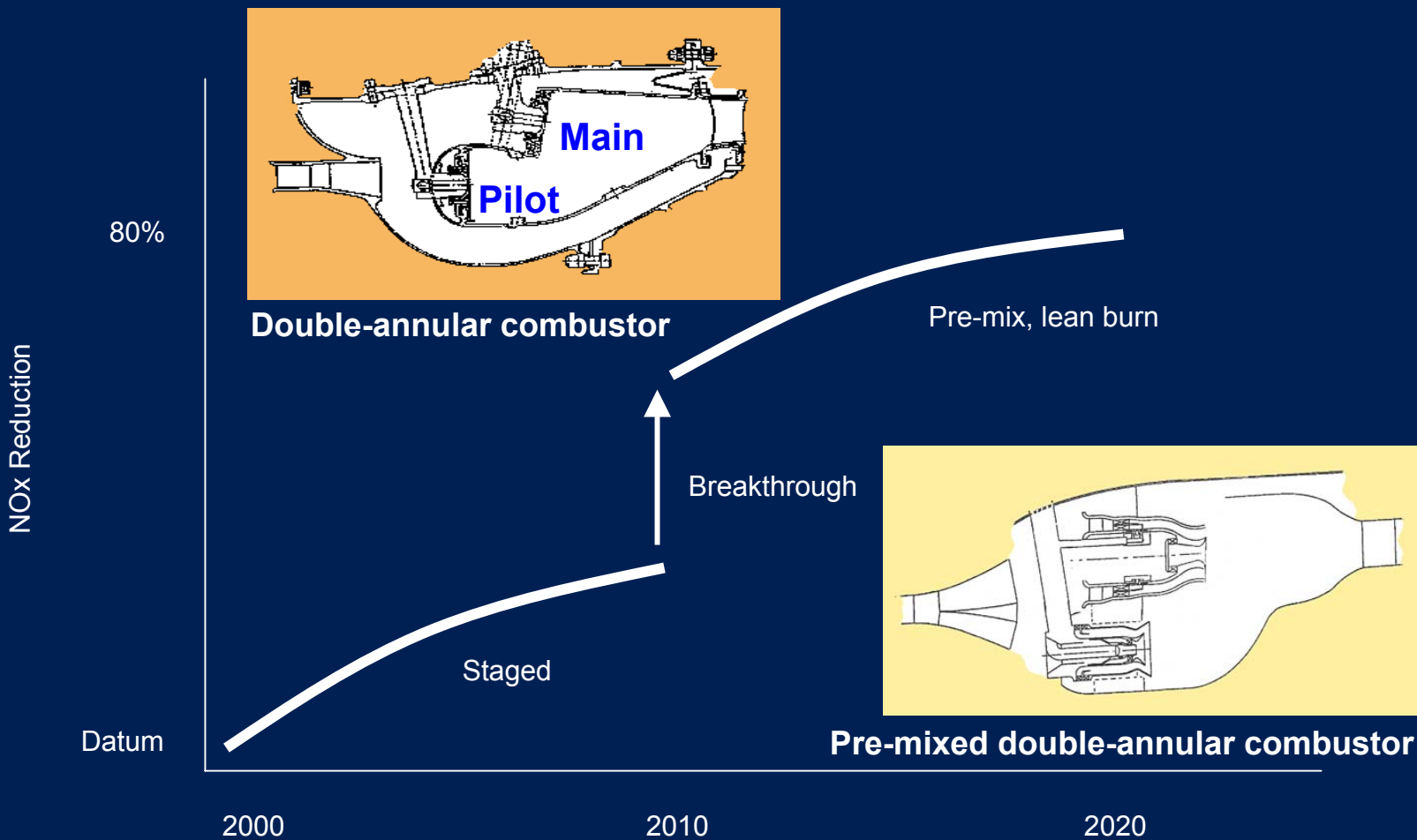
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Reducing Perceived Noise by 50%





The Path to 80% NOx Reduction





The Path to Green Manufacture, Maintenance & Disposal

Manufacturing contribution to CO₂ emissions is less than 5% of that generated through the life of aircraft, but we must:

- Minimise the use of resources
- Reduce harmful emissions to air, land and water
- Reduce the hazards associated with materials and processes





Conclusions



- Demanding goals that must be tackled on a European scale
- Radical new technologies needed to achieve the goals
- An Air transport system model is required to assess new technologies
- Study projects needed to identify the best options for future research
- Large scale research test beds are required
- Technology Integration Platforms will be required, potential examples include:
 - Environmentally Friendly Aircraft
 - Advanced cycle engine
 - Ultra low noise / advanced Tilt Rotor