PROPULSION AND POWER ROADMAP

DRIVERS

Reduce Cost: reduce waste, improved manufacturing productivity and better utilisation of resources/skills
Improve Energy Efficiency: improved propulsive efficiency through novel architectures
Protect the Environment: reducing CO2, NOx, nvPM, perceived noise, material usage and waste
Meet Operational Needs & Flexibility: resilient and efficiently-maintainable propulsion and power systems
Enhance Passenger Experience: reduce in-cabin perceived noise
Improve Safety: damage tolerance, intrusion tolerance, predictability, quality assurance

TARGET (EIS)

ENVIRONMENT

CO2 (% margin/fuel burn, 2000 baseline)**:** 20% reduction by 2025, 25% reduction by 2035
NOx (% margin relative to AEP6, 2000 baseline)**:** 55% reduction by 2025, 65% reduction by 2035
Perceived Noise (Propulsion, relative to Chapter 3, LR2 average)**:** 30 EPNdB cumulative reduction by 2025, 36 EPNdB cumulative reduction by 2035

TECHNOLOGY PRIORITIES (TRL 6)

ULTRA HIGH BYPASS TURBOFAN ENGINE

- Lightweight, low speed, low noise composite fan system
- Next generation composite fan system optimised to gas generator
- High pressure ratio, high efficiency gas turbine core
- Variable pitch fan systems
- Lean burn, low NOx combustion system
- Variable area fan nozzle systems
- Development of sustainable fuels
- High stress, high temperature materials
- Novel, variable thermodynamic cycles
- Installation of large diameter UHBR system into short, slimline nacelle
- Powerplant system integration
- Adaptive control systems
- Advanced integrated heat exchangers and thermal management systems

HYBRID GAS TURBINE/ELECTRIC PROPULSION SYSTEMS

- Integrated hybrid propulsion concepts
- Advanced integrated hybrid propulsion concepts (BLI, distributed, embedded)
- UK technology validation facilities for high power hybrid propulsion systems
- Lightweight cryogenic, superconducting, high power systems
- High power, high efficiency electrical machines and power electronics
- Hybridisation of UHBR
- High voltage electrical systems for operation in high altitude environments
- Thermal management systems for electrical machines and power electronics

ALL-ELECTRIC BATTERY AND FUEL CELL PROPULSION SYSTEMS

- Integration of all electric propulsion systems in air vehicle concepts
- Integration of fuel cell propulsion systems in air vehicle concepts
- High power density battery power packs, power electronics and electrical motors
- High efficient, safety critical fuel cell systems for propulsion
- Lightweight thermal management systems
- Energy recovery systems
- Lightweight fan and propeller systems

| 2020-2025 | 2025-2030 | 2030-2035+ |