EIMG Engine Industry Management Group

EIMG

The European Aero-engine Community

Riga, 20 April 2005

Presented by: Dr. Ralf v.d. Bank, Rolls-Royce Deutschland

EIMG Engine Industry Management Group

EIMG : The European aero-engine community

Rolls-Royce UK

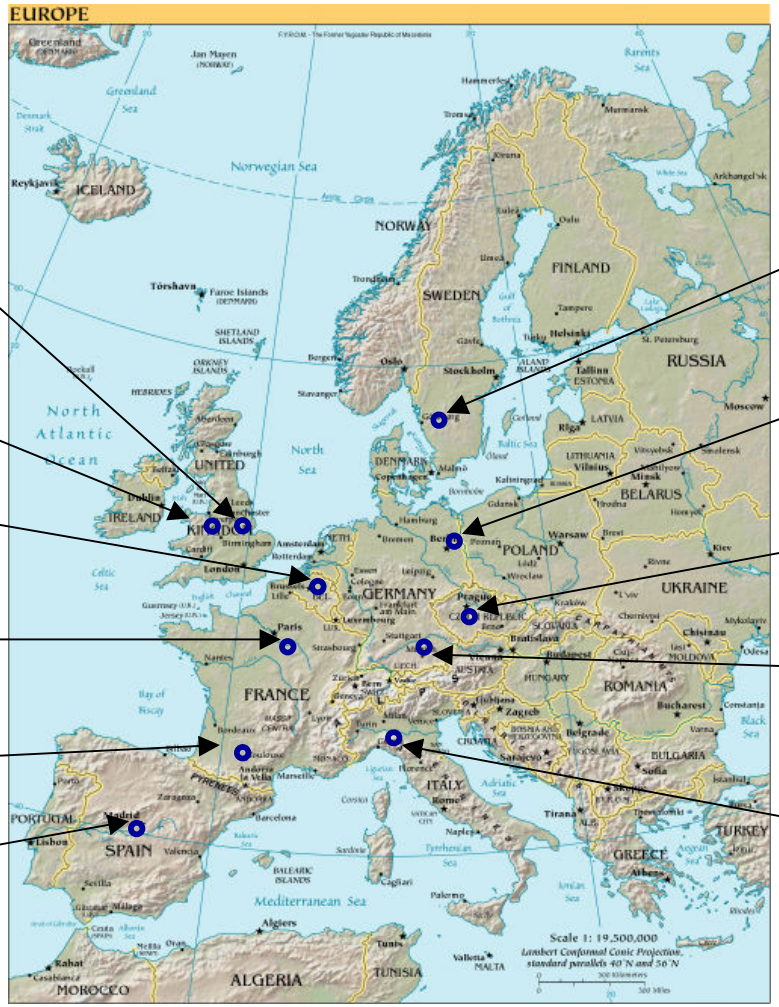
Alstom

Techspace Aero

Snecma Moteurs

Turbomeca

ITP



Volvo Aero

Rolls-Royce D

PBS

MTU Aero Engines

AVIO

EIMG Engine Industry Management Group

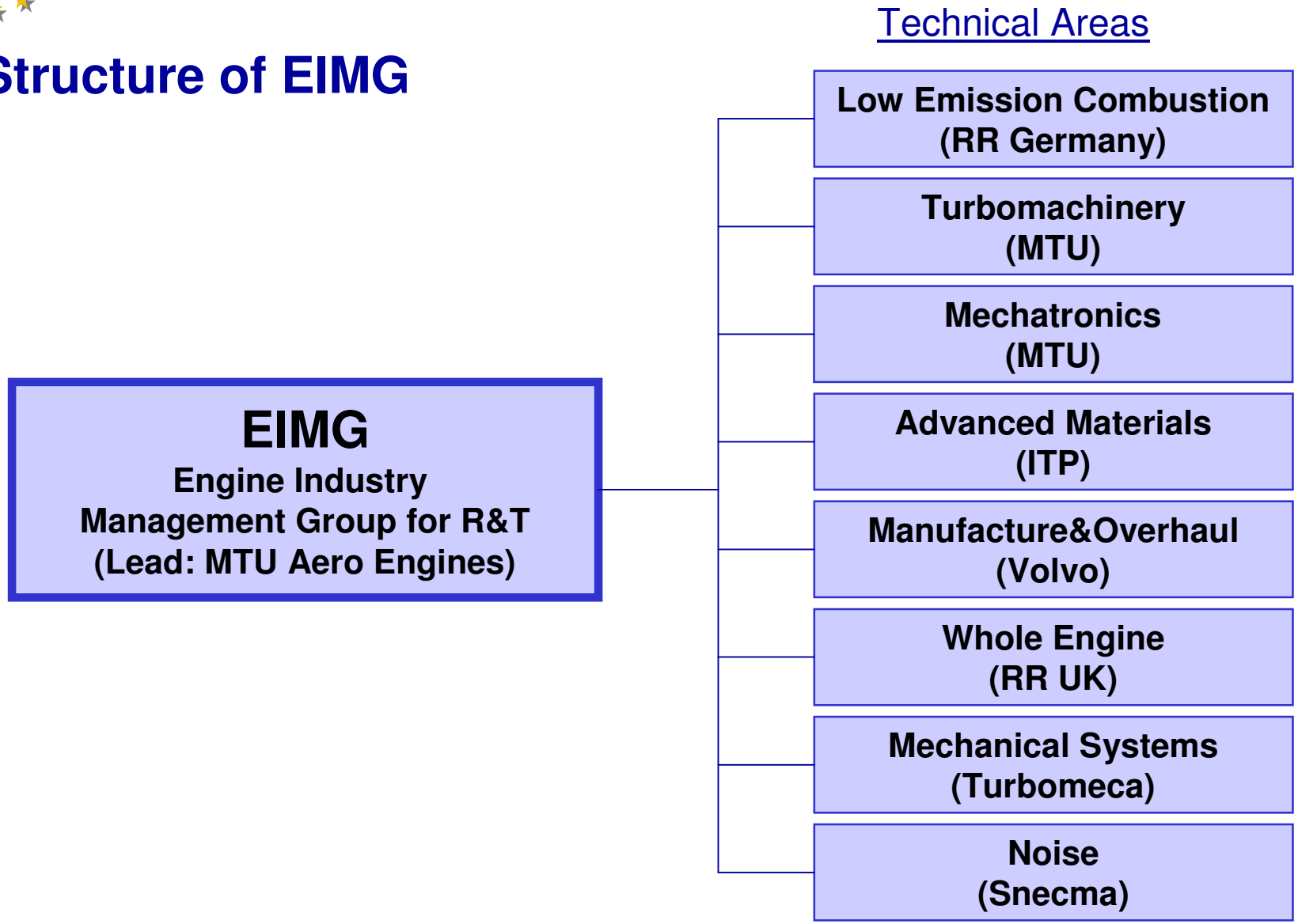
Objectives of EIMG

- EIMG was formed in 1990 in response to a request from the European Commission.
- EIMG consists of one representative from each of the major European Aero-engine companies.
- The Purpose of EIMG is:
  - to provide a European Aero-engine view on research and technology programmes
  - to maximise leverage of technology acquisition between partners in pre-competitive areas
  - to support the European Commission in developing future framework programmes

The EIMG companies undertake joint actions such as co-ordinated preparation and submission of project proposals to be carried out under European Commission contracts within the Research Framework Programmes

EIMG Engine Industry Management Group

Structure of EIMG

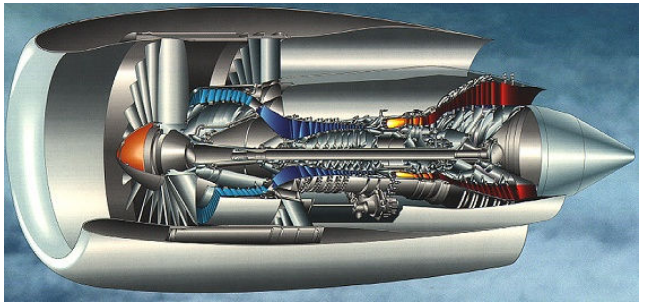


EIMG Engine Industry Management Group

ACARE 2020 Environmental Goals : The Engine Contribution

ACARE 2020 OBJECTIVES (reference : 2000 aircraft)

- Reduce perceived noise by half (10dB)
- Reduce CO2 by 50%
- Reduce NOx by 80%
- Acceptable cost

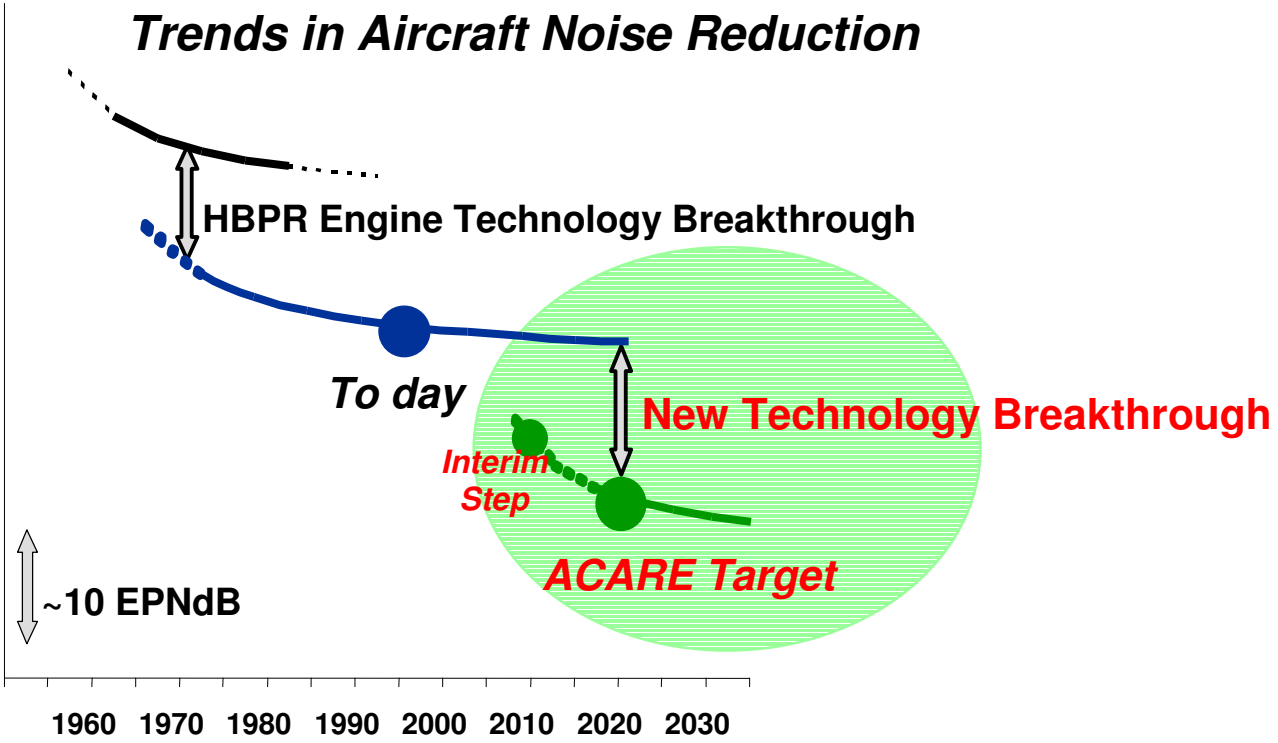


ACARE 2020 OBJECTIVES Engine Contribution

- Reduce noise by 6db at each certification point
- Reduce CO2 by 20%
- Reduce NOx by 80%
- Acceptable cost

EIMG Engine Industry Management Group

Background for Noise

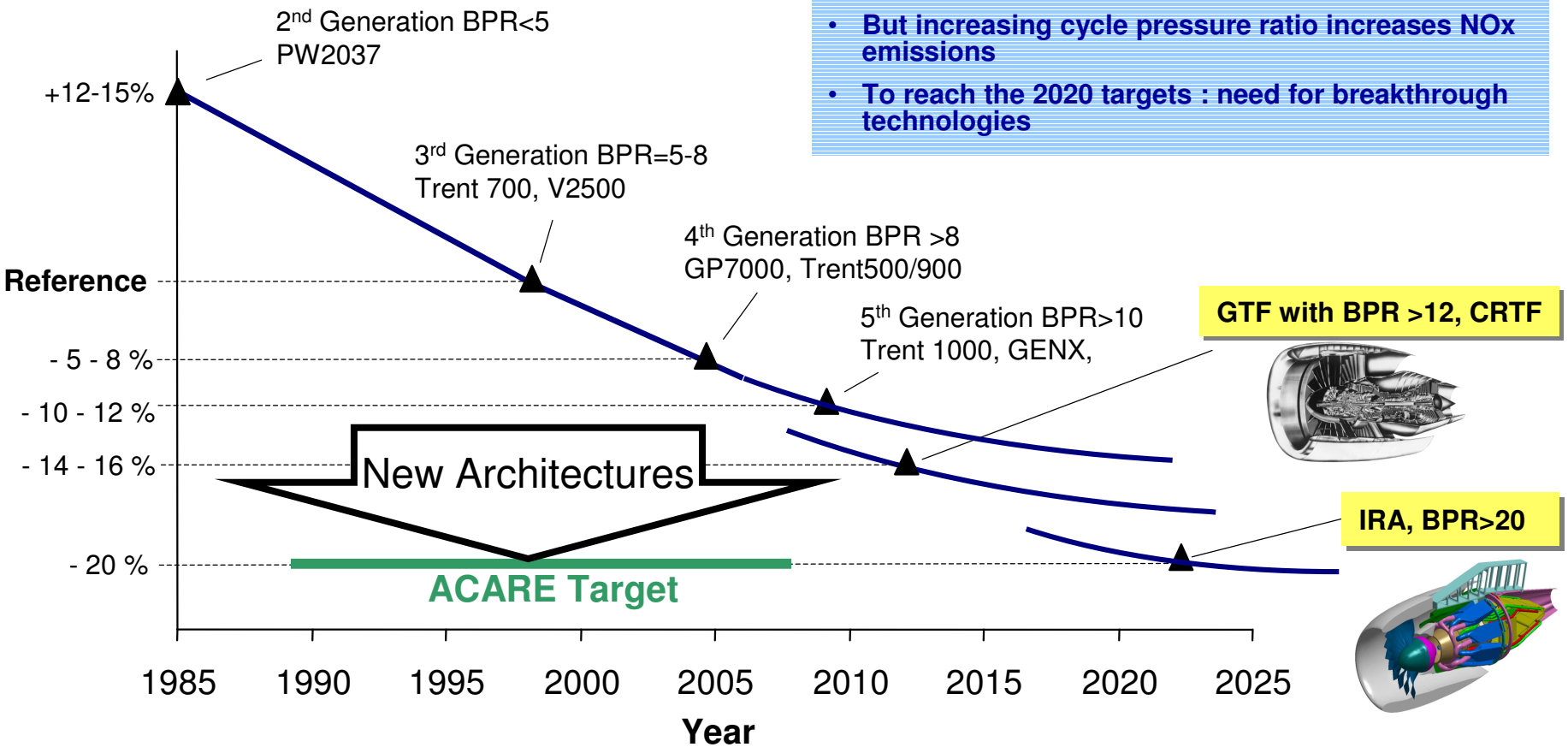


- High bypass-ratio (BPR) turbofan engines represented a technology breakthrough allowing a 20 db noise decrease in 40 years.
- To reach the 2020 targets : need for new breakthrough technologies

EIMG Engine Industry Management Group

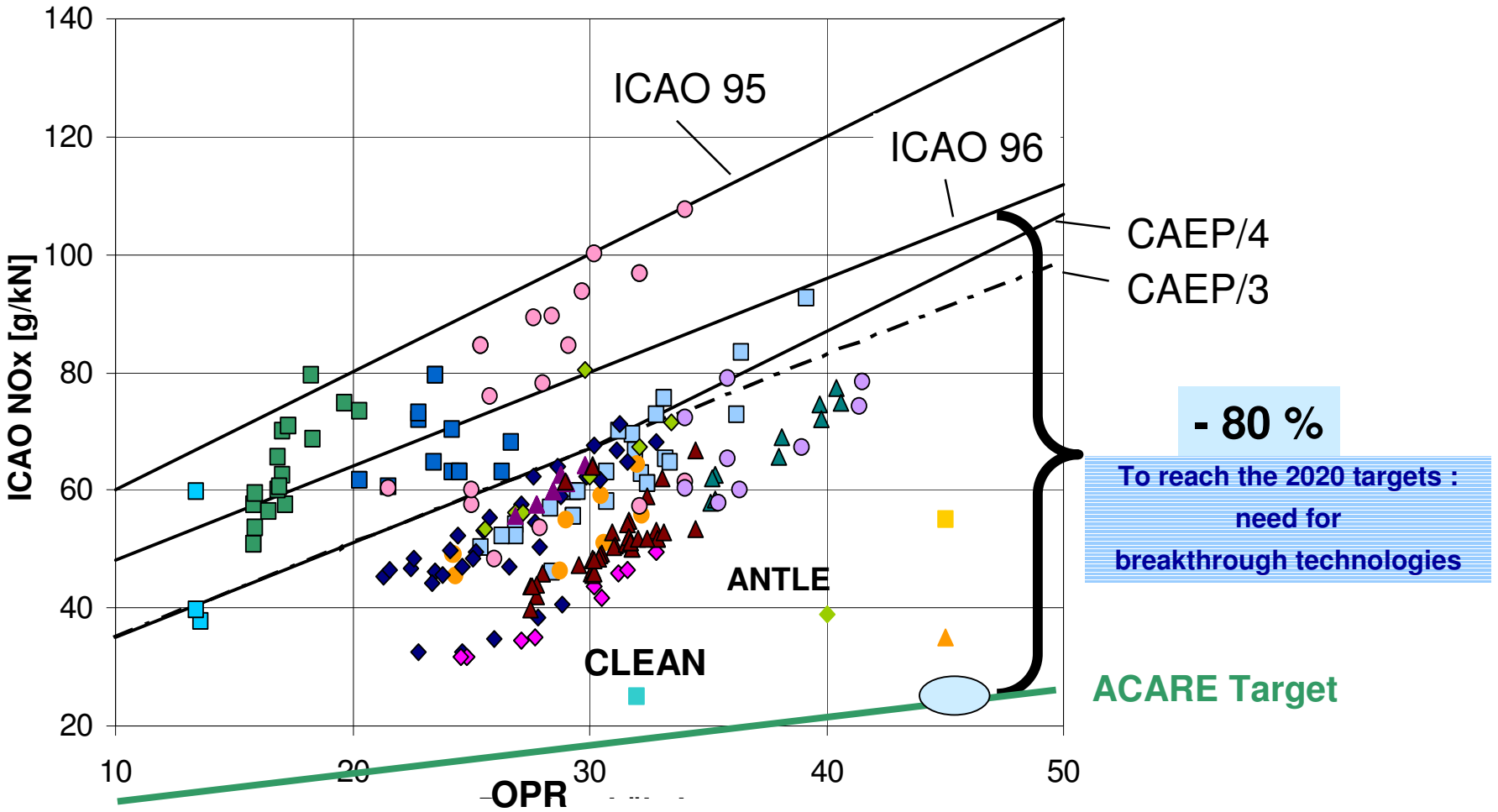
Impact of Bypass-Ratio on Fuel Consumption / CO2

- Introduction of high bypass-ratio turbofan engines in the 1970's and then increasing cycle pressure ratio and BPR have reduced fuel consumption
- But increasing cycle pressure ratio increases NOx emissions
- To reach the 2020 targets : need for breakthrough technologies



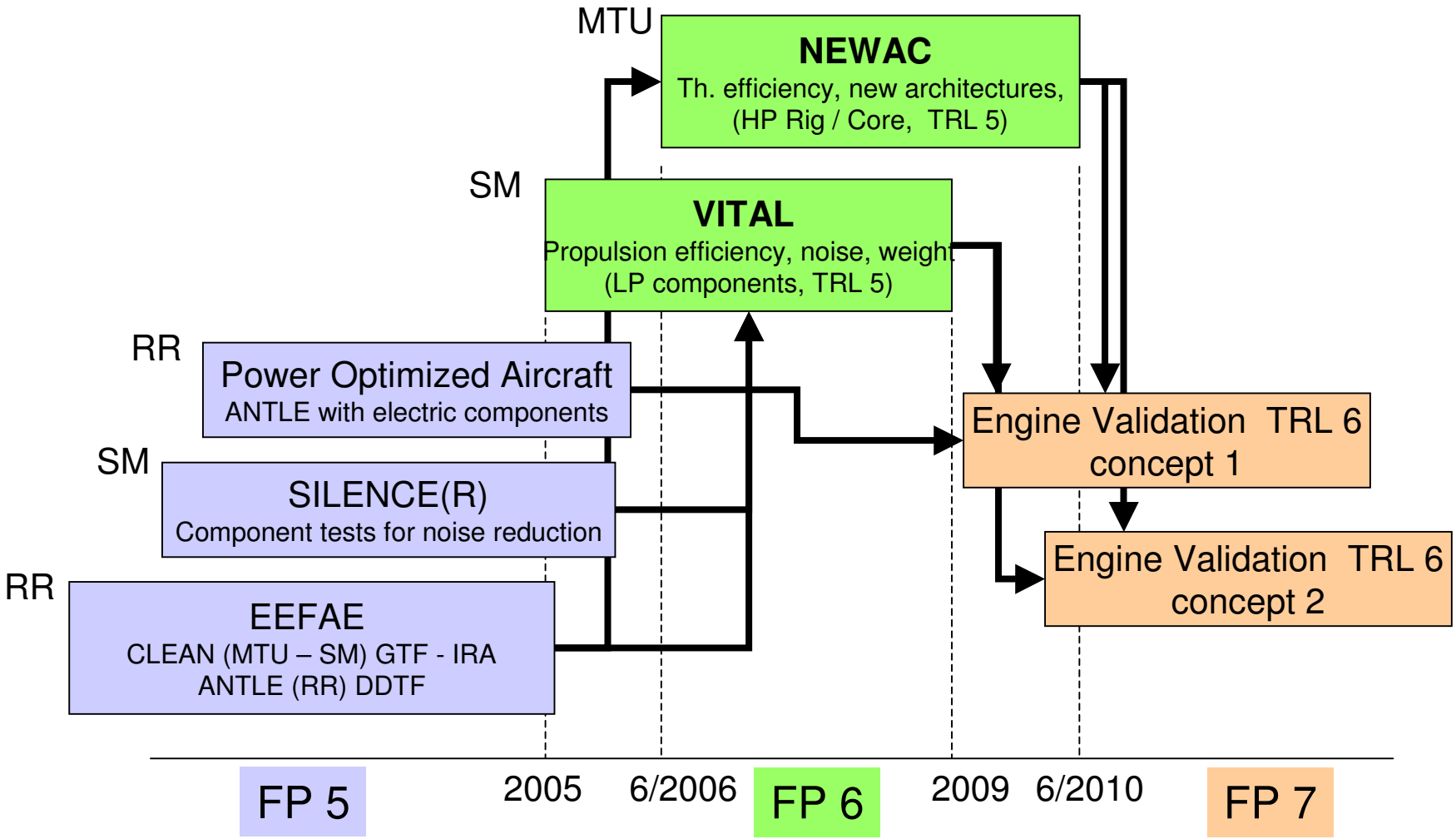
EIMG Engine Industry Management Group

Impact of Overall Pressure Ratio (OPR) on NOx



EIMG Engine Industry Management Group

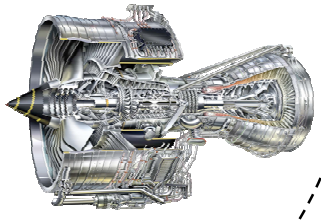
Overview of Integrated Projects in FP 5-6-7



EIMG Engine Industry Management Group

Evolution of Engines for Noise

Datum : Engine in service in 2000



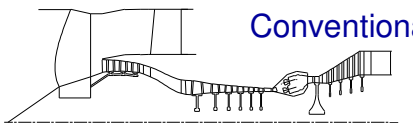
Evolutionary Technologies

SILENCER
FP5

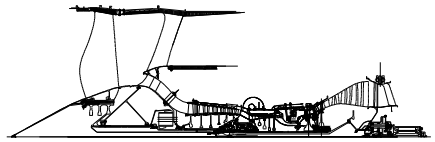
Noise reduction technologies on conventional aircraft/engine configuration

Revolutionary technologies for SRA Objectives

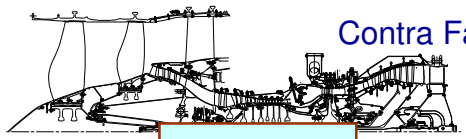
Conventional Fan



Geared Fan



Contra Fan



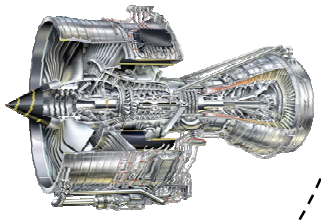
VITAL
FP6 IP
2nd Call

Novel engine architecture for noise and fuel burn reduction

EIMG Engine Industry Management Group

Evolution of Engines for NOx and CO2 Emissions

Datum : Engine in service in 2000



-12% CO2
- 60% Nox

ANTLE

EEFAE
FP5

CLEAN

-20% CO2 partial demonstration
-80% NOx

SRA objectives

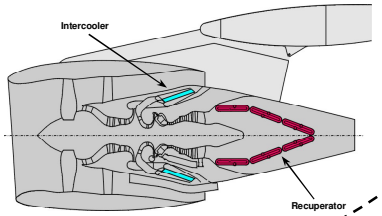
VITAL
FP6 IP
2nd call

-20% CO2 mainly from propulsive efficiency

SRA objectives

NEWAC
FP6 IP
3rd call

-20% mainly from thermal efficiency



EIMG Engine Industry Management Group

STREP's in 1st & 2nd CALL of FP6

- 15 STREPS with engine leadership were retained (success rate 1:3, total budget ca. 85 mio €, ca. 45 mio € funding, 150-200 partners)

- Subjects covered :
  - Combustion for less emissions
  - Turbine and compressor technologies
  - Advanced control systems
  - Advanced material technologies
  - Manufacturing technologies
  - Engine noise (modelling, testing, ANC development…)

EIMG Engine Industry Management Group

STREP's in 3rd CALL of FP6

- 20 STREPS with engine leadership in preparation (total budget ca. 120 mio €, ca. 65 mio € funding requested, success rate 1:3 expected)

- Subjects covered :
  - Combustion for less emissions
  - Turbine and compressor aerodynamics, aeroelasticity
  - Advanced monitoring and measurement systems
  - Advanced material technologies
  - Manufacturing technologies
  - Advanced rotordynamics
  - Advanced bearing lubrication systems
  - Engine fan and jet noise modelling & testing

EIMG Engine Industry Management Group

Conclusions

- FP6 engine makers objectives are consistent with ACARE objectives
- Environment is the priority
- Technology breakthroughs will be necessary to achieve 2020 targets
- All European aero-engine manufacturers are working together
- All Integrated Projects include participation of aircraft and equipment sectors
- All projects involve widely Research Establishments, Academia and SME

EIMG Engine Industry Management Group

Contact

EIMG Chairman: Dr. Hermann Scheugenpflug

MTU Aero Engines GmbH
Dachauer Str. 665
80995 Munich
Germany

E-mail: Hermann.Scheugenpflug@muc.mtu.de