

Executive Summary

Aircraft Emissions and Reduction Technologies Results of a Workshop on Inputs for FP7 - Aeronautics and Wider Research Means of Delivering the ACARE 2020 Goals

held at the DLR Office in Brussels, Belgium, on January 24 - 25, 2006



The AERONET Coordination Action held a workshop on 24-25 January 2006 to crystallise the collected opinions of partners and related experts on how the FP7 research programme can help to deliver the ACARE environmental goals. The workshop considered the SRA II and looked for gaps in the research. The workshop found relatively few gaps but did consider a number of strategic themes that the AERONET community felt were important.

Key strategic themes

- 1) FP7 is a significant research opportunity that can influence ACARE goal delivery.**
Given the time required for product development and market introduction, research would have to lead viable technologies and other capabilities by 2018 (TRL8) to result in products entering service in 2020. Accordingly, it is suggested that the priority for FP7 in the environmental area should be towards those technologies that stand the best chance of contributing to realisation of the ACARE goals. The ACARE goals were considered to be extremely challenging and needed a gear change on research work to be with reach of achievement.
- 2) A combination of research into evolutionary improvements and 'blue skies' or 'frontier' research is needed to unlock step-change technologies that can close the gap due traffic growth.**
Additional resource is needed to stimulate and test higher-risk novel and advanced technology ideas to the point that promising options can be taken forward through 'technology readiness' evaluation.
- 3) Scenarios are a key to understanding the most productive research directions.**
Mechanisms and arrangements should be sought to enable scenarios to be constructed, updated and maintained to provide a 'living' forward look that would help guide research and wider policy strategies.
- 4) Greater maturity in models and simulation tools would help to explore technologies and practices in a cheaper and more flexible manner.**
Developing tools to examine and iterate design options, their practical application and system functioning is a crucial means of accelerating the delivery of aeronautical developments for environmental gain.

- 5) **A holistic systems approach, beyond research, will be needed to deliver the ACARE environmental goals and keep the sector on a sustainable track thereafter.** It is important to put research in the context of action and reaction by the aviation sector to its various stimulate. New system approaches need to be envisaged and tested to help the sector to break out of some inherently unsustainable practices and structures.
- 6) **Cross-discipline collaborative research with the scientific community is needed to explore the interaction between vehicle design/operation and environmental impact.** Evolving evidence of aviation's atmospheric impact suggests the need for closer working to understand the trade-offs.

The ACARE SRA II is a fairly comprehensive assessment of issues that contribute to the greening of aviation to help it grow and meet predicted demand on a sustainable basis. The workshop identified a number of topics that were felt to need emphasis on account of their potential for delivering achievable benefits:

- **Contrails and Cirrus cover and climate impact**
The impact of contrails and aircraft induced cirrus cover needs to be clarified as this is a necessary background information for the future ATM and potential aircraft development.
- **Novel / alternative aviation fuels**
Research on fuel optimisation is needed. Design fuels from oil, coal or gas, biofuels or alternative renewable fuels need to be considered for a sustainable environmentally friendly air transport after the next decades. There is a need to develop a comprehensive strategy for identifying and introducing technically and economically viable alternative fuels.
- **Noise and Airport air quality**
Airports may become the most critical bottle necks for future air transport growth. Besides runway and air space capacity shortage noise and airport air quality may be the limiting criteria.
- **Aviation scenario capability and requirements**
A durable prediction for the development up to 2050 is not possible. But high quality scenario work and quality in Europe can support industry in its decisions for long term technologies and related major investments.
- **Low NOx combustion technology in aero-engines**
Lean-burn technology is essential to achieve the low NOx targets, it has to be driven towards higher technology readiness levels and application in aero-engine gas turbines. Operability issues (such as flame stability, altitude relight, oscillations etc) have potential to significantly compromise NOx reductions.
- **Interdependency Modelling**
A European Interdependency modelling capability is needed. This capability should enable to assess technical, operational or regulatory options and the effects on aviation emissions environmental impact (local, regional and global level), aircraft