



# **Towards Climate-optimized Aviation Conclusions and Discussion**

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**See also: Towards Climate-Optimized Aviation**  
**Special Session, Today, 15:10-18:10, ECC Room 4**

➤ **Global Climate Change and Aviation - The Challenge**

15.10-16:30:

Ulrike Lohmann, *ETH Zürich*: Global Climate Change

Ulrich Schumann, *DLR*: Climate Impact of Aviation

David Lee, *Uni Manchester*: Science Progress and Uncertainties

**Growing Air traffic and Climate - The Response**

16:50-18:10:

Cord Rossow, *DLR*: ACARE Goals and DLR Contributions

Regina Egelhofer, *TU Munich*: Aircraft Design for Mitigation

Norbert Arndt, *RR Germany*: Engine Emissions Reduction Potential



## Conclusions: The Challenge

- **Global warming is observed and largely caused by human drivers**
- **Climate protection requires reductions of the total greenhouse gas emissions, including those from aviation**
- **The aviation share in CO<sub>2</sub> emissions is presently about 2 %**
- **Hence, increased fuel efficiency is important (for several reasons)**
- **In addition, cruising aircraft impact climate by NO<sub>x</sub> and contrails**
- **The aviation share in radiative forcing is presently 3 % (range 2-8%)**
- **Scenarios of aviation CO<sub>2</sub> emissions show potential increase by factors 3.3 – 5 until 2050**
- **NO<sub>x</sub> and Contrails offer special chances for climate mitigation**
- **Largest uncertainty and possibly largest contribution from contrail cirrus**
- **The contrail issue needs higher attention by ACARE and others**



## Conclusions - The Response

- **Today's air transport system is highly matured:  
actual response to societal need for travel and transportation**
- **Drastic system changes require high incentives or urgent demand**
- **Reliable Metrics mandatory to include emissions into system design**
- **Global legislation and ecological targets necessary**
- **Physics is not the barrier to achieve ACARE goals**
- **Challenge lies in pragmatic combination of economy and ecology**
- **Continuous, disciplinary and multidisciplinary research required**
- **Research and Industry committed to address ACARE challenges**
- **Climate change has replaced noise as top environmental concern in air traffic**



## Discussion Questions

1. **Is the climate issues as important for aviation as postulated?**
2. **Are the IPCC findings correct and accepted?**
3. **Are the aviation climate contributions correctly assessed?**
4. **What are the open research questions?**
5. **Which technological options do we have for reducing climate impact?**
6. **How much emission reduction is technically possible?**
7. **What can be contributed by air traffic management?**
8. **What can be contributed by operations?**
9. **Is present research strong enough and sufficiently focused?**
10. **What can be achieved by enhancing cooperation?**
11. **When will improved technology be ready and what does retard implementing them?**
12. **What consequences will come from an EU Emission Trading System?**