

## **Economic analysis of potential Market Based Options for the reduction of CO<sub>2</sub> emissions**

Abstract

Working Group 5 has designed several market based options to reduce CO<sub>2</sub> emissions from aviation: levies (taxes and charges); voluntary agreements and emission trading. Each group contained various sub-alternatives, such as: a fuel tax, an emissions en-route tax and charge and a revenue neutral emission charge; an open system, a closed system and a closed system with sinks. Other variations were different application areas: (globally, only international traffic and Annex-1 countries only); different targets and target years. On top of that, sensitivity analyses were performed for the most important assumptions.

The analysis was mainly based on the AERO-modelling system. This tool enables the comparison of economic consequences to the aviation sector of different (economic and technical) options to reduce its emissions. As there was a very wide range of options and their alternatives to consider, the analysis was performed in two steps. First, all the options were analysed globally in a screening stage. After that, the more promising options were analysed in more detail.

The analysis showed that:

- A fuel tax, en-route emission tax, voluntary agreements that reach the targets and a closed emission trading system have roughly the same costs and benefits.
- When aviation has to meet the same targets as those specified for countries (Parties) under the Kyoto Protocol, the effects on aviation would be devastating. Only under an open trading system at the presently projected permit prices could a realistic solution be found. It should be noted that here money leaves the aviation sector.
- At less stringent targets, a system of charges complemented with a system where the proceeds of the charge are re-channelled back into the sector for emission abatement measures, also seems to be a viable option.
- When the targets are even further relaxed, a revenue-neutral charge also becomes an environmentally effective and economically efficient measure as well.
- When the targets only apply to the international part of the traffic and/or to the traffic of Annex-B countries only, the environmental benefits will decrease roughly proportionally to the amount of traffic affected. At the same time, the chance of distortions will increase.

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*Recent environment-related projects in which he has been involved include:*

- *Project-leader of the AERO-project (Aviation Emissions and Evaluation of Reduction Options).*
- *Dutch policy document on air pollution of aviation.*
- *Computer modelling approaches for noise impacts, air pollution and third party risk.*
- *Economic modelling of market-based measures to reduce the noise problems at Schiphol (Amsterdam Airport).*

*Before becoming Co-chairman of FESG, Mr. Pulles was actively involved in earlier CAEP analytical work:*

- *1994-1995: Dutch representative in the Economic Analysis Support Group.*
  - *1996-1998: CAEP Focal Point on Charges.*
  - *1998-2000: Dutch representative in the Working Group on market-based options.*
  - *1999-2000: Co-chair of a task group analysing market-based options.*
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