



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 27.9.2005
COM(2005) 459 final

**COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE
EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

Reducing the Climate Change Impact of Aviation

{SEC(2005) 1184}

**COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE
EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

Reducing the Climate Change Impact of Aviation

1. INTRODUCTION

Air transport has become an integral part of society in the 21st century, enabling both passengers and freight to span large distances at an unprecedented speed. However, aviation also contributes to climate change. Although aircraft fuel efficiency has increased by more than 70% over the last 40 years, the total amount of fuel burned has still increased due to even higher growth in air traffic.

As a result, the impact of aviation on the climate is on the rise: whilst the EU's total emissions controlled under the Kyoto Protocol fell by 5.5% (-287 MtCO₂e) from 1990 to 2003¹, its greenhouse gas emissions from international aviation increased by 73% (+47 MtCO₂e), corresponding to an annual growth of 4.3% per year.

Although aviation's share of overall greenhouse gas emissions is still modest (about 3%), the rapid growth undermines progress made in other sectors. If the growth continues as up to now, **emissions from international flights from EU airports will by 2012 have increased by 150 % since 1990. This growth in the EU's international aviation emissions would offset more than a quarter of the reductions required by the Community's target under the Kyoto Protocol.** In the longer run, aviation emissions will become a major contributor if current trends continue.

2. THE CURRENT POLITICAL CONTEXT

This Communication is a basis for discussion with other European institutions and stakeholders on internalising the environmental costs of aviation emissions into the EU Emission Trading Scheme. While the aviation sector is confronted with the highest oil and fuel prices in history causing significant economic impacts for the airlines, a number of recent dramatic weather events in Europe and abroad give a reminder of the potentially huge costs associated with the increase in the frequency and severity of such events that climate change is expected to cause.

Although the economic context is difficult, the problem of climate change remains urgent and discussions have to be launched now in order to provide timely input for the planned review of the EU Emissions Trading Scheme in June 2006.

¹ Annual European Community greenhouse gas inventory 1990-2003 and inventory report 2005.

The strategy outlined in this Communication has to be seen in the context of the following already existing political orientations.

On the basis of the Commission Communication “Winning the Battle Against Global Climate Change” the European Parliament and the European Council in spring 2005 re-affirmed the EU objective that global surface temperatures should not rise by more than 2°C compared with pre-industrial levels in order to prevent dangerous and irreversible anthropogenic climate change. The European Council also stated that

- reduction pathways for the group of developed countries of the order of 15-30% by 2020, compared to the baseline envisaged in the Kyoto Protocol, should be considered;
- the Commission should continue its cost-benefit analysis of CO₂ reduction strategies and
- international negotiations should be reinvigorated by exploring options for a post-2012 arrangement in the context of the UN climate change process, ensuring the widest possible cooperation by all countries and their participation in an effective and appropriate international response.

On the basis of these guidelines action needs to be taken to ensure that aviation does not undermine, but contributes to, achieving this overall objective.

This communication outlines a strategy for complementing existing action by implementing a new market-based instrument at EU level. It is underpinned by stakeholder consultations and an impact assessment, which are reported separately.

3. THE CLIMATE IMPACTS OF AIR TRANSPORT

Commercial aircraft operate at cruise altitudes of 8 to 13 km, where they release gases and particulates which alter the atmospheric composition and contribute to climate change.

Carbon dioxide (CO₂) is the most important greenhouse gas because of the large quantities released and its long residence time in the atmosphere. Increasing concentrations have a well-known, direct effect which warm the earth’s surface.

Nitrogen oxides (NO_x) have two indirect effects on the climate. Nitrogen oxides produce ozone under the influence of sunlight, but they also reduce the ambient atmospheric concentration of methane. Both ozone and methane are strong greenhouse gases. The net result is that the ozone dominates the methane effect, thus warming the earth.

Water vapour released by aircraft has a direct greenhouse gas effect, but as it is quickly removed by precipitation the effect is small. However, water vapour emitted at high altitude often triggers the formation of condensation trails, which tend to warm the earth’s surface. Moreover, such “contrails” may develop into

cirrus clouds (clouds of ice crystals). These are also suspected of having a significant warming effect, but this remains highly uncertain.

Sulphate and soot particles have a much smaller direct effect compared with other aircraft emissions. Soot absorbs heat and has a warming effect; sulphate particles reflect radiation and have a small cooling effect. In addition, they can influence the formation and properties of clouds.

In 1999 the Intergovernmental Panel on Climate Change (IPCC) estimated that the total impact of aviation currently is about 2 to 4 times higher than the effect stemming from its past CO₂ emissions alone. Recent EU research results indicate that this ratio may be somewhat smaller (around 2 times). None of these estimates take into account the highly uncertain cirrus cloud effects.

4. THE NEED FOR POLICY ACTION AT ALL LEVELS

4.1. Air transport emissions in the UNFCCC and the Kyoto Protocol

International air transport is treated differently from most other sectors in terms of how its greenhouse gas emissions are accounted for under the United Nations Framework Convention on Climate Change (UNFCCC). Owing to a lack of consensus over whether and how to allocate responsibility for these emissions, only domestic CO₂ emissions are included in the Parties' national emission totals. Emissions from international flights are simply dealt with as a "memo item". Consequently they are not subject to the quantified emissions limitations taken on by the developed countries which ratified the Kyoto Protocol. A key part of the political pressure which drives States to implement mitigation measures for other sectors is thus lacking in the case of international air transport.

The Commission argued, in its February 2005 communication², that **international aviation should be included in any post-2012 climate change regime** to give States stronger incentives to take action on their own *and* in cooperation with others.

4.2. ICAO policies to control aviation emissions

In the absence of an agreement on the allocation question, the Parties negotiating the Kyoto Protocol agreed to include an explicit obligation for developed countries to pursue the limitation or reduction of emissions from aviation, working through the International Civil Aviation Organization (ICAO).

Action taken so far through ICAO has mainly contributed to improving the understanding of the global climate impacts of aviation. ICAO's 188 member countries have not been able to agree on regulatory standards or emissions charges applicable to CO₂ emissions, and an attempt to identify and agree a suitable efficiency indicator for aircraft has failed. However, **ICAO has endorsed the concept of international open emissions trading** to be implemented through

² COM(2005) 35, 9.2.2005

voluntary emissions trading or the incorporation of international aviation into the existing schemes of states.

4.3. The case for action at Community level

The EU consistently participates in and supports UNFCCC and ICAO activities, helping to maximise consistency and participation in mitigation efforts worldwide. However, as explicitly recognised in the policy statements agreed by all its Contracting States it is not realistic to expect ICAO to take global decisions on uniform, specific measures to be implemented by all nations. The reluctance of developing countries to commit themselves to more demanding policies before they see clear leadership from industrialised countries, combined with the lack of such action from important industrialised partners who are not Parties to the Kyoto Protocol, is likely to prevent this from happening.

The EU is a major player in global aviation, accounting for about half of the CO₂ emissions from international aviation reported by developed countries³. At the same time, as an organisation of developed countries and as ratifying Parties, the European Community and the EU Member States have special obligations under the UNFCCC and the Kyoto Protocol.

In recognition of this, in the **6th Community Environment Action Programme** the European Parliament and the Council decided to identify and undertake specific actions to reduce greenhouse gas emissions from aviation if no such action was agreed within ICAO by 2002. Since then, the Council has repeatedly recalled the need for urgent action to reduce emissions from international air transport and called upon the Commission to consider such action and make proposals.

Against this backdrop, the Commission has reviewed the available options. There is **no quick and easy technical solution**. Hence there is a need for a comprehensive approach, **strengthening existing action and exploring new measures**.

5. TAPPING THE POTENTIAL OF EXISTING POLICIES

A number of existing Community and Member State policies hold potential for contributing further to mitigating the climate impact of aviation, albeit to a limited extent or only in the longer term. Apart from raising public awareness and increasing the performance and competitiveness of alternative modes of transport, these include notably **research, air traffic management and energy taxation**.

5.1. More research into cleaner air transport

The EU has chosen aeronautics as one of its research and development priorities with the aim of minimising the environmental impact of aircraft. Since the pilot phase in 1990-1991 under the Second Framework Programme, more than 350 research projects have been funded at a total cost of 4 billion euros. About 30% of this research work has taken the form of activities aiming at reducing the

³ 103,411 of 202,779 MtCO₂e - 2002 data as reported by Annex I Parties to the UNFCCC.

environmental impact of aircraft, in particular CO₂ and NO_x. In addition, research into better understanding the climate impact of aviation has been investigated through the “Global Change and Ecosystem Programme” of the Sixth Framework Programme. **A stronger orientation towards “greening” air transport and a greater focus on its impact on climate change** will be a priority in the new Seventh Framework Programme recently proposed by the Commission. Further research into alternative fuels may reveal additional potential for reducing greenhouse gases emitted by aircraft.

5.2. Improving air traffic management

While research can increase the opportunities available tomorrow, more efficient air traffic management holds important potential in the shorter term. Fuel consumption, for instance, can be reduced by minimising queuing before take-off, using more optimal flight paths and reducing the extent to which aircraft must fly in holding patterns before landing at congested airports. The **Single European Sky** and **SESAME**⁴ initiatives have begun the reforms necessary to reap these benefits. Timely progress with implementation must now be a priority.

5.3. Towards more consistent application of energy taxation

While generally imposed by Member States for fiscal objectives, wider **application of energy taxation to fuel for commercial aviation** might also contribute to internalising environmental costs and reducing CO₂ emissions. On numerous occasions the Commission has stated its preference for normalising the treatment of aviation fuel as soon as possible within the international legal framework governing aviation, arguing that as a matter of principle aircraft fuel should be subject to energy taxes as are other motor fuels.

Following the adoption of Council Directive 2003/96/EC restructuring the Community framework for the taxation of energy products and electricity, **Member States can already introduce fuel taxation for domestic flights**. Fuel for domestic flights is already taxed in non-EU countries such as the USA, Japan and India, but in the EU only the Netherlands has so far decided to do so.

Subject to mutual agreement, fuel taxation can also be introduced for flights between two Member States under existing Community legislation. In such cases it would apply to all EU carriers. However, it has been common practice for aircraft fuel for international flights to be exempted from all taxes - a policy originally established to promote civil aviation during its infancy. The legally binding exemptions are found in the bilateral air service agreements (ASAs)⁵. Avoiding discrimination against EU carriers could therefore be difficult on routes where non-EU carriers have traffic rights and continue to enjoy tax exemptions under the relevant ASAs⁶.

⁴ The Single European Sky legislation was adopted in 2004. It provides the institutional and regulatory basis for de-fragmented, inter-operable European Air Traffic Control. SESAME covers technical implementation of the Single European Sky.

⁵ Contrary to common perception, the 1944 Chicago Convention only precludes taxation of aircraft fuel in transit, a provision which can be seen simply as a safeguard against double taxation.

⁶ These regulate traffic rights and other issues relating to international air services.

In this context, the judgments delivered on 5 November 2002 by the Court of Justice of the European Communities in the “Open Skies” cases⁷ are significant. They triggered a comprehensive reform of the EU’s external aviation relations. As part of this process, more than 200 ASAs between EU Member States and non-EU countries have already been amended to open the possibility of taxing fuel supplied to EU and non-EU carriers on an equal basis. However, while this process must and will continue, it will inevitably take time to complete. In view of this specificity of the aviation sector, the wider application of energy taxes to aviation can not be relied upon as the key pillar of a strategy to combat the climate change impact of aviation in the short and medium term. It has therefore not been further assessed in the present context.

6. ECONOMIC INSTRUMENTS AS COST-EFFECTIVE DRIVERS FOR CHANGE

The combined effect of the above existing measures alone will not be sufficient to offset the growth in air traffic emissions. **New approaches going further and beyond traditional technical standards and voluntary action are needed.** As already acknowledged in the Commission’s 1999 Strategy on Air Transport and the Environment, the need for cost-effective approaches points in favour of flexible economic instruments. Such measures apply the “polluter pays” principle and also tap into the multitude of potential reductions, the costs of which are best known to the industry, by sending price signals that reflect environmental policy objectives.

Several types of market-based instruments have been considered (see impact assessment). However, instruments such as **airline ticket or departure taxes would have an effect only through dampening demand** and so would not give operators an incentive to improve environmental performance. While they are potentially appropriate for pursuing other policy objectives⁸, the focus has therefore been placed on **emissions trading** and **emissions charges** as more promising ways to address the climate impact of aviation.

6.1. Assessing the options

Emissions trading works by first setting a limit on total emissions from a group of entities, and then letting the market determine the cost for emitting each tonne of emissions. By contrast, charges set the cost for emitting a tonne of emissions, but then let the entities concerned determine the extent to which emissions are reduced in response.

In the present context the two instruments also differ in terms of **environmental effectiveness, economic efficiency and potential for wider application.**

⁷ In which the Commission had brought actions against eight Member States regarding bilateral ASAs signed with the USA.

⁸ For example, the possibility of raising funds for development aid via airline tickets has recently been discussed in the ECOFIN Council.

6.2. Environmental effectiveness and economic efficiency

If emissions trading or emissions charges were applied to the aviation sector in isolation, the two instruments would in principle be equivalent in terms of environmental effectiveness and economic efficiency. However, emissions trading need not be applied to the aviation sector in isolation. Emissions trading is already being used as a means of tackling climate change: Parties with emissions limitations under the Kyoto Protocol are able to trade with each other. In addition, many of these Parties are either delegating, or considering delegating, part of their own emissions limitation to company level through a domestic or regional emissions trading scheme.

With Directive 2003/87/EC, the EU has established the largest multi-country, multi-sector emission trading scheme seen so far. The European emissions trading scheme (EU ETS), covering greenhouse gas emissions from approximately 12 000 energy-intensive installations, began operation on 1 January 2005. Generally speaking, the broader the coverage of an emissions trading scheme, the lower the costs of achieving the same specific level of emissions reductions. Therefore, if aviation were to achieve the same environmental goal under emissions trading and emissions charges, the economic costs for the sector and for the EU as a whole would be lower if this was done under the EU ETS rather than under a charging system for aviation only.

6.3. Potential for wider application

In the view of the Commission, both emissions charges and emissions trading are compatible with the current international legal framework for aviation. However, the concept of emissions charges has been contentious at international level and the extent to which such charges can be applied by States to foreign carriers was the single most disputed issue at ICAO's 35th Assembly in October 2004. By contrast, the concept of voluntary emissions trading as well as incorporating international aviation emissions into States' existing emissions trading schemes has been explicitly endorsed by ICAO. The latter approach fits well with EU climate policy since integrated emissions trading is also a fundamental design feature of the Kyoto Protocol and is a key component of the EU's future climate change strategy.

7. SPECIFIC EMISSIONS TRADING DESIGN ISSUES

Given these differences, including aviation in the EU ETS seems to be the most promising way forward. However, a number of technical design elements are crucial if the policy is to deliver its full potential for environmental and economic efficiency, which will have to be further examined by a new Working Group to be set up and will also be developed in the Impact Assessment. On the basis of its feasibility study⁹, the Commission is of the view that the following four issues are at the centre of the further debate: the **type of entity made responsible** for aviation's climate impact, the **extent to which the full impact is addressed**, the **types of flights covered**, and the approach taken for calculating and apportioning

⁹ Giving wings to emission trading, CE Delft, July 2005.

the sector's overall **emissions limitation**. In addition, the impact on prices and the allocation of emission rights need further examination.

It is fundamental that the entity made responsible must be the one with the most direct control over the type of aircraft in operation and the way in which they are flown. Therefore, **the Commission considers that aircraft operators should be the entities responsible** within the EU ETS.

In order to minimise potential negative trade-offs between the different impacts and safeguard the environmental integrity of the overall scheme, both the **CO₂ and non-CO₂ impacts of aviation should be addressed to the extent possible**. In doing so, the uncertainties surrounding certain impacts should be balanced against the risks they pose to the climate. Pending scientific progress in developing more suitable metrics for comparing the different impacts, a pragmatic approach would be needed. In the short term, this could be based either on:

- a requirement for aviation to surrender a number of allowances corresponding to its CO₂ emissions multiplied by a precautionary average factor reflecting other impacts; or
- an approach where initially only CO₂ is included, but ancillary instruments are implemented in parallel such as differentiation of airport charges according to NO_x emissions.

The Commission believes that the objective should be to provide a workable model for aviation within emission trading in Europe that can be extended or replicated worldwide. The precise scope will be assessed in the working group to be set up as outlined in the Annex. In environmental terms, the preferred option is to cover all flights departing from EU airports, as limiting the scope to “intra-EU” flights, which both depart and land in the EU, would address less than 40%¹⁰ of the emissions from all flights departing from the EU. As regards the competitiveness of the airline industry, the impact in particular on relative market shares of EU and non-EU carriers will be further examined.

As regards calculating and apportioning aviation's overall emissions limitation, rules already in place for participants in the scheme are not necessarily suitable for aviation. Only CO₂ emissions from domestic flights are accounted for under the Kyoto Protocol, and hence special arrangements would be needed to ensure that this does not adversely affect the accounting system¹¹ linking the EU ETS and the Kyoto Protocol. In addition, given the level of integration in the Community's air transport market, **a harmonised allocation methodology should be agreed**.

8. IMPACTS OF INCORPORATING AVIATION INTO THE EU ETS

In all scenarios considered in the impact assessment accompanying this communication and the feasibility study carried out for the Commission, both EU

¹⁰ Estimates of CO₂ emissions from Eurocontrol. 2004 estimates indicate that intra-EU flights emitted around 52 MtCO₂ while all departing flights caused 130 MtCO₂.

¹¹ Commission Regulation (EC) No 2216/2004.

and non-EU carriers would be treated in exactly the same way on routes covered by the scheme. As a result, the inclusion of the climate impact of aviation into the EU ETS is unlikely to have any significant adverse effects on the competitive position of EU airlines relative to non-EU airlines. According to the Commission study, second-order effects such as cross-subsidisation by carriers using profits generated on routes outside the scope of the measures towards routes covered by the measure could occur but would be small. Nonetheless, the issue of competitiveness will be further examined in the follow-up to this Communication.

An additional consequence is that cost increases stemming from inclusion of the sector in the EU ETS may be passed on to air transport users. However, modelling some illustrative scenarios suggests that ticket price increases would be modest, varying according to the specific design parameters chosen (see impact assessment). Air transport demand would not fall but would simply grow at a slightly slower rate (a relative reduction of between 0.2 and 2.1% over a five-year period (2008-2012) compared to business-as-usual growth of more than 4% *per year*).

Given these low estimates for ticket price increases, any effect on tourism or peripheral regions relying on aviation as a key mode of transport would seem to be limited and should be further explored, also taking into account the existing framework for public service obligations.

9. CONCLUSIONS AND NEXT STEPS

To date, policies instituted at international, regional and national level to mitigate climate change have not required any substantial contribution from the aviation sector. In view of the likely future growth in air traffic, further policy action is needed to prevent this from leading to continued growth in its climate impact.

Having analysed a number of options, the Commission considers that the best way forward, from an economic and environmental point of view, lies in including **the climate impact of the aviation sector in the EU emissions trading scheme**. Emissions trading is likely to remain a core part of any future strategy to combat climate change, and the EU ETS will help foster the development of a truly international carbon market capable of tapping the potential for emission reductions across the globe. To prepare for the necessary decisions to be taken, the Commission:

- **will set up an Aviation Working Group under the European Climate Change Programme¹²**. This group will be assigned the task of considering ways of including aviation in the EU ETS in accordance with the terms of reference annexed to this communication. The results will feed into the ongoing review of the existing framework for the EU ETS¹³ due to report by 30 June 2006. The Commission will aim to put forward a **legislative proposal by the end of 2006**;

¹² The ECCP is a multi-stakeholder consultative process, in which the Commission, national experts, industry and the NGO community work together.

¹³ See Article 30 of Directive 2003/87/EC.

- invites the Council and the European Parliament to consider the policy and design recommendations in this communication, including questions of timing, in preparation for a future legislative decision.

In parallel, **a number of existing policies and actions should continue and be strengthened** as elements of a comprehensive and consistent approach:

- While research aimed at narrowing remaining uncertainty and further improving understanding of the effects of aviation on climate should continue, higher priority must be given to EU **aeronautics research** aimed at actually reducing the negative impacts of air transport on climate change, with this increased emphasis being reflected in the Seventh Framework Programme¹⁴.
- Timely progress must be made on the processes already begun with the **Single European Sky** to enhance the performance of the European air traffic management system.
- Regarding the application of energy taxation to aviation fuel, the process of removing all legal obstacles from bilateral air service agreements remains essential and will continue.
- **The Commission will take the necessary action**, at both European and international level, **to continue to keep all options for economic instruments open** in the event that complementary measures are required alongside emissions trading to address the full climate impact of aviation.
- The Commission will work with EU Member States within ICAO towards continuous improvements in existing technical design standards, and where appropriate the development of new standards, aimed at limiting aircraft emissions at source.

¹⁴ COM(2005) 119.

Annex : Terms of Reference for the Aviation Working Group set up under the European Climate Change Programme

The purpose of the working group is to advise the Commission services and will consist of experts from Member States and key stakeholder organisations including industry, consumer and environmental organisations.

This working group shall assess the necessary ways, as listed below, of incorporating the climate impact of aviation into the European emissions trading scheme (EU ETS)¹⁵, taking full account of the precautionary principle.

Coverage of the climate impact of aviation

The group shall:

- assess how monitoring and reporting the climate impact of aviation can be addressed by adding further annexes to Decision 2004/156/EC, taking the existing methodologies used therein as a benchmark and noting the potential for achieving greater accuracy over time;
- explore whether the flexibility offered by the tier system of Decision 2004/156/EC would be appropriate for the aviation sector or whether further harmonisation is required;
- analyse the possibility that incomplete coverage of the climate impact of aviation could provide an incentive for reduction of one impact within the scheme at the expense of another outside the scheme;
- consider the complementary use of charges or other flanking measures to establish full coverage of the climate impact of aviation in order to avoid the identified potential adverse effects from incomplete coverage.

Scope of emissions covered

The group shall consider the flights and emissions covered, taking into account the need: to limit differences of treatment between short-haul and long-haul services, to examine differences in the accessibility of peripheral regions, to reflect on how the EU model can be extended to other countries as the EU ETS itself expands, and to capture a significant quantity of emissions in line with the environmental objective of combating climate change.

¹⁵ Directive 2003/87/EC.

Approach used for calculating and apportioning the overall emissions limitation for the aviation sector

The group shall consider:

- the different models used within the EU and internationally to calculate growth and emissions projections for both the aviation sector and other sectors of the economy, and the different assumptions used therein;
- the range of overall emissions limitations which should be considered for the aviation sector, taking into account different results from models;
- which elements of setting and apportioning the overall emissions limitation can be harmonised across the EU;
- the impact on the competitiveness of Community industry, the impact on the price of tickets (considering *inter alia* the existence of alternative means of transport) and on emission allocations and the proportionate distribution of costs between industry and transport end-users;
- how to ensure that the accounting system established in Commission Regulation (EC) No 2216/2004, which ensures consistency between trading under the EU ETS and trading under the Kyoto Protocol, is not adversely affected by the inclusion of aviation. Any design solution needs to balance the introduction of specific rules for aviation against the overall objective of its inclusion in the EU ETS, i.e. to contribute towards tackling climate change in the simplest and most cost-effective manner possible.

Compliance

The group shall consider how existing compliance measures currently applied to the aviation industry can be used in addition to those already instituted under the EU ETS to ensure compliance with the obligations imposed by the scheme.

Administration

The group shall consider how best to administer aviation's inclusion in the EU ETS taking into account the conclusions reached on emissions limitation, the registries system and compliance.

This working group will submit its conclusions in the form of a report by 30 April 2006 at the latest.