



FÖRDERVEREIN ÖKOLOGISCHE STEUERREFORM

GREEN BUDGET GERMANY

CONFERENCE REPORT:

REDUCING GREENHOUSE GAS EMISSIONS FROM AVIATION

21ST NOVEMBER 2005

**THE ANGLO-GERMAN FOUNDATION
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Edited by Jacqueline Cottrell

**A GREEN BUDGET GERMANY AND EFTEC PROJECT,
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CONFERENCE AIMS AND OBJECTIVES

Although currently accounting for 3 percent of transport emissions in the European Union, aviation is the fastest growing source of greenhouse gas emissions (GHG) in the transport sector. Emissions from aviation increased by almost 70 percent between 1990 and 2002 and are predicted to neutralise one quarter of all emissions reductions in other sectors for the achievement of Kyoto targets by 2012. The issue of how to stabilise and ultimately reduce emissions from aviation is, therefore, of considerable urgency. It was the aim of this conference to address this pressing issue.

The conference focussed on the issue of aviation emissions within the European Union, with particular emphasis on the policies favoured by Germany and the United Kingdom, as it is these two countries in particular that have contributed considerably to the discussion of this topic on the international agenda. In this regard, the timing of the conference was very pertinent, as one of the UK's declared objectives during its EU Presidency in the second half of 2005 was to advance the inclusion of the aviation sector in the EU Emissions Trading Scheme (ETS). The panel discussion gave all participants the opportunity to evaluate and possibly contribute to the achievement of this objective.

Our aim was to compare and contrast the very different economic instruments favoured by the two countries to achieve the goal of reducing aviation emissions. While in Germany, policy makers have been relatively open to kerosene taxes and ticket duties, the UK has very much focussed on inclusion of aviation within the EU ETS. In the light of this difference of opinion, the conference aimed to examine the arguments commonly presented within these two countries, and beyond, in favour of these alternative strategies, to weigh up the advantages and disadvantages of emissions trading and kerosene taxation.

We set out to evaluate alternative policy options for the reduction of GHG emissions from aviation in the context of booming low-cost airlines, airport expansion and construction, unprecedented growth in flight numbers and increased air traffic congestion. The conference provided a forum for policymakers to examine a range of policy instruments in detail, and case studies enabled participants to assess the effectiveness and wider applicability of the Air Passenger Duty (APD) currently levied in the UK, the kerosene tax introduced in the Netherlands in 2005, and the kerosene tax applied in Norway for several years.

The conference aimed to establish whether one market-based instrument was particularly viable, e.g. because it had received sufficient political acceptance to be implemented in the near future. The importance of developing a common position between the two driving forces for the introduction of market-based instruments to curb aviation emissions in the EU, Britain and Germany, made this conference a most interesting event which offered speakers from the German and British government, as well as business, aviation authorities and NGOs the opportunity to exchange views and find shared ground.

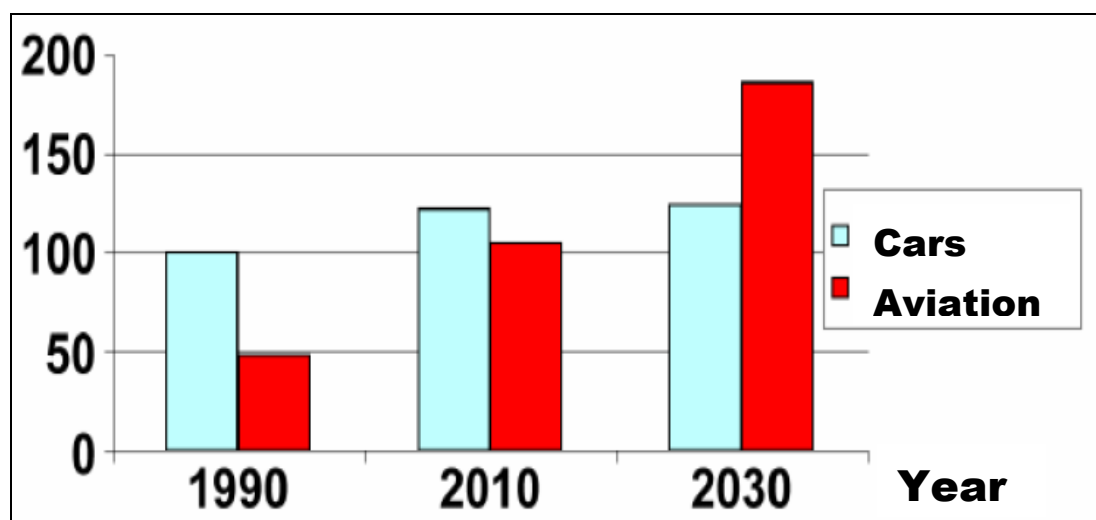
SESSION ONE: PERSPECTIVES FROM THE UK AND GERMANY

From Bathtub to Bathtub: Flight Solar One Ready for Departure! Anselm Görres, Green Budget Germany Chairman

An introductory presentation by GBG President Dr. Anselm Görres highlighted the underlying problem motivating the conference – the low levels of taxation on aviation, particularly in view of the high levels of environmental damage aviation emissions cause per passenger – and warned that this trend must be broken to prevent aviation emissions increasing significantly. He pointed out that the aviation industry has no alternative but to respond to declining oil reserves very soon, and that the absence of a backstop technology in aviation is a serious issue that must be addressed if it is not to pose significant problems in the future. In view of this, the application of an Ecological Tax Reform (ETR) to stimulate innovation could be used to smooth over a transitional phase from fossil fuels to solar energy.

Although the conference focussed on the contribution of CO₂ emissions to climate change, Dr. Görres discussed a number of further pollutants from aviation, including: water vapour condensation from fuel combustion, which is thought to result in a disproportionate global warming effect and the formation of contrails and cirrus clouds at altitude; nitric oxide and nitrogen dioxide (NO_x), which form ozone (a greenhouse gas) at typical cruising altitudes; particulates (soot and sulphate particles); and other compounds, such as sulphur oxides, carbon monoxide and hydrocarbons, and radicals such as hydroxyl. He also quoted a series of figures to emphasise the scale of the problem, pointing out that global aviation emissions may soon surpass Germany's total emissions, and will overtake total emissions from road vehicles by 2030 if present trends continue.

Relative Burden From Aviation and Road Traffic in the European Union



However, in spite of the seriousness of the issue of increasing aviation emissions, air traffic continues to enjoy considerable and widespread subsidisation, and kerosene remains largely exempt from taxation¹. In Germany, for example, direct and indirect state subsidies are numerous. They include:

¹ As other presentations show, some countries have introduced kerosene taxation, including the Netherlands and Norway (for more details see the presentations by Kai Schlegelmilch, Nils-Axel Braathen and Coen Peelen, below).

land tax exemptions for airports; coverage of losses by the state; government aid for airlines and the aviation industry; tax breaks for investment in airline funds; construction and maintenance of infrastructure on the ground (roads, transport links); free provision of the Federal Border Guard; and finally, waiving of take-off and landing fees, customs clearance charges, parking fees, etc. Moreover, tax exemptions on kerosene alone are a serious budgetary issue: if a mineral oil tax of 0.6545 Euro/litre were levied on kerosene in Germany, a return journey from Munich to Hamburg would raise €39 per passenger.

Dr. Görres cited advertisements from budget airlines offering flights within the European Union for the price of a taxi fare, highlighting the paradoxical economic and political setting that makes such prices possible. This setting is characterised by a number of contradictions. While aviation is the means of transport that does the most damage per passenger kilometre, it is taxed the least. While many argue that the need to implement price increases is obvious, the sector has boomed in the last two decades as a result of deregulation and the resulting fall in flight prices. Finally, although aircraft production is one of the most monopolised industries, it is also one of the most subsidised industries as well.

In response to this absurd situation, Dr. Görres proposed the implementation of a series of domestic fiscal measures in Germany – Air Passenger Duty, kerosene tax, VAT on international flights and reduction of tax support mechanisms – to target aviation and avoid projected VAT increases. He noted that the implementation of these four measures could generate between 3.7 and 5 billion Euros, sufficient revenue to avoid at least some of the VAT increases currently proposed in the country. He also came out in support of the inclusion of aviation in some form of Emissions Trading Scheme.

Why Aviation Should be Included in the EU Emissions Trading Scheme

Chris Dodwell, National Climate Change Policy, Department for Environment, Food and Rural Affairs (*Defra*)

Chris Dodwell of *Defra* presented the UK's case for the inclusion of aviation in the European Union's Emissions Trading Scheme (ETS), focussing on the practical advantages of the policy and the UK's role as a driving force in the realisation of this goal. He too emphasised the challenge posed by the rapid growth of aviation emissions, which made up 3 percent of carbon dioxide emissions in 2001 and are projected to double by 2010.

He then moved on to examine the options open to policy makers in the field: taxes, charges, and emissions trading, before coming out strongly in favour of the latter. Trading, he argued, is preferable because it has a clearly identifiable environmental objective, achieves emissions reductions in the most cost-efficient manner, incentivises additional emissions reductions, is relatively simple to implement, offers industry flexibility in achieving its objectives, and has been internationally endorsed by the International Civil Aviation Organisation ICAO. He also noted that *Defra* was wary of the creation of perverse incentives, should a kerosene tax be introduced. For all these reasons, as well as the reality of the international political situation – which is potentially more open to emissions trading than a form of kerosene taxation – the UK government favours the inclusion of aviation within the European Union's ETS.

However, Chris Dodwell did acknowledge that unresolved issues remain in the debate: the climate impact of aviation; the geographical scope of any trading scheme; the entity to be traded; the allocation rules and methodology to be employed within any scheme introduced; the issue of interplay with the Kyoto protocol; and finally, means of monitoring, reporting and verification within the scheme itself.

During its presidency of the European Union, the UK government created considerable pressure in favour of aviation within the ETS and indeed, a measure of its success was Chris Dodwell's announcement that a legislative proposal on the inclusion of aviation within the ETS is to be expected by the end of 2006.

Introducing a Kerosene Tax: Attitudes of European Countries and New Legal Possibilities of the EU Energy Tax Directive

Kai Schlegelmilch, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany

Kai Schlegelmilch argued in favour of ending the preferential treatment of aviation by introducing taxes on aviation, emphasising the importance of removing competitive distortions in the transport market. He reiterated the arguments of the preceding speakers regarding the urgency of the problem, noting that the greenhouse impact of aviation emissions is between 2 and 4 times higher than emissions close to the ground.

Kai Schlegelmilch analysed rational arguments in favour of a kerosene tax, pointing out that competition distortions on the current market to the detriment of rail and other modes of transport need to be rectified, a distortion exacerbated by the emergence of low-cost carriers. A kerosene tax, he pointed out, would increase the progressivity of the tax system and in Germany, would rectify an inconsistency within the Ecological Tax Reform: The aviation industry, while it benefits from reduced labour costs as a result of the ETR, does not contribute to its financing. However, he also acknowledged the depth of resistance to the implementation of kerosene taxation at international and EU level. A drawback to the unilateral implementation of kerosene taxation can be 'tankering' – fuelling aircraft in countries with lower kerosene prices – which can swiftly undermine any environmental benefits from a tax and discredit a scheme as well. However, clever policy design can reduce this problem considerably. An alternative to trading and tax that does not meet with too much opposition internationally – not at least given that no unanimity is required as in the case of kerosene taxation – appears to be some form of Air Passenger Duty, although the environmental impact of such a policy is inevitably less precise.

Thus, while acknowledging that policy makers face significant practical problems when implementing a kerosene tax internationally, Kai Schlegelmilch cited several successful examples of domestic kerosene taxation, including the Netherlands, Norway and some US states. In the light of these unilateral measures, he called on individual states to take those actions that are currently legally feasible, such as charging VAT on international flights, levying kerosene tax on domestic flights, and introducing the Air Passenger Duty. In contrast to emissions trading, he argued, domestic taxation constituted a "first and relatively easy step" for governments to take unilaterally. He suggested introducing low rates at first, such as 21 cents per litre as in the Netherlands, and announcing and increasing these gradually over a number of years to come into line with tax on other transport fuels.

Internationally, he suggested that governments form 'coalitions of the willing' of countries prepared to introduce kerosene taxation for domestic flights and to enter into bi- or multi-lateral agreements to that effect. Furthermore, he cited the new German government's coalition agreement, which supports the European Commission's evaluation of the inclusion of aviation within the ETS. He also drew participants' attention to the 'Lula Group', formed in September 2004 to implement national innovative finance mechanisms to help achieve the Millennium Development Goals. This group of countries comprising Brazil, Chile, Spain, Algeria, France, the UK and Germany agreed on a solidarity contribution levy on air tickets as its first revenue-raising instrument.

A legal feasibility study on taxing domestic flights, without having negative impacts on the competitiveness particularly by tankering strategies, is available for download at:
<http://www.umweltbundesamt.org/fpdf-1/2905.pdf>

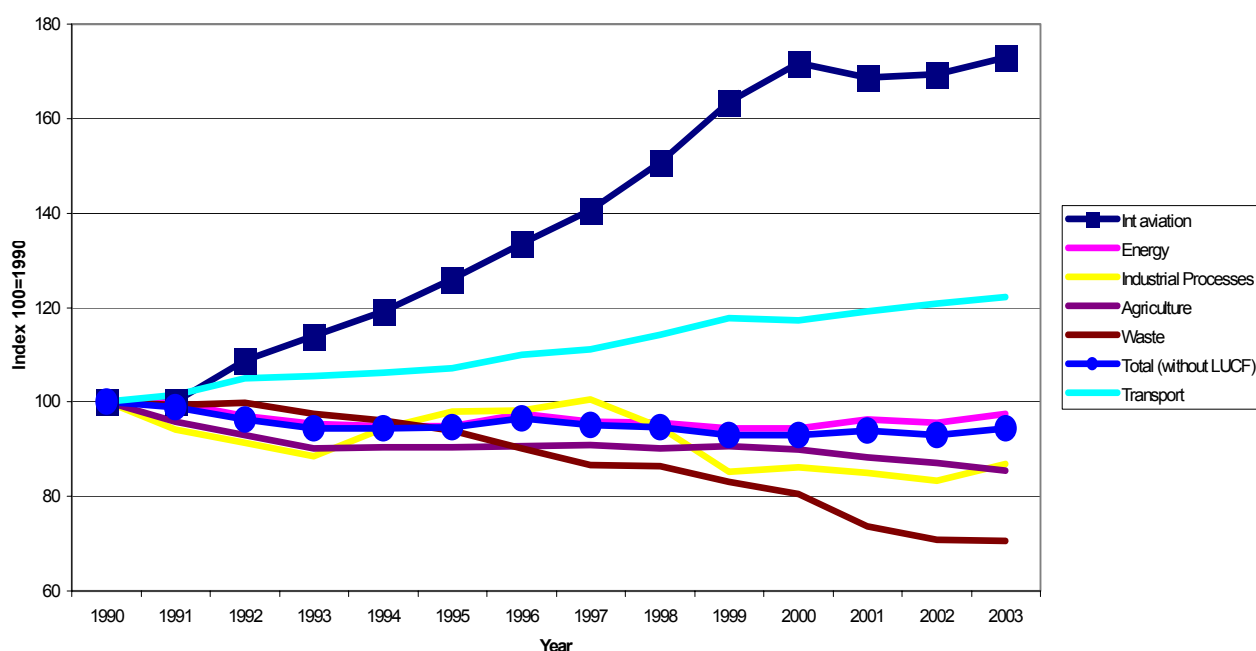
SESSION TWO: PERSPECTIVES FROM THE EUROPEAN COMMISSION, THE AVIATION INDUSTRY AND NGOS

Possibilities for the Implementation of Aviation Emissions Reduction Measures in the European Union

Niels Ladefoged, Policy Officer, DG Environment, European Commission

Niels Ladefoged also began by examining the scale of the problem of aviation emissions in the European Union, noting that while aviation contributes with a modest share of overall GHG emissions, it could offset more than 25 percent of the cuts required to meet the EU-15's targets under the Kyoto protocol by 2012, if the growth of aviation emissions, as shown in the table below, continues at the same pace:

EU GHG Emissions by Sector as an Index of 1990 Levels



He also drew participants' attention to other impacts, including NO_x emissions and the effect of aviation on cloud cover. For this reason, he continued, one policy objective of the Commission is to ensure that aviation contributes to efforts to mitigate climate change through improved internalisation of the external costs of climate change. To achieve this, the Commission recognises it must create stronger incentives for air transport operators to reduce their impact on the climate.

Niels Ladefoged listed a number of policy options the Commission had decided not to pursue at this stage, including restrictions on air traffic volumes and access to EU airports, regulatory standards, voluntary agreements with airlines, departure and/or arrival taxes, VAT on airline tickets and removal of public subsidies. Instead, some existing policy options will be strengthened, including efforts to develop more efficient air traffic management (SESAR), research into more environmentally friendly aircraft, and the removal of legal barriers to the application of energy taxation to commercial aviation.

While the Commission concluded that trading and taxation, under certain assumptions, can achieve equivalent outcomes, Niels Ladefoged listed a number of possible advantages of inclusion within an

Emissions Trading Scheme. First, in terms of environmental impact, a trading system can establish the reductions to be achieved in advance. Second, the interplay with other sectors permitted by the inclusion of aviation in emissions trading will increase the overall economic efficiency of emissions reduction. Third, emissions trading has more potential for global participation in the long term, as the concept of emissions charges remains contentious at an international level, while emissions trading for international aviation has even been endorsed by ICAO. Fourth, trading has more legal certainty on the international stage, while en-route emissions charges are still regarded as being of uncertain legality by states outside the EU: thus, the risk of a legal challenge to trading is lower.

For all these reasons, the Commission intends to pursue a policy of including aviation within the EU ETS. Its policy will focus on aircraft operators and will aim to address CO₂ and non-CO₂ impacts where possible. In environmental terms, the preference is to include emissions from all flights departing from EU airports. A working group on aviation is due to report on the matter by 30th April 2006, a report on a review of the ETS is due by 30th June, and a legislative proposal is to be expected by the end of the year.

Policy Options to Reduce Air Transport Emissions: An Industry Perspective
Andy Kershaw, Climate Change Manager, Environmental Affairs, British Airways plc.

Andy Kershaw began by acknowledging that air transport was a small, but growing, source of CO₂ emissions. He was less ready to accept policy measures for addressing other short-term atmospheric effects, such as ozone creation, methane reduction & cirrus clouds. He emphasised the openness of the aviation industry to inclusion within the ETS and favoured the centralised allocation of allowances free of charge by benchmarking, so as not to discriminate against the sector.

His presentation emphasised the importance of technological improvements, drawing the audience's attention to increased fuel efficiency: British Airways has become 27 percent more efficient since 1990 and aims to become 30 percent more efficient by 2010. Moreover, he outlined the UK Sustainable Aviation goal to reduce CO₂ emissions by 50 percent and NO_x by 80 percent per passenger by 2020. Other measures to manage emissions include more efficient air traffic management (ATM), improved weight management and the use of continuous descent approach flight measures. The company called for any instrument geared towards reducing aviation emissions to be cost-effective and to minimise costs for the industry and consumers, to be technically feasible, to avoid competitive distortion, and to provide for policy certainty in the long-term.

British Airways prefers trading over taxation, arguing that taxation will have a detrimental impact on the industry's growth and cost consumers £50 billion annually. BA regards trading as more efficient, it ensures environmental objectives will be met, minimises competitive distortions and is in principle supported by ICAO as well. Andy Kershaw emphasised the importance of any environmental instruments being clearly directed towards environmental and not fiscal objectives. He also introduced a number of suggestions on how to implement an ETS for aviation, including non-discriminatory allocation of allowances for the sector, free of charge by benchmarking. British Airways also proposes that allocation should be centralised throughout the EU to avoid competitive distortions and that trading should be open, rather than closed within the aviation sector.

The inclusion of aviation within the EU ETS could represent the start of a process to cost-effectively address the contribution of aviation to CO₂ emissions, he concluded. The ETS, if it is practical and proportionate and avoids disputes with other non-EU countries, can demonstrate internationally that an ETS is workable for aviation. Finally, support for an ETS at ICAO level must be fostered to enable expansion of an ETS to provide a global solution in the future.

An NGO's Position on Aviation and Environmental Fiscal Reform **Ian Dickie, Senior Economist, RSPB**

The position of the Royal Society for the Protection of Birds was presented by Ian Dickie, Senior Economist for the RSPB. After introducing the RSPB, an NGO with over a million members, Ian Dickie went on to present the organisation's position.

In response to the impact of climate change on wildlife habitats and species – he noted that between 15 and 37 percent of bird species could be 'committed to extinction' by 2050 – the RSPB has developed a detailed response to factors that cause climate change. As part of this package, the RSPB supports environmental fiscal reform as a means to deliver environmental outcomes cost effectively – provided that environmental targets are actually met. While acknowledging the arguments of opponents regarding the reliability of environmental taxation, Ian Dickie argued that their criticisms are misplaced. He said that ETR could be an effective means of reducing the impact of humans on the environment and environmental cycles, citing the Climate Change Levy as a successful example. What is important, he continued, is that green tax policy is geared towards producing both the benefits of the double dividend, i.e., of raising tax revenue and reducing the externality.

Turning to aviation, Ian Dickie pointed out that flying is a luxury good enjoyed by a wealthy few: as average income increases, the amount spent on aviation increases as well. This is a very strong argument against subsidising flying as a means of transport – he compared it to subsidising Sports Utility Vehicles! Moreover, he listed other significant environmental impacts caused by the aviation industry: noise, land take and local air pollution. The external costs of aviation have been estimated by INFRAS at 90 billion Euros annually in the EU 17.

The RSPB urged a policy response to constrain demand and/or capacity and was critical of current predict and provide government policy in the UK, as set out in the government's 2003 transport white paper. Instead, the RSPB favours mechanisms to tackle aviation's externalities, with government having a strategic airports plan and using market forces to deliver it (e.g. by taxing aviation appropriately). The organisation prefers setting a long-term emissions target to internalising the cost of aviation's externalities, as the former can be more easily quantified, has a more reliable scientific basis, and has more certainty in the long term. The RSPB is also in favour of putting an end to the favourable tax treatment currently enjoyed by the aviation industry and including aviation within the ETS, as well as introducing interim tax measures, e.g. increasing APD – to tax and/or regulate the industry in proportion to other resources and its externalities.

Finally, Ian Dickie reiterated that the RSPB is not opposed to the aviation industry *per se*, but is simply promoting slower, more controlled expansion that takes environmental impact into account, rather than the doubling of air passengers by 2030 on the back of falling ticket prices predicted by the government's aviation white paper. Permitting the unrestrained growth of the aviation industry, he concluded, would render the government's laudable sustainable development strategy meaningless.

SESSION THREE: COUNTRY CASE STUDIES

Nils Axel Braathen, OECD Environment Directorate

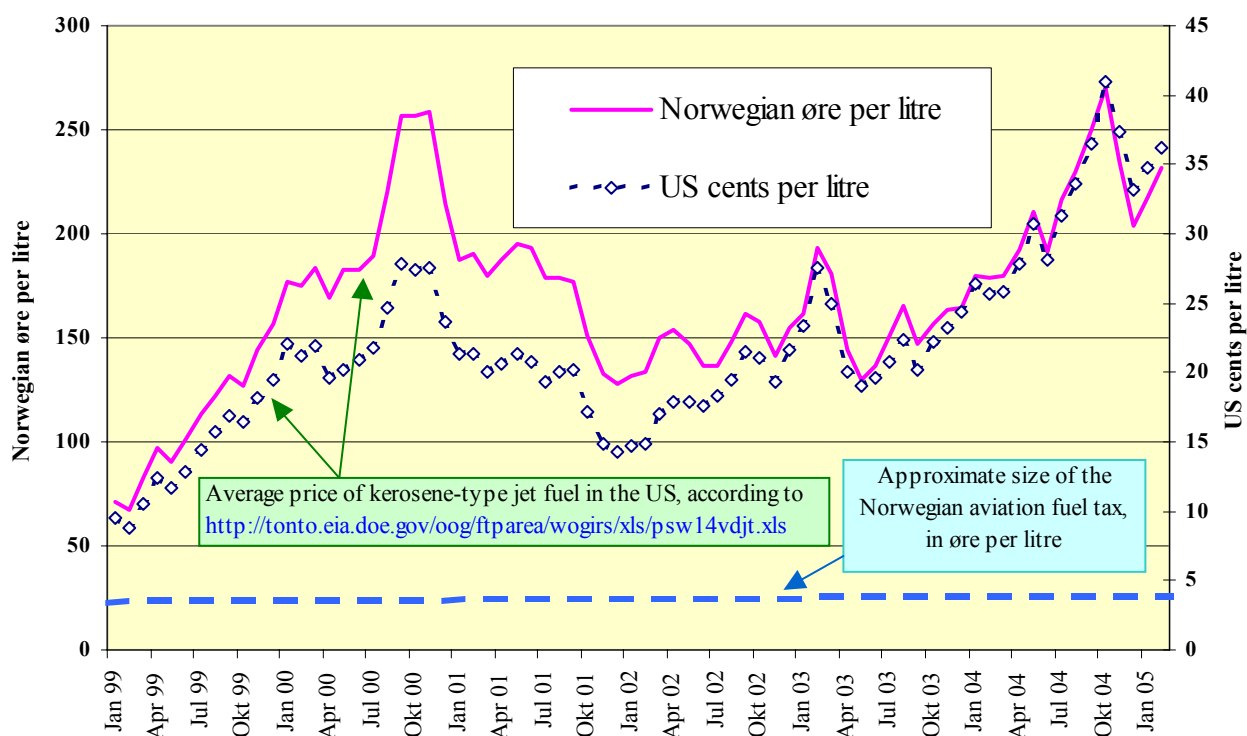
A Case-Study of Kerosene Taxation: The Taxation of Fuels used in Domestic Commercial Aviation in Norway

Nils Axel Braathen of the OECD Environment Directorate presented a case study of the Norwegian domestic kerosene tax which was financed by a voluntary contribution from the German Ministry for the Environment, Nature Conservation and Nuclear Safety. His findings represent one of a series of in-depth studies of taxes with potential negative sectoral competitiveness impacts, as part of the OECD's Joint Meetings of Tax and Environment Experts.²

The CO₂ fuel tax on aviation was first implemented in January 1999 as part of a wider green tax reform (although parliament subsequently rejected the CO₂ tax for industry). It was compensated for by a reduced seat tax. Furthermore, the tax was removed later in the year for international flights because it violated bilateral aviation agreements. Interestingly, while airlines, parliament, and the general public were fiercely opposed to seat and passenger taxes, only airlines opposed the CO₂ tax, fearing that it would not be fully compensated and contending it would have distortive effects in relation to competition. The industry also feared conflict with ICAO rules and the EU. However, this opposition was overcome because airlines did not receive sufficient public attention and were overshadowed in parliament by the case of energy-intensive industries.

The tax was set at a relatively low level in relation to fuel prices, as shown below.

Kerosene Tax in Relation to Fuel Prices



² Other studies focussed on the Climate Change Levy in the UK, the Swiss road use fee for HGVs, and the Dutch MINAS accounting system for nutrients in agriculture.

Perhaps for this reason, the tax had a small impact on ticket prices and hence little effect on demand. The tax also had little or no apparent effect on operational measures to reduce fuel use, or on new aircraft design. There was also little increase in ‘tankering’. Thus, the tax appears to have had very little environmental impact overall. Nevertheless, low initial tax rates may facilitate implementation of domestic tax, which often faces considerable opposition, and environmental impacts can be improved as a tax is gradually increased over time.

In conclusion, Nils Axel Braathen noted that there are a number of lessons to be learned from the Norwegian case. Firstly, a fuel tax on international aviation must be coordinated, which is difficult, as bilateral air service agreements must be renegotiated for this to take place. In this respect, recycling of tax revenue may represent a real option for fuel taxation. It seems that emissions trading, which would be more easily accepted by stakeholders, currently represents a more plausible option for international flights. With reference to the taxation of domestic flights, the Norwegian case showed that fuel tax on domestic flights should be part of a broader tax reform, needs to be carefully considered to avoid tanking abroad, should start at a relatively low rate (and potentially be compensated for by reductions on other levies or duties on air traffic), and could include redistribution of the revenues raised. While seat or passenger tax may prove easier to implement, it will probably meet with more resistance.

The analysis of the Norwegian CO₂ tax on aviation fuel is available at www.oecd.org/env/taxes. A new OECD publication examining the Political Economy of Environmentally Related Taxes will be issued in 2006.

Coen Peelen, Ministry for the Environment, the Netherlands Experiences with the Kerosene Taxation of Domestic Flights in the Netherlands

Coen Peelen of the Dutch Ministry for the Environment presented the case study of the Netherlands. The domestic kerosene tax there was introduced in the first instance for budgetary reasons, rather than as an overtly environmental measure, as government parties needed additional revenues to finance desired changes in the national budget of 2005. Nevertheless, he noted that such a tax is in line with the internalisation of environmental costs, the greening of the tax system and the creation of a level playing field between modalities.

The excise duties levied on domestic flights did not only target kerosene as a fuel and did not only target aircraft. Legislation removed the exemption of excise duties on kerosene for domestic flights on 1st January 2005. It also abolished a tax refund previously in place for other motorfuels for domestic flights (like light oil for aircraft and LPG for hot air balloons). Leisure and pleasure flights were already paying excise duties on fuel at this time. Helicopter flights to oil rigs were exempted from the legislation.

A domestic flight was defined as a flight that starts and ends in the Netherlands, without a stop abroad. Flights which start and end in the Netherlands but constitute one leg of an international flight were not classified as domestic flights, unless separate tickets were available for purchase for the domestic flight.

The tax rate on commercial domestic flights was €0.21 per litre on kerosene, the sum of the Dutch energy tax of €0.16 and excise duties (not road traffic) of €0.05 on kerosene. Operators that principally perform domestic flights were liable to pay the tax while fuelling, for all their flights, and were then refunded for their international flights. Conversely, largely international operators were not charged while fuelling, but were liable to pay tax on fuel used for their domestic flights. Operators with no domestic flights at all (i.e. foreign operators) were not confronted with the administrative

obligations the levy entailed. This system did not operate for other fuels. Instead, fuel was always tax inclusive and a refund was given for international flights.

In some respects, the measure was not a great success, as there are not many purely domestic flights in the Netherlands: domestic flights tend to be one leg of an international flight. As well, fuel tanked abroad could not be taxed in the Netherlands and the potential for tankering remained. The revenue initially estimated will not be raised. However, on a more positive note, the introduction of such a tax represents the initial stages of removing tax exemptions on airline fuel and should be regarded as being of symbolic importance, and other EU countries may well follow the Netherlands' example. The tax's implementation also highlighted the theoretical advantages of such a tax: creation of a more level playing field between modalities, and a regulatory effect on supply and demand, as well as on GHG emissions. What is more, the tax proved sufficient deterrent to a taxi firm planning to start helicopter flights as part of its service to customers: in the light of the tax, the company cancelled its plans.

Coen Peelen went on to discuss other market-based instruments for the control of greenhouse gas emissions from aviation. He acknowledged the appeal of including aviation within the EU ETS, but pointed out that the inclusion of aviation in the scheme still has some methodological problems that need to be solved. For instance, the question of how to treat other GHGs aside from CO₂, and the issue of how and whether to link an ETS for aviation with the existing Emissions Trading Scheme for industry. As well, he pointed out, not all environmental costs are incorporated in the ETS and even if grandfathering were implemented, this would still not create a level playing field.

He also discussed a ticket tax/passenger duty, relevant to EU discussions because of plans to commit revenues to poverty reduction as discussed by the Lula group. One advantage of this measure is that it faces fewer legal problems in terms of implementation for international flights. Deductions for clean aircraft would improve the regulatory effect of the ticket tax. While both ticket tax and VAT have demand side-effects – although levying VAT on flight tickets would not effect business travel – a ticket tax is easier to implement on foreign flights than VAT. On the other hand, a new discussion has started in the Dutch parliament on introducing VAT on flights between the Netherlands and Germany.

In conclusion, Coen Peelen contended that while excise duty on aviation fuel has had only minor environmental effects, it remains an important symbolic first step, which creates a more level playing field between sectors and modalities, has regulatory effects on demand and supply, and on greenhouse and non-greenhouse pollutants.

Steve Lowe, MVA Transport Consultancy

Assessing Potential Success: Quantifying the Environmental and Economic Impacts of Market-Based Instruments to Reduce Aircraft Emission

Steve Lowe of MVA presented the modelling system AERO (Aviation Emissions and Evaluation of Reduction Options), which was designed to model as completely as possible the economic and environmental impacts of measures to curb emissions arising from civil aviation. The AERO modelling system (AERO-MS) has formed a key part of a number of international studies commissioned by ICAO, the Dutch government and the EU, where the results from model tests have provided a clearly quantified basis on which policy judgements may be made. On the basis of these studies, Steve Lowe analysed the various policy options open to decision-makers in the field of aviation emissions reduction.

A study for the EU on kerosene taxation found that there would be strong tax avoidance incentives through tankering that would significantly reduce the environmental benefits of a EU-implemented kerosene taxation regime, and that extensive re-negotiation of over 1,000 bilateral Air Service

Agreements would be necessary to allow fuel taken on by non-EU carriers at EU airports to be taxed. If this could not be achieved, EU carriers would be put at a severe competitive disadvantage relative to non-EU carriers. In response to these conclusions, Steve explained, the EU decided not to pursue kerosene taxation at EU level, but that kerosene taxation on national flights might be adopted by individual Member States if they wished to do so.

The AERO-MS has also been used to model an open system of permit trading, applying prices much lower than the equivalent fuel cost increases following the introduction of a taxation to meet Kyoto obligations. Thus, as Steve Lowe pointed out, the impact on the aviation industry proved to be minimal in comparison: activity levels were held back by not more than half an average-year's growth, and operating results were only marginally reduced. Correspondingly, CO₂ emissions by the aviation sector changed little from the business-as-usual scenario. The implication was that, if an open-market permit price of (say) \$25/tonne of CO₂ were sufficient to achieve the average Kyoto commitment across all sectors (as suggested by the literature), the aviation sector would be enabled by permit trading to purchase over 90 percent of its Kyoto-equivalent contribution to CO₂ reduction from other sectors, with little impact on its own activity levels or financial viability.

From a modelling viewpoint, and presuming that permits are secured through the market system and not by grandfathering, finding the price of CO₂ permits that satisfies a given cap is identical to finding the level of fuel taxation to meet those same targets. Thus, a model of closed system trading produced far higher prices per tonne of CO₂ – \$570 – to meet Kyoto targets.

Steve Lowe went on to conclude that what the AERO model shows in relation to emissions trading is that it would be more cost-effective to seek CO₂ reductions in other sectors (on average) than in the aviation sector. In an open system, the aviation sector would be a net purchaser of permits – indeed, the model predicted that 91 percent of emissions reductions would be purchased from other sectors. Clearly, the policy implications of this conclusion are manifold and merited heated discussion! Anselm Görres voiced the opinions of many in the audience when he questioned whether the aviation industry should be permitted to offset 91 percent of its emissions elsewhere. The problem is, Steve Lowe pointed out, that there is little scope within the industry to reduce emissions as cheaply as they can be reduced in other sectors.

This is a summary of a paper by Steve Lowe *et al.* available for download at:
http://www.eco-tax.info/downloads/Lowe_Assessing%20potential%20success_v2.pdf

DISCUSSION: THE OPTIMUM INSTRUMENT - EMISSIONS TRADING OR TAXATION?

Pertinent questions posed by the audience in the last session facilitated an in-depth discussion in which emissions trading was favoured by almost all parties for the mitigation of greenhouse gas emissions from aviation. Perhaps the single most important reason for this agreement was the political palatability of emissions trading on the international stage: ETS has the support of stakeholders, is realistic in terms of implementation, and can be 'sold' to the general public as an unquestionably environmental measure. The debate sometimes took a somewhat either / or approach, which was regrettable, inasmuch as ETR and ETS are far from mutually exclusive but can often be implemented as complementary instruments. Green Budget Germany and the other NGOs present were certainly agreed that inclusion of aviation in the ETS alone would not be sufficient to remove market distortions, and called for domestic kerosene taxation and removal of tax relief for aviation as well.

Panel members:

Chris Dodwell, Kai Schlegelmilch, Andy Kershaw, Nils-Axel Braathen, Niels Ladefoged

Chairman: Anselm Görres

Dr. Anselm Görres, Chairman and President of Green Budget Germany, welcomed the conference participants and guests to the panel discussion and gave a brief introductory speech, highlighting the importance of using as many instruments as possible to tackle the problems of climate change in general and the contribution of aviation in the particular. He noted that in relation to greenhouse gas emissions from aviation, the discussion should not necessarily take an either / or approach. Both ETS and ETR could be successfully employed as steering mechanisms to facilitate emissions reduction.

In the light of this statement, he challenged the panel to say something in support of the instrument they did not prefer for tackling climate change.

Andy Kershaw, Climate Change Manager at British Airways plc., responded by discussing the benefits of including aviation within the ETS, and by expressing scepticism that ETR was the way forward in this case. He did not feel able to say a great deal that was positive about ETR, referring to a Department of Trade and Industry estimate that taxation would result in 0.5 percent less annual growth [which does still imply substantial absolute positive growth] within the industry than a business as usual scenario up until 2050.

As the ETS would initially focus solely upon flights departing from the EU, he admitted that only approximately 20-30 percent of British Airways flights would be affected by inclusion within the scheme.

He also emphasised the need for the issue to be seen in perspective, noting that aviation is predicted to account for 5 percent of CO₂ emissions in 2050, according to the IPCC. He also emphasised the responsibility to the consumer to find least-cost solutions to the problem.

Nils Axel Braathen, Environment Directorate, OECD, noted that the OECD does not have a preference for ETR or ETS, while suggesting that ETS might be the better option for aviation. He suggested that product labelling should be improved to facilitate consumer access to information on the effects of their purchasing actions. He also made the interesting point that in the long term, the best way to include aviation in the EU ETS might be to include oil refineries in the trading scheme (i.e.,

an upstream approach – in contrast to the downstream approach presently applied in the EU), thus including the whole of the transport sector.

Niels Ladefoged, DG Environment, EU Commission, noted that ETR and ETS could under certain assumptions achieve the same outcome in theory. The advantage of an ETS was that it was proven to be a successful instrument which was already in place for a number of sectors, and it left the general public and those effected in no doubt of its objectives. While there is a danger of ETR being regarded as a pretext for ‘yet more tax’, it is difficult to dispute that ETS is an environmental tool and not a fiscal instrument.

He pointed out that inclusion of intra-EU flights only within the ETS would cover less than 40 per cent of the total aviation emissions of flights to and from EU airports.

Mr. Ladefoged went on to explain the context of the European Commission’s work on aviation and the ETS. The European Community, he said, had stated in its 6th Environment Action Program that it would take action as regards aviation emissions if ICAO did not do so and thus, the Communication was to be seen in the light of this specific agreed objective. The Commission’s current proposal, he said, did not take a position on whether or not to allocate emissions certificates free of charge.

Kai Schlegelmilch, German Federal Ministry for the Environment, noted that he does not favour either ETR or ETS, arguing that the decisive factor is how the certificates are allocated in the latter case. Taking on the earlier comments of Juliusz Komorek, a representative of Ryanair who was extremely critical of the economic impact of the ETS, Mr. Schlegelmilch pointed out that a benchmarking system could work – in relative terms – to Ryanair’s advantage, because they have already taken action to increase passenger numbers per flight, thus decreasing CO₂ emissions per passenger, and this could of course be taken into account in this case. On the other hand, he acknowledged that grandfathering would probably prove more advantageous for other, older airlines rather than low-budget airlines, and that auctioning would also disadvantage Ryanair against those airlines which still had a great deal of potential to implement many more measures to increase passenger numbers per flight, etc.

Furthermore, the issue does not require an ‘either / or’ solution, but far more, is a question of finding the right instrument mix. In his presentation he drew the audience’s attention to several countries like the Netherlands, Norway and the USA, which all have kerosene taxation in place. And in the domestic arena, the hurdles in the way of implementing kerosene taxation brought up later in the discussions on international kerosene taxation do not apply. Hence, he continued, kerosene taxation for domestic flights is easy and quick to introduce, while a more comprehensive approach for all international flights at least is provided by the ETS. However, the latter fails to provide for cost equality, as all other means of transport (except for shipping) have to pay mineral oil taxes. For this reason, kerosene taxation is justified in parallel to inclusion within the ETS. Summing up, he could identify a clear role for both instruments if they were in place at the same time.

He also drew the audience’s attention to a recent scientific study carried out by the German Federal Environment Agency on involving the entire transport sector, with the exception of aviation, in the EU ETS. The scientific study, which simulates the allocation of certificates to oil traders, found that the ETS would be an effective policy option in this case, and that the steering effect achieved would be very similar to the implementation of an ETR. Price increases of between 1 and 8 Ct/litre of transport fuel were to be expected.³

³ The study can be downloaded from the German Environment Protection Agency at: http://www.uba.de/verkehr/downloads/Executive_Summary_EH_Verkehr.pdf or <http://www.umweltbundesamt.org/fpdf-l/2969.pdf>.

Chris Dodwell, head of the EU ETS team at *Defra*, questioned the argument that auctioning would be worse for budget airlines, noting that if they had genuinely taken action to reduce emissions then they would have to buy less certificates. The more pressing question, he argued, was how to implement auctioning at all, as several questions remained open – how the revenues from auctioning would be recycled, for instance, and how to avoid the imposition of massive costs on airlines associated with auctioning. For this reason, he contended, some form of benchmarking must take place if air traffic is to be included within the ETS.

Another advantage of including aviation in the ETS is the speed at which an internationally binding piece of legislation can potentially be introduced, because the scheme itself is already in place. The inclusion of aviation within the ETS does not even require unanimity at EU level and represents a quick solution which would be able to address aviation emissions in just a few years. No such potential framework is in place for the introduction of an ETR which requires unanimity – in fact, this is the reason why it took about eleven years to agree on the EU Energy Tax Directive, finally passed at the end of 2003. Finally, inclusion within the ETS has the support of many stakeholders within the industry, meaning that opposition to any policy developments will be less. In short, there are many pragmatic reasons that speak in favour of ETS as the preferable policy option.

An ETR, Chris Dodwell continued, is probably a suitable instrument to address issues aside from CO₂ emissions, for instance, in the form of NO_x charges. In this capacity, taxation may well have a role to play alongside emissions trading, but faces significant hurdles before it can be implemented internationally.

The UK government, he concluded, is taking the issue extremely seriously and intends to press for interim measures prior to the inclusion of aviation in the ETS, perhaps in 2008 and certainly by 2013. Interim measures included offsetting carbon emissions from aviation, as the civil service is going to do from 2006, and Air Passenger Duty (APD). APD, while it is a useful political gesture, transparent and easy to implement, is perhaps not a particularly efficient instrument in environmental terms, as it does not incentivise fuel efficiency but merely passes on an extra cost to the consumer. In order to improve its environmental impact, Mr. Dodwell continued, the APD needs to be revised to reflect distance flown and the type of aircraft used.

Tom Roberts of the Centre for the Study of Environmental Change (CSEC) pointed out one problem with environmental taxation was the issue of what to do with the revenues raised. If money generated was not channelled into climate change issues, he contended, then the public would feel alienated by the tax and would fail to understand what its environmental impact was.

The ETS has another advantage over ETR in this respect, Chris Dodwell replied, as a ‘name and shame’ policy can be pursued informing the public on the behaviour of industry. The carbon disclosure project and the drawing up of carbon ratings for companies are important to inform the public of available data and through publicity help them to make informed decisions as consumers.

The importance of increasing awareness was emphasised by Kai Schlegelmilch of the German Environment Ministry. He praised BA’s initiative to inform its passengers of climate change issues as a result of flight travel. Awareness is also increasing in government itself, as the German government offset its flights and journey-related emissions incurred as a result of the Earth Summit in Johannesburg in 2002. In addition, it offers to anyone to do the same for her/his journeys by using the facility of www.atmosfair.de, set up by the Ministry.

Anselm Görres also highlighted the importance of public support for policy measures. One of the greatest mistakes of the German ecotax reform, he said, was that it was misunderstood by the public and came to be regarded as a revenue raising measure, rather than an instrument of environmental policy. For instruments to receive public acceptance, he continued, a visible proportion of revenues

must be channelled into green projects. He contrasted the German Ecotax with current ETR proposals in Japan, where it is planned that all revenues flow into green projects, whereas 88 percent of German Ecotax revenue was used to reduce pensions payments.

Robert Rabinowitz from the European Climate Exchange suggested that trading in the USA, which is based on technology standards rather than emissions, may be a better tool to promote the development and use of the best available technologies. He suggested that the focus of the conference may well have been too much on fiscal instruments.

Chris Dodwell replied that the best technology approach and the EU ETS scheme are not mutually exclusive: technology and targets are not alternatives, he pointed out, but complementary.

Kai Schlegelmilch seconded this, and emphasised the importance of UK commitment to fixed targets, following rumours in the media that the UK was considering a shift towards US policy emphasising technology rather than targets. This was particularly important, he said, in the run-up to the United Nations Climate Change Conference in Montreal from 28th November to 9th December.

Morgan Foulkes representing UPS asked the panel if they regarded trading within a company as a feasible way to reduce emissions.

Kai Schlegelmilch answered citing the example of BP, which introduced emissions trading within the company in 1999 and was able to save \$650 million and reduce its GHG emissions by 10 percent or over 9 million tonnes by 2002, eight years ahead of their target year, as a result.

Barbara Ambrose of the European Regions Airline Association (ERAA) pointed out that carriers had already made considerable efforts to introduce technological improvements to their aircraft and that their proposals, submitted to the European Commission some time prior to the conference, suggested not only the inclusion of aviation in the ETS but a number of other measures as well, including improved air traffic management. She said that these were not apparent in the EU Commission's subsequent report on the issue.

Juliusz Komorek of Ryanair also commented on the inclusion of aviation within the ETS, arguing that the European Commission had jumped hastily to the ETS solution without properly examining available alternatives. He contended that the Commission has not performed a proper economic impact assessment of including aviation in the EU ETS and pointed out that the European Low Fares Airline Association (ELFAA) have estimated extra costs to industry at several billion Euros per year, and job losses triggered by an extra 9 Euro per ticket at 60,000 throughout the EU economy.

Furthermore, he asked the Commission representative why more cost-effective measures were not being properly explored, arguing that real environmental benefits can be achieved through alternatives to the ETS, such as fleet renewal programmes, installing winglets, efficient seat configuration and higher load factors (which result in 25 percent less emissions per passenger in case of Boeing 737-800), as well as improvements to air traffic management.

In reply, Niels Ladefoged noted that the EU Commission did emphasise a more comprehensive approach to reducing aircraft emissions and did not focus solely on the ETS. But the report focussed on the most important tool available, and that was ETS. For this reason, other instruments were analysed in less detail. As well, he said, it is not the role of the EU Commission to introduce improvements to Air Traffic Management, but that of the operators themselves, while the ETS concerns it directly. The role of the ETS was to create incentives for the operators to introduce such improvements, he concluded.

Nils Axel Braathen pointed out that – from the perspective of ‘older’ airlines, such as British Airways or Lufthansa – it was a ‘shame’ that ETS had not been introduced in the 1980s, as Ryanair and other budget airlines would have been less able to penetrate the market in that case. He expects the impact of the introduction of ETS on budget airlines to be considerable.

In this context, Anselm Görres expressed his concerns about the motivations behind the industry's support for ETS.

Finally, Andy Kershaw defended the airline industry. He reiterated British Airways' commitment to the inclusion of aviation in a pragmatically designed ETS that increases costs in proportion to emissions, and incorporates benchmarking procedures to reward early action. He also highlighted the offsetting scheme at British Airways, in place since September 2005, and invited the audience to visit the website www.sustainableaviation.co.uk, which lists the long-term goals and commitments of the industry to achieve sustainability and improve customer awareness and understanding. He also emphasised improved aircraft efficiency and technology standards at BA, reporting that NO_x emissions had already been reduced, a process that would have to continue in the face of tighter regulation. He contended that the NO_x problem would best be tackled by setting standards, not by the introduction of an ETR.

Anselm Görres summed up, once again drawing participants' attention to the dominant thread that had emerged during the conference – that emissions trading, taxation, and other instruments are not mutually exclusive, but can be effectively implemented alongside each other. He then thanked all conference panellists and participants and drew the session to a close.

CONCLUSION: REDUCING GREENHOUSE GAS EMISSIONS FROM AVIATION

The majority of participants at the conference came down in favour of including aviation in the European Union's Emissions Trading Scheme. Much of the discussion became focussed on an either/or debate, weighing up the pros and cons of emissions trading and ecological taxation, rather than considering how best to apply a combination of both to create a level playing field within the transport industry. However, some participants – not including carriers and representatives of the industry – were in favour of introducing some form of kerosene taxation and removing various other subsidies to create a more level playing field with other means of transport as well as including aviation in the ETS. This was undoubtedly the position of several government representatives and members of international organisations, as well as of the NGOs present (Green Budget Germany, the RSPB and Friends of the Earth).

While the discussion proved reassuring in that both UK and German governments are clearly gearing current policy towards reducing greenhouse gas emissions from aviation, much remains to be done. The conference did not have time to discuss in any detail the best model of emissions trading for aviation: should it be included in the current ETS in place in the EU, or should a separate scheme be set up for aviation? How can certificates best be distributed? What benchmarking procedures, if any, should be applied? Furthermore, does including all sources of fuel, i.e. oil refineries, in emissions trading constitute a valid alternative for the inclusion of transport in the ETS system? The potential for the implementation of kerosene taxation on flights between EU countries opened up by EU Directive 2003/96/EC, which remains largely untapped, was also not discussed in depth during the proceedings. As well, the conference focussed almost exclusively on carbon dioxide emissions, as most discussions of climate change mitigation tend to do, while other GHG emissions and pollutants from aviation were put on hold for policy solutions at a later date. The potential for further discussion and more importantly, the need for concerted action in this field in the future should not be underestimated. One important milestone to providing first opinions on all those questions will be incorporated in the forthcoming report from the European Commission's Working Group which is due to report back by 30th April 2006.

ACKNOWLEDGEMENTS

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APPENDIX 1 CONFERENCE AGENDA

A. WELCOME

10:00 – 10:05 **Ray Cunningham, Anglo-German Foundation**
Volker Klein, German Embassy

B. INTRODUCTION AND PERSPECTIVES FROM THE UK AND GERMANY

Chair: **Ece Ozdemiroglu, Director, eftec**

10:05 – 10:25 **Dr. Anselm Görres, Green Budget Germany Chairman**
“Ecotaxes and Emission Trading are Complements, not Rivals”

10:25 – 10:45 **Chris Dodwell, Head, EU Emissions Trading Scheme Team, Defra**
“Why Aviation Should be Included in the EU ETS from 2008?”

10:45 – 11:05 **Kai Schlegelmilch, German Federal Ministry for the Environment**
“The legal and political background to the EU Council Directive 2003/96/EC permitting kerosene taxation in and between EU Member States”

11:05 – 11:25 Discussion

11:25 – 11:45 Coffee Break

C. PERSPECTIVES FROM THE EUROPEAN COMMISSION, THE INDUSTRY AND THE NGOS

Chair: **Ray Cunningham, Director, Anglo-German Foundation**

11:45 – 12:00 **Niels Ladefoged, DG ENV, European Commission**
“Possibilities for the Implementation of Aviation Emissions Reduction Measures in the EU”

12:00 – 12:15 **Andy Kershaw, Climate Change Manager, Environmental Affairs, British Airways**
“Policy Options for Market-Based Instruments to Reduce Aviation Emissions: An Industry Perspective”

12:15 – 12:30 **Ian Dickie RSPB**
“The NGOs Position on Aviation and Environmental Fiscal Reform”

12:30 – 13:00 Discussion

D. LUNCH BREAK

13:00 – 14:00

E. COUNTRY CASE STUDIES

Chair : **Kai Schlegelmilch, German Federal Ministry for the Environment**

14:00 – 14:20 **Nils Axel Braathen, OECD Environment Directorate**
“A Case-Study of Kerosene Taxation: The Taxation of Fuels used in Domestic Commercial Aviation in Norway”

14:20 – 14:40 **Coen Peelen, Ministry for the Environment, the Netherlands**
“Experiences with the kerosene taxation of domestic flights in the Netherlands”

14:40 – 15:10 **Steve Lowe, MVA**
“Assessing Potential Success: Quantifying the Environmental and Economic Impacts of Market-Based Instruments to Reduce Aircraft Emission”

15:10 – 15:30 Discussion

15:30 – 16:00 Coffee break

F. DISCUSSION: THE OPTIMUM INSTRUMENT - EMISSIONS TRADING OR TAXATION?

16:00 – 17.30 Panel Discussion: Introduction and Chair: Dr. Anselm Görres (FÖS)
Panel Participants: Chris Dodwell, Kai Schlegelmilch, Niels Ladefoged; Andy Kershaw; Nils Axel Braathen
“Which is the most preferable option for controlling GHG emissions from aviation: taxation or trading? Are the two compatible?”

19:00: Cocktail-Reception hosted by the German Embassy

APPENDIX 2 BIOGRAPHIES

Nils Axel Braathen, Principal Administrator, National Policies Division, Environment Directorate, OECD

After receiving his Masters degree in Economics from the University of Oslo in 1981, Nils Axel Braathen worked at the Ministry of Industry, the Association of Norwegian Finance Houses and the Norwegian Ministry of Finance until he was seconded to the Environment Directorate of the OECD in 1996. Before 1998, he worked on a statistical framework for environmental taxes. In his current position since 1998, he has been working on environmental taxation, voluntary policy approaches, instrument mixes for environmental policy and on the economics of waste.

Jacqueline Cottrell, Project Manager, Green Budget Germany

Jacqueline Cottrell has been working for Green Budget Germany since March 2004 and has been a freelance writer and editor since 1998. She has an M.A. in International Peace and Security from King's College London (2003) and an M.A. in History from the University of Edinburgh (1997).

Ray Cunningham, Director, Anglo-German Foundation

Ray Cunningham has been director of the Anglo-German Foundation since January 2005 and was deputy director from 2001-2004. He is also cofounder of the British-German Environment Forum. Prior to this, he was projects director at the AGF for nine years. He has worked as commissioning editor for the Open University Press and as a lecturer at the University of Würzburg.

Ian Dickie, Senior Economist, the Royal Society for the Protection of Birds (RSPB)

Ian Dickie joined RSPB in April 2000. As the senior economist in the environmental policy department, he gives economic advice and analysis to support all aspects of the Society's conservation effort. After completing an Economics degree at St. Andrews University and a European Environmental Policy and Regulation Masters, he worked as a consultant on economic development and sustainable construction before moving to the RSPB. He now covers the socio-economic impacts of nature conservation; natural resource economics (mostly water, wetlands and the Water Framework Directive); sustainable development issues; and economic valuation of the environment.

Chris Dodwell, Head, EU Emissions Trading Scheme Team, Department for Environment, Food and Rural Affairs (*Defra*)

Chris Dodwell joined *Defra* in October 2000 as a solicitor. After initially working as a legal adviser, he then turned to advising on policies to address emissions of greenhouse gases. Chris worked on the development of the UK Emissions Trading Scheme and he was also a member of the UK negotiating team for the EU Emissions Trading Directive. In 2003, he became head of the team responsible for the UK implementation of the EU Emissions Trading Scheme. Current priorities for the unit include the Phase II (2008-12) National Allocation Plan, aviation emissions policy, and the shape of emissions trading post 2012.

Dr. Anselm Görres, President, Green Budget Germany

Dr Görres started his career as an assistant professor in Heidelberg, Stuttgart and Munich working on the labour market and international free trade agreements. He worked for clients such as Allianz, Daimler-Benz, Deutsche Bahn, Grundig, Krupp and Siemens as a management consultant in the 1980s. His activities in the fields of ecology and sustainability go back to the early 1980s when he first published on green taxes. He published two editions of the FÖS (GBG)'s Green Book for Ecological Tax Reform. He has been the president of GBG since 2000 and the editor of ÖkoSteuer-News and GreenBudgetNews since 2002.

Andy Kershaw, Climate Change Manager, Environmental Affairs, British Airways Plc

Andy Kershaw has led the development of the British Airways climate change programme since 2003, including managing the airline's participation in the UK and EU Emissions Trading Schemes, and the EU IAGOS project (Integration of routine Aircraft measurements into a Global Observing System). Andy serves on the climate policy committees of the UK Emissions Trading Group, the Association of European Airlines and the International Air Transport Association. He made a substantial contribution to the UK Sustainable Aviation strategy launched in June 2005 by a coalition of airlines, airports, air traffic control and aerospace manufacturers. Andy has worked in the field of aviation environmental policy since 1998 and has previously contributed to research into aircraft noise effects, noise abatement flight procedures and safety risk assessment for aircraft operations.

Niels Ladefoged, DG ENV, European Commission

Niels Ladefoged is the policy officer in the Environment Directorate-General of the European Commission, with responsibilities relating to the integration of environmental considerations in air transport policy. He holds an MSc degree in mechanical engineering with focus on energy conversion technologies and emissions. Mr Ladefoged came to the Commission from a position in the Danish Energy Agency where he worked on a number of areas in the energy, transport and environment domain, including integration of economic and technical models for energy demand forecasting, market-based renewable electricity support schemes, energy efficiency and demand side management in the electricity sector, and capacity building of energy administrations in developing countries.

Steve Lowe, MVA (Consultancy in Transport)

Steve Lowe is an economist of over 30 years' standing, mainly in the transport field, with powerful skills in statistical analysis and mathematical modelling techniques. His experience covers a wide spectrum of transport forecasting and appraisal for both public and commercial sectors, across all surface transport modes and aviation, as well as a large body of policy-oriented transport planning research. Steve is currently advising a MVA study for the Dutch civil aviation ministry to assess the consequences for (particularly) KLM and Amsterdam Schiphol Airport of incorporating international aviation in the European Emissions Trading Scheme. Steve's earlier major involvement in the link between aviation and the environment was as Manager of MVA's major contribution to the Dutch civil aviation ministry's "Project AERO", a world-wide air traffic forecasting model to support policy analysis in connection with mitigating aircraft emissions.

Ece Ozdemiroglu, Founding Director, eftec (Economics For The Environment Consultancy)

Ece Ozdemiroglu is currently working on cost benefit analyses for two multi-billion pound water quality and supply projects in the UK. Her main interests are methods of gathering quantitative evidence that environmental and other non-market resources have economic values and how to incorporate this evidence into decision-making, both in terms of policy and project design and appraisal. Since 1992, Ece has worked on over 130 projects, the majority of which she has managed. She has co-edited or co-authored 11 books and contributed to several articles and conference papers. Her latest book (with Dr Paul Hardisty) concerns the utilisation of economic analysis for making decisions about cleaning contaminated groundwater. The book, entitled “Economics of Groundwater Remediation and Protection” is targeted to technical experts working on remediation projects and is published by the CRC Press.

Coen Peelen, Ministry for the Environment, the Netherlands

Coen Peelen has been working, as a policy advisor, at the Dutch Ministry of Housing, Spatial Planning and the Environment at the Strategy and Policy Affairs Directorate since 2001. He deals with the greening of the tax system, i.e. environmental taxes, but also on differentiations in taxes to stimulate environmentally friendly behaviour.

Kai Schlegelmilch, Deputy Head, Climate Change Programme, German Federal Ministry for the Environment

Kai Schlegelmilch has been working for the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety on environmental taxes and fiscal reform and energy/climate change issues since early 1999. He has published more than 100 articles and books, mainly on environmental taxes and has broad knowledge on environmentally-related fiscal policies in Europe. He has worked for science, businesses, governments, NGOs and international organisations such as UNDP, UNEP, UNECE, OECD, the European Commission, European Environment Agency (EEA) and the Wuppertal Institute. In his spare time he is also Vice-President of Green Budget Germany. He is a member of the Council of the Foundation for Ecology and Democracy (the *Kuratorium* of the *Stiftung für Ökologie und Demokratie*) and of the Council of the Association for Ecological Economic Research (the *Vereinigung für ökologische Wirtschaftsforschung*).

APPENDIX 3 LIST OF PARTICIPANTS

Name	Surname	Organisation
Ray	Cunningham	Anglo German Foundation
Graham	Earl	BAA
Ino	Kremezi	Berkeley Hanover Consulting
Andy	Kershaw	British Airways
Tom	Roberts	Centre for Study of Environmental Change (CSEC)
Chris	Nicholls	Department for Environment Food and Rural Affairs (<i>Defra</i>)
Chris	Dodwell	Department for Environment Food and Rural Affairs (<i>Defra</i>)
Bob	Davies	Department for Environment Food and Rural Affairs (<i>Defra</i>)
Daniel	Yeo	Department for Environment Food and Rural Affairs (<i>Defra</i>)
Claire	Macaulay	Department of Trade and Industry (DTI)
Preetum	Domah	Department of Trade and Industry (DTI)
Emma	Papworth	Earthwatch Institute
Niels	Ladefoged	European Commission DG Environment
Ece	Ozdemiroglu	Eftec
Allan	Provins	Eftec
Helen	Johns	Eftec
Camille	Bann	Environment Agency
Robert	Rabinowitz	European Climate Exchange
Barbara	Ambrose	European Regions Airline Association (ERAA)
Bruce	Horton	Ewan Group Plc
Kai	Schlegelmilch	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
Richard	Dyer	Friends of the Earth
Andrew	Jarvis	GHK Consulting Limited
Anselm	Görres	Green Budget Germany
Jacqueline	Cottrell	Green Budget Germany
Steve	Bailes	Hertfordshire County Council
Mario	Deconti	HM Revenue and Customs (HMCE)
Taro	Hallworth	HM Revenue and Customs (HMCE)
Shailin	Shah	HM Revenue and Customs (HMCE)
Paul	Harrison	HM Revenue and Customs (HMCE)
Stuart	Kozam	HM Revenue and Customs (HMCE)
Sophie	Oliver	HM Treasury
Sophie	Cruickshank	HM Treasury, Stern Review Team
Jonathan	Kohler	Institute of Aviation

Jim	Rushworth	Lafarge Cement UK (British Cement Association representative)
Val	Beale	London Borough of Hillingdon
Anderson	Ramdeen	London Borough of Hounslow
Carol	Lee	London Borough of Richmond
Howard	Sanderson	London Luton Airport
Neil	Thompson	London Luton Airport
Claudia	Dias Soares	London School of Economics
Aldo	Ravazzi Douvan	Ministry for Environment & Territory, Italy
Coen	Peelen	Ministry of Environment, Netherlands
Karel	Korba	Ministry of Finance, Czech Republic
Per	Bolund	Ministry of Industry, Employment and Communication
Steve	Low	MVA Limited
Hazel	Peace	netcen, AEA Technology
Nils Axel	Braathen	OECD Environment Directorate
Leon	Hibbs	Reigate & Banstead Borough Council
Colin	Beesley	Rolls Royce Plc
Ian	Dickie	RSPB
Juliusz	Komorek	Ryanair
Luke	Redmond	School of Geography, Planning and Environmental Policy, University College Dublin
Ingvar	Junden	Swedish Environment Protection Agency
Amira	Ayoubi	Swiss Agency for the Environment, Forests and Landscapes
Stefan	Laeger	TRL
Sally	Cairns	TRL
Kirsty	Neale	Trucost Plc
Alice	Bows	Tyndall Centre for Climate Change Research
Jan	Pavel	University of Economics, Prague
Morgan	Foulkes	UPS
Christina	Cant	Uttlesford District Council
Alan	Thawley	Uttlesford District Council