OXERA

OXFORD ECONOMIC RESEARCH ASSOCIATES

BAA EXTERNAL EMISSIONS TRADING STEERING GROUP

ASSESSMENT OF THE FINANCIAL IMPACT ON AIRLINES OF INTEGRATION INTO THE EU GREENHOUSE GAS EMISSIONS TRADING SCHEME

EXECUTIVE SUMMARY

OCTOBER 2003

Blue Boar Court
Alfred Street
Oxford OX1 4EH
Tel: +44 (0) 1865 253000
Fax: +44 (0) 1865 251172
Email: Enquiries@oxera.co.uk

Steering Group

The Terms of Reference for this analysis were set by the BAA External Emissions Trading Steering Group, building on the outputs of a major stakeholder workshop, on March 31st 2003. The workshop, independently facilitated by Lindsey Colbourne of the InterAct Network, brought together over 60 senior representatives from government, industry, and NGOs, to consider stakeholder perspectives on a credible approach to aviation's integration in an emissions trading scheme.

In addition to setting the Terms of Reference, reproduced in Appendix 2, the Steering Group has 'challenged and reviewed' the analysis herein and discussed its findings.

The analysis has been commissioned by the Steering Group as a contribution to public debate, and has been co-funded by BAA and the Department for Transport. **However, neither the steering group as a whole nor its individual members are formally committed to the analysis undertaken by OXERA, and the conclusions in this paper remain the responsibility of OXERA alone.**

BAA External Emissions Trading Steering Group

Government	Mike Crompton (Department for Transport)
	Hartmut Behrend (European Commission DG Environment)
	Sarah Hendry (Department for Environment, Food and Rural Affairs)
Business	Kathryn Barker, Chair (BAA), Philip Douglas (BAA), Liz Tooke (BAA)
	Andrew Sentance (British Airways)
	Vanessa Tamms (Virgin Atlantic)
	Burr Stewart (Seattle Airport)
	Colin Beesley (Rolls Royce)
NGOs/others	David Lee (Manchester Metropolitan University)
	Brian Pearce (Forum for the Future)
	Tony Grayling (Institute for Public Policy Research)
	Tim Johnson (Aviation Environment Federation)

Note: Roger Higman (Friends of the Earth), Mike Mann (Department for Transport) and Chris Leigh (Department for Environment, Food and Rural Affairs) among others have also been included in specific meetings at the request of steering group members
Source: BAA.

Further copies of this paper are available from the following web site:

www.baa.com/sustainability

Executive Summary

This paper analyses the financial impact of integration of intra-EU aviation into the EU greenhouse gas emissions trading scheme (EU ETS). The assessment is carried out both qualitatively and quantitatively.

The basic architecture of an emissions trading scheme consists of a requirement to surrender an allowance for each unit of emission and a rule allowing emission allowances to be traded which leads to an equilibrium allowance price. An initial allocation of allowances can be made to the participants. The decision regarding the amount of emission reductions to target is made by comparing the emission allowance price path with the cost of in-house abatement. Excess allowances can be sold to the market.

Emissions trading affects costs and revenues in three ways:

- the addition of the allowance price to the fuel costs changes the operating profit by reducing the margin, and, if passed through in the ticket price, causes a loss of volume;
- the investment in energy efficiency improvement of the fleet results in higher fixed costs;
- the initial allocation constitutes a fixed revenue.

The impact on demand for flights depends on how the additional costs are passed through in the ticket price. Two rules are conceived for two types of airport:

- *marginal cost pricing*—the ticket price for each flight is determined on a marginal cost basis (ie, on the basis of the additional cost that the operation of this particular flight incurs);
- *demand clearance pricing*—when capacity is constrained, the ticket price is set at the level which clears the demand for tickets at the given supply.

In this analysis, it is assumed that flights between uncongested airports price at marginal cost, while flights to and from congested airports adopt a demand clearance pricing strategy. The pricing strategies imply a difference in financial impact of emissions trading at both types of airport:

- *uncongested airports*—the allowance price is passed through to passengers in the ticket price, resulting in a loss of profit margin and volume;
- *congested airports*—the costs are not passed through in the ticket price, avoiding volume loss, but resulting in higher loss of profit margin.

The literature relating to the assumptions made in the paper is reviewed. The proportion of flights from congested airports is assumed to be 25%. The elasticity of demand is estimated at –0.8 for business, and –1.4 for leisure travel. The different estimates for EU allowance prices and proposals for a tax on emissions from aviation are also summarised. The range of allowance prices is estimated as €5–€30/tCO_2, whereas the tax estimates range from €10 to €70/tCO_2. In the model, assumptions of €5, €10 and €20/tCO_2 are used for both allowance prices and tax rates.

These assumptions are used in the modelling of the financial impact of emissions trading on aviation. The model tests the following three groups of options.

1. **Initial allocation** (three scenarios):

   A1 a 25% reduction compared against a baseline of 40% growth between 1990 and 2010;
   A2 an 8% reduction from 1990 emissions by 2010; and
   A3 a 60% reduction of 1990 emissions by 2050.

2. **Percentage of auctioning and grandfathering[1] in the initial allocation** (two scenarios):

   – auctioning of 10% of the allocation while grandfathering 90%; and
   – 100% grandfathering.

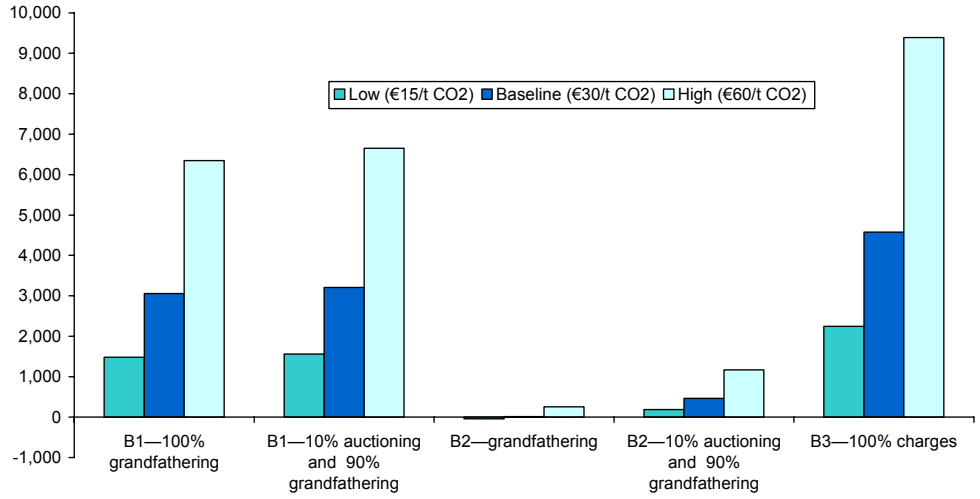
3. **Balance between emissions trading and taxation** (three scenarios):

   B1 a requirement to submit one allowance per tonne of CO_2 and a tax on the residual climate change impact of 1.5 to 2 times the CO_2 equivalent (CO_2e);
   B2 a requirement to submit 2.5 to 3 allowances for each 1 tonne of CO_2e emitted; and
   B3 a tax on the basis of 2.5 to 3 times the estimated damage from 1 tonne of CO_2e.

The analysis of different tax and emissions trading options shows that a pure trading system with a requirement to submit allowances covering 2.5 to 3 times the emitted tonnes of CO_2e is much cheaper for the industry—up to 40 times—than any of the scenarios involving a tax on part or all of the climate damage costs. In the pure trading scenario, the financial impact is almost zero, and in some cases a gain is made. The reason is that the value of the grandfathered allowances equals or exceeds the profit lost through reduced margins and demand volume loss. Under the scenario requiring one allowance to be surrendered for 1 tonne of CO_2e, combined with a tax amounting to 1.5 to 2 times the damage of 1 tonne of CO_2e, the financial impact amounts to about €2,200m–€3,200m per annum. The pure taxation scenario results in an impact of €3,800m–€4,600m. In a separate study carried out for the European Commission, CE Delft has estimated that the revenue generated by an emissions charging regime will be in the range of €1,100m to €8,600m. When a charge of €30/t CO_2 is used the estimate is approximately €3,300m.[2] However, the two estimates are not directly comparable: the OXERA estimate is the financial impact on the industry, a figure that includes profits forgone, while the CE Delft estimate is for the revenue raised by such an instrument.

[1] Grandfathering involves giving the initial allocation of allowances to the industry free of charge, whereas auctioning requires the industry to pay for the initial allocation.
[2] CE Delft (2002) 'Economic Incentives to Mitigate Greenhouse Gas Emissions from Air Transport in Europe', commissioned by the European Commission, July.

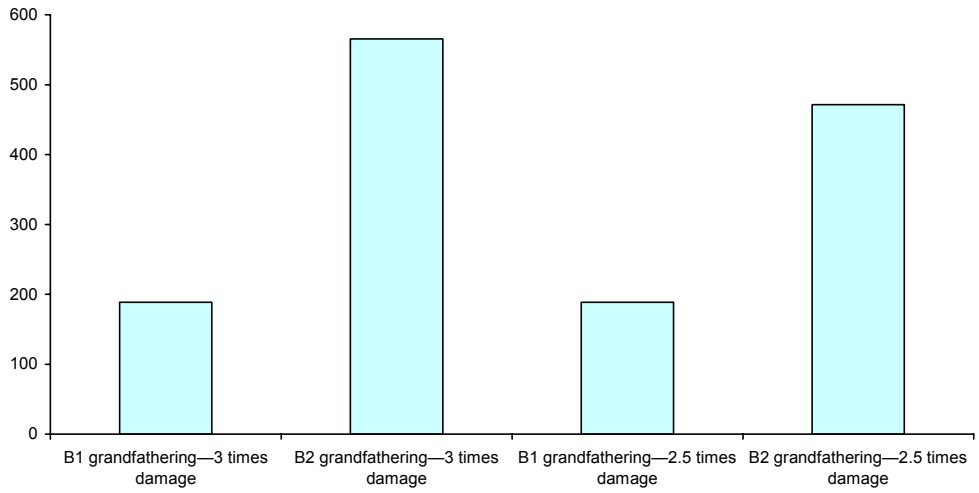
Total financial impact with different allowance prices and EU charge levels in scenario A1 assuming that total damage is 3 times that due to CO_2 alone (€m per annum)



Notes: Figures in parentheses refer to the marginal price (sum of allowances and charges) paid to emit 1 tonne of CO_2.
Source: OXERA modelling.

The quantitative analysis shows that the difference between the allocation scenarios is less significant than the different assumptions about the mix of emissions trading and taxes. The initial allocation of –8% of 1990 emissions (scenario A2) results in an additional cost of around €200–€550m compared with the allocation scenario of –25% (scenario A1) from projected emissions.

The increase in financial impact on the industry caused by switching from scenario A1 to A2 (€m per annum)



Source: OXERA modelling.

Auctioning 10% of the emissions leads to a greater financial impact of around €150m–€450m. Sensitivity analysis shows that the model is relatively sensitive to the assumptions about the proportion of cost pass-through at uncongested airports, and to the assumption about price elasticities of demand. Relaxing the no-cost-pass-through assumption to full cost pass-through leads to a reduction in financial impact of €1,300m. Changing the elasticity by 0.5 from –1.5 leads to a change in impact of €894m.

The 2008–12 baseline scenarios all result in a direct emissions reduction of approximately 8.5% by the aviation sector. The majority of this (5.3 percentage points) is attributable to a reduction in demand caused by higher ticket prices, while 3.2 percentage points are attributable to supply-side abatement. In addition, in the partial and full trading scenarios, the aviation sector purchases emissions reductions from other industries, increasing the effective emissions reduction attributable to aviation to around 20% for partial trading, and around 40% for full trading.

The modelling of the 2050 scenario shows that the difference between the emissions trading and tax mixes is considerably less pronounced than for the 2008–12 scenario. The total financial impact amounts to around €4 billion under a low allowance price and €16 billion–€17 billion under a high one.

Two assumptions in the modelling are worth highlighting at this point:

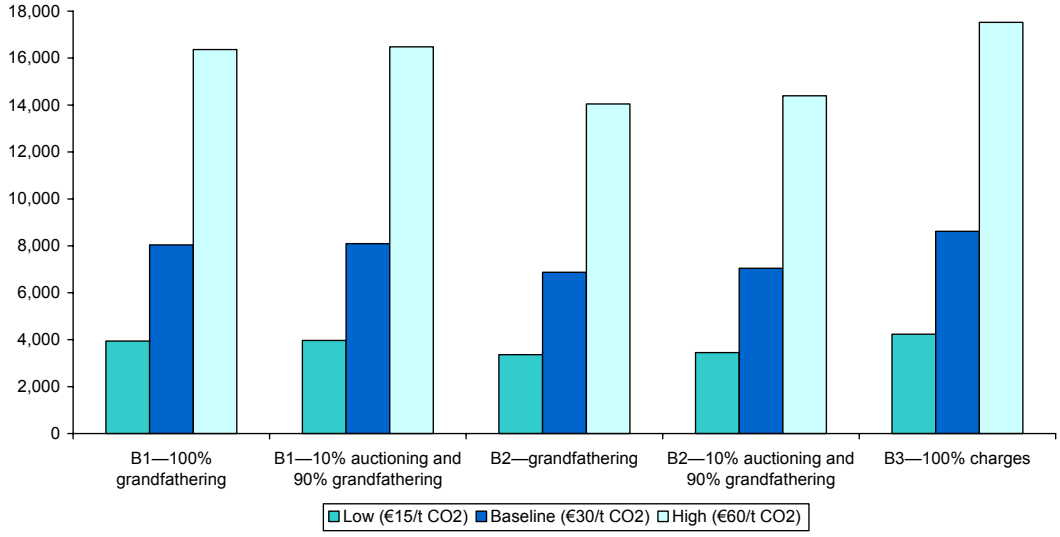
- taxes are assumed to be levied at the same level as the allowance price for the comparison graph shown below. If taxes were set equal to Defra's current estimate for the damage costs associated with CO_2 emissions, the financial impact may be much greater, at around €45 billion per annum;
- taxes are not recycled back into the industry, and therefore represent a net loss to the aviation sector.

A further reason for the different pattern and the higher costs is chiefly that the initial allocation of allowances is very limited, but also because the model assumes unabated growth in aviation emissions. This assumption might not be compatible with industry responses to a sustained high allowance price in terms of abatement. In addition, there is a considerable amount of uncertainty surrounding the 2050 scenario—in particular, the likely level for taxes and allowances is far from clear for this time horizon. It is possible that intra-EU aviation may have become part of a wider global ETS by 2050, potentially affecting allowance prices. However, the modelling presented here assumes that it is part of an EU-based ETS.

Only the full trading scenarios (B2) result in a 60% reduction against 1990 levels in emissions from society as a whole in the modelling for 2050. The 60% target helps to determine the allowance price in the entire emissions trading market, not just the aviation sector. Therefore, the reductions from different sectors can be greater or less than 60%, but the delivery of 60% emissions reductions from society would be achieved.

The taxation scenarios (B3) do not result in such large emissions reductions; instead, the industry largely chooses to continue emitting and pay the charges. To achieve a 60% reduction in emissions from the baseline using taxation, the tax rate would have to be higher than the range examined here, and/or the revenues from taxes may have to be used to purchase and retire allowances from an emissions trading market.

Total financial impact with different allowance prices and EU charge levels in scenario A3 assuming that total damage is 3 times that due to CO_2 alone (€m per annum)



Notes: Figures in parentheses refer to the marginal price (sum of allowances and charges) paid to emit 1 tonne of CO_2.
Source: OXERA modelling.