



Plane Truths:

Do the economic arguments
for aviation growth really fly?



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Executive summary

The international aviation industry is conspicuous by its absence from international and national targets for emissions reductions. It is also the fastest-growing source of greenhouse gas emissions in developed countries.

The impact of climate change, coupled with the threat of oil production reaching its peak and then declining, is challenging us all to learn to live with far fewer fossil fuel resources. There is overwhelming evidence of an urgent need for concerted global action to reduce greenhouse-gas emissions rapidly and significantly.

Despite the overwhelming environmental case for curbing aviation growth to ensure that we are able to make the cuts in emissions we know are needed to avert potentially irreversible climate change, the aviation industry and its supporters say that there are compelling economic arguments in favour of continued growth. They argue that aviation growth: helps power the engine of international trade and global business, brings significant benefits to the UK economy, 'democratises' travel by enabling more people on lower incomes to take advantage of low-cost flights and provides a lifeline to the economies of poorer countries that are particularly reliant on income from international tourism.

This report from **nef** (the new economics foundation) and the World Development Movement (WDM) examines these economic arguments, assesses their worth and exposes the plain truths. It focuses in particular on the relationship between aviation, tourism and development in poorer countries. To do this, we analysed the potential economic impact of curbing UK aviation growth on four leading UK tourist destinations – Kenya, the Maldives, Thailand and the Dominican Republic. In each case, our analysis of real economic benefit to those nations reveals that, once we account for the money which effectively 'leaks' out of those economies to foreign-owned companies and imported resources, the impact is marginal (see Table 1). Kenya, the Maldives and the Dominican Republic are also three of the most vulnerable nations to the impacts of climate change.¹

We have also considered the aviation industry's claims that technological advances will empower airlines to neutralise the environmental impact of aviation growth by enabling them to become cleaner and greener in the near future.

Having examined the case made by the aviation industry, our conclusion is that:

- **Growth in the aviation industry cannot be maintained if we are to make the cuts in UK emissions of between 80–90 per cent below 1990 levels we know are necessary to make our contribution to avert a dangerous accumulation of greenhouse gases;**

Table 1: Summary of analysis

Country	Real revenue loss between 2009–2025 from halting aviation growth from UK (assuming a 60 per cent leakage rate)	
	millions of US\$	as a % of GDP
Kenya	228	0.07
Maldives	396	3.42
Thailand	4,470	0.17
Dominican Republic	1,308	0.39

- **Since the overwhelming majority of tourists travel within regions, not between them, rail can replace air travel in key markets;**
- **Many of the claimed benefits of tourism to local people in developing nations are lost to international actors;**
- **In the UK (and globally) air travel remains the preserve of the wealthy.**

It is clear that more research and a proper debate are needed because the economic case for growth advanced by the aviation industry is at best flimsy and at times fundamentally flawed. It is also clear that the policy measures put in place so far to mitigate the environmental impact of aviation, such as Air Passenger Duty (APD) in the UK and the European Union (EU)'s emissions trading scheme, will have little impact on the strong and environmentally destructive growth trend that we report. What is needed instead is a bold package of measures that use a combination of carrot and stick to significantly reduce demand for air travel – including substantial investment in high-speed rail links and high taxes on short-haul flights for which alternative modes of transport are often available.

‘Plane’ truths:

Why the economic arguments in favour of aviation growth just don’t fly

Growth in the aviation industry is environmentally unsustainable

Between 1990 and 2000 global CO₂ emissions grew by 13 per cent. Over the same period CO₂ emissions from aviation and road transport both grew by 25 per cent.² In the UK, aviation emissions grew far faster – by 80 per cent between 1990 and 2000.³

Air travel is now the primary mode of transport for international tourism – estimated to account for 43 per cent of all travel associated with tourism.⁴ Estimates of the impact of the aviation industry on emissions have tended to undercount the impact of the industry on emissions. In 1992 the aviation industry was estimated to be responsible for approximately two per cent of global CO₂ emissions. But a more recent estimate that includes other climate effects implies that this is more like four to nine per cent.⁵

It is in industrialised countries, overwhelmingly responsible both currently and historically for the levels of concentration of greenhouse gases in the atmosphere, which have the responsibility to act first and to do the most to reduce emissions, where the contribution of aviation to emissions is most significant. In the UK, for example, aviation accounts for approximately 6.3 per cent of CO₂ emissions. Applying a *conservative* multiplier to allow for effect of other climate effects this equates to 12.6 per cent of the country's contribution to climate change.⁶

And it is set to get worse. Air travel is set to double in the next ten years unless restrictions are imposed. The UN World Tourism Organization (UNWTO) forecasts that international tourist arrivals will increase from 800 million in 2005 to 1.1 billion in 2010 and nearly 1.6 billion in 2020. If this forecast proves correct, we can expect tourist arrivals to grow by just over four per cent each year over the next decade, with a five per cent growth in tourists travelling by air.

The economics of tourism, aviation and international development don’t add up

The tourism and aviation industries are quick to identify the economic importance of tourism for developing nations in their defence. But our analysis shows that the vast majority of tourism occurs within regions, not from one region to another. Since tourism within regions is expected to grow more than tourism between regions (which is heavily dependent on long-haul flights), there is a case for developing efficient and equitable alternatives to air travel, such as good networks of high-speed rail links.

The benefits of tourism to the economies of developing nations has been significantly and systematically over-estimated. The significant role of transnational corporations and other international actors in the tourism sector is well documented. Foreign ownership or control of tourist facilities in developing countries often means that a large proportion of income generated through tourism is repatriated, ‘leaking’

out of the national economy. This means that the real contribution made by tourism to the economies of developing nations can be significantly overestimated. In some cases, leakage of up to 75 per cent, or more, of the money tourists spend have been reported, raising questions about the value that tourism brings to development.

Further questions are now being asked about the benefits of international tourism as a result of climate change and the prospect of peak oil. Is it a good idea for poor nations to be so dependent on an industry that is highly vulnerable to rising oil prices? And what about island nations and other low-lying countries that are likely to be hit first and worst by climate change? What is the wisdom in relying heavily on carbon-hungry international travel that is contributing to rising sea levels, storing up devastating human and economic consequences for the near future? While tourism may bring economic benefits to some areas in the shorter term, in many places such benefits are likely to be far outweighed by the impact of climate change.

Who really benefits? The rise and rise of short-haul flying

This report makes the case for a package of measures to curb aviation emissions that would benefit the UK economy and help support a transition to a more sustainable economic picture in the developing world. We believe that one of the ways in which this can be achieved is using targeted taxation to reduce demand for short-haul flights. These create more emissions per passenger kilometre and account for a significant proportion of the passenger flows from UK and other EU airports, but contribute little to economies in the developing world:

- **Three in every four flights from the UK are short haul.⁷ Approximately 70 per cent of flights leaving the UK are to destinations within the EU-25.**
- **According to one estimate, 45 per cent of all European flights are over distances of less than 500km. Yet evidence suggests that high-speed trains can provide a quality of service better than or equal to the air equivalent for distances of 500km or more.⁸** This means that many of these journeys have the potential to transfer to high-speed rail – particularly as recent airport security concerns have led to longer and more inconvenient check-in. And investment in rail links works. A recent analysis suggests that flights between London and Manchester have fallen as a result of £7 billion improvements to the rail link between the two cities.⁹ The Civil Aviation Authority (CAA) reports that BMI, the UK's second-largest full-service airline, suffered a 26 per cent drop in passenger numbers between Heathrow and Manchester between September 2004 and October 2005.
- **According to statistics from the Civil Aviation Authority, only nine per cent of flights from UK airports (excluding domestic flights) are to nations in the 'global south' – defined as countries of low or medium development according to world development indicators.** Just four per cent of flights from the UK are bound for Africa, three per cent for Asia (excluding Hong Kong, Singapore and Japan) and two per cent for the Caribbean and South or Central America.

Curbing short-haul flying from industrialised countries would not only have a negligible effect on developing world economies but it would also target journeys for which a viable alternative to air travel is more likely to be available:

- Less than 20 per cent of tourism trips within Europe in 2000 were based on air travel.¹⁰
- Only five per cent of tourist journeys from European airports are intercontinental.¹¹ Even allowing for the fact that some journeys within Europe are dependent on air travel, the percentage of all current journeys that are flight-dependent is relatively small.¹²

Air travel: An illusory democracy

In the UK the rapid expansion of airports has been justified by talking about the 'democratisation' of air travel – presenting flying abroad on holiday as something that should be accessible and affordable for all. Social analysis reveals, however, that air travel overwhelmingly remains a choice made by more wealthy people.

Those with the highest incomes are disproportionately responsible for emissions from aviation. Research at a London airport, for example, shows that in 2005, people from the highest socio-economic groups took 40 per cent of all low-cost flights (domestic and EU bound) from the UK – even though these groups account for only 24 per cent of the population. In contrast those at the bottom of the income scale (DE) fly least, accounting for only 7.7 per cent of these low-cost flights, although they make up 32 per cent of the UK population.¹³ Trips by those in the lower-income bands fell between 2000 and 2004.¹⁴ The proliferation of cheap flights may have widened the base of those who fly, but it has done little to change a picture in which those who benefit most from aviation, are those who already have most.

Aviation and the UK economy: taking the UK into the red

We found that the airline industry's claim to support the UK economy appears overstated:

- In effect, the absence of any tax on aircraft fuel or any VAT on ticket sales provides the industry with a significant government subsidy. In 2007 the World Development Movement (WDM) estimated that this subsidy amounted to approximately £10.4 billion per year.¹⁵ This is nearly 850 times more than the UK's annual spending on flood defences or over 120 times more than what the government spends each year on research and development for renewable energy. This is also double the estimated £5 billion investment needed to ensure that the UK's entire housing stock was insulated.¹⁶
- The aviation industry claims it contributes to 1.1 per cent of the UK's total GDP per year (£11.4 billion in 2004). This suggests that even before the environmental and social costs of the impact of aviation industry's operations are taken into account, the industry's net contribution to the UK economy when compared to the effective subsidies it receives, is negligible.

Conclusion

If we are to stabilise emissions within the range compatible with preventing catastrophic climate change, the aviation industry must be brought within national and international emission reduction targets.

As a first step, developed countries such as the UK need to halt growth in emissions from aviation in order to make the level of emissions reductions needed to prevent catastrophic climate change which will impact first and worst on the world's poorest people. This could partly be done through limiting the number of short-haul flights in regions such as the EU, without any impact on the economies of developing countries.

Our analysis also shows that halting the growth in UK aviation would have little impact even on the economies of those developing countries that receive a relatively large number of UK tourists. Instead of expanding aviation to increase the number of people travelling to developing countries, it would be more beneficial to introduce policies that keep more of the tourism revenues within developing countries.

In the longer term, when emissions and air travel are reduced, the impact of this must be managed in a way that enables a transition towards more sustainable models of development for those nations that have pursued models of development based on international tourism.

In the light of this report, we argue that the UK Government should:

Ensure that the Climate Change Bill, currently passing through parliament is fit for purpose:

- Include all emissions from aircraft and shipping in the Climate Change Bill currently passing through parliament;
- Include mechanisms in the Climate Change Bill to ensure that emissions are cut in the UK, rather than allowing industries such as aviation to carry on with business as usual by buying carbon credits to meet reduction targets;
- Revise emissions reduction targets for the UK set out in the Climate Change Bill to 80–90 per cent below 1990 levels; the targets the most up-to-date scientific research suggests are necessary.

Halt planned airport expansion, and ensure that proposed taxes on flights reduce demand for short-haul flights:

- Halt plans for airport expansion in the UK, such as allowing a third runway to be built at Heathrow airport, and a second runway at Stansted;
- The tax on flights set to replace Airport Passenger Duty in 2009 should be set at a proportionally higher rate for short-haul flights than long haul; be varied according to aeroplane type, and include transfer passengers and freight. Evidence suggests that it must be set at a higher rate than the current level of APD if it is to influence behaviour and reduce demand;
- The proceeds from such a UK tax could be split between contributing towards the investment needed for improvements in the rail network, and providing funds to developing countries to help adaption to climate change and support low-carbon infrastructure.

Play an effective role in managing curbs in aviation effectively so that it does not impact developing nations:

- Where developing nations are dependent to a degree on international travel, curbing aviation must be managed carefully. We believe it makes sense to weight taxation so that one of the main influences on behavioural change – the cost of travel – is applied more stringently to short-haul flights. A tax structure weighted against short-haul flights could stall the growth of the multiple short-break market without significantly affecting long-haul flights to those developing nations reliant on tourism for development;
- The best way to tackle aviation emissions would be an international tax on aviation fuel, set at a high enough level to prevent catastrophic climate change impacts. Much of the revenue from such a tax could go to developing countries to support climate change adaptation and development of low-carbon infrastructure, as well as to compensate for any loss in revenue from a fall in tourism. Unfortunately there has been no sign yet of this materialising through the UN's International Civil Aviation Organization.

Invest in close analysis of the real impact of aviation, and genuine public debate:

- The economic impact of aviation should be examined more closely and objectively, guarding against taking industry claims at face value;
- This closer scrutiny should include a vigorous public debate about how aviation is taxed and how public money is spent.

This report suggests that the airline industry needs to be wrenched from its fossil-fuelled fantasies if we are to have a chance of reducing emissions by the levels required to avert catastrophic climate change. Far from jeopardising economic development in the world's poorest nations, curbing aviation growth may have a significant part to play in reducing emissions that threaten the very survival of hundreds of millions of people in developing countries.

Introduction

The role of aviation in increasing atmospheric concentrations of greenhouse gases is rapidly becoming critical to the climate change debate. The UK aviation industry is the largest in the EU. It is also the sector of the UK economy that is growing fastest in terms of CO₂ emissions.¹⁷

In this report we begin by reiterating the seriousness of the challenge that climate change presents for industry and society as a whole, and by underlining the overwhelming environmental case for curbing aviation growth.

Beyond the environmental dimension of the debate, however, are a number of economic arguments that the aviation industry and its supporters advance in favour of continuing growth. This report looks at those economic arguments in turn.

We examine in particular depth the link between aviation, tourism and economic development in poorer countries. Alongside the claimed benefits to the UK economy of aviation, the tourism industry argues against taking swift and meaningful action on aviation emissions on the grounds that such action will reduce tourism in developing countries and increase poverty.

We have looked at the value of international tourism to four countries that are major UK tourist destinations in the developing world – Kenya, the Maldives, Thailand and the Dominican Republic. For each, we project the likely economic impact of curbs on the UK aviation industry that might halt the growth in tourists flying in from UK airports.

The UN World Tourism Organization (UNWTO) and many developing countries with high tourism dependency are caught in a bind. Small island states and other tourist destinations in developing countries are likely to be hit first and worst by climate change, yet they have economic concerns about action to curb emissions.

Our research indicates that the aviation industry is not a big net earner for the UK economy and appears to be a significant net drain on the public purse. Our examination of international tourism linked to aviation suggests that the benefits have been significantly overstated, partly because so much of what tourists spend 'leaks out' of host nations' economies via the pockets of foreign-owned airlines, tour operators and hotels. A development model based on such an unregulated industry may bolster foreign-exchange earnings to a modest extent but it risks making the economies of developing countries more vulnerable to exogenous shocks. The exogenous factors that could affect a nation's tourism market include:

- Climate change policy
- Changes in tourist tastes, behaviours and environmental awareness
- Conflict, terrorism or public health scares
- Geological disasters and extreme weather events
- Fuel prices

In Kenya, for example, international tourist arrivals fluctuated wildly during the 1990s. There were never more than two years of consecutive growth in the industry in this period, and there was little growth overall.

The years 1997 and 1998 were particularly bad, as tourist arrivals were affected by violence in Likoni and a bombing of the US embassy. While the industry made some recovery, this stalled in the wake of the attacks on the United States on 11 September 2001. Another setback occurred in November 2002 when ten Kenyans and three Israelis were killed by a car bomb outside an Israeli-owned hotel in Mombassa. While the immediate effect was nominal, the ongoing threat of terrorism led to a security alert being issued by the Kenyan government in May 2003. This led to the suspension of British Airways flights to Nairobi and of a number of charter flights into Mombassa. It was reported in the *East African* that flight cancellations in May and June 2003 cost the Kenyan economy approximately \$9.6 million. The violence that broke out after the contested Presidential elections of December 2007 has once again highlighted the vulnerability of Kenya's tourism industry to shocks.

The travel and tourism industries argue that curbing aviation growth will hinder development in poorer countries that draw a large proportion of their GDP from tourism. We believe this argument does not stand up to close scrutiny. Restructuring the tourism industry would mean that developing countries could maintain growth in tourist flows and income in other ways, instead of remaining heavily reliant on international tour operators and long-haul flights. It would also make these countries less vulnerable to the exogenous and volatile swings in the aviation and tourism industries, described above.



Photo: Andrew Simms

Aviation and greenhouse gas emissions – a major cause for concern

‘For individuals concerned with their carbon footprint, a long-haul flight can nullify the carbon savings achieved by changing behaviour in other areas of daily life’

**Dr Victoria Williams, Centre for Transport Studies,
Imperial College, London, 2007¹⁸**

The twin threats of climate change and peak oil are challenging us all to learn to live with far fewer fossil fuel resources. But the aviation industry has greater cause for concern than most.

Emissions from aviation

Over 80 per cent of the CO₂ released into the atmosphere from human activity is due to the burning of fossil fuels, mainly in producing electricity and heat and in transport.¹⁹

In the tourism industry the greatest share of energy consumption is associated with travel. In some cases, as much as 90 per cent of the estimated energy consumption by tourists is spent on travelling to and from host countries.²⁰ While travel is a fundamental prerequisite of tourism, it is one of the biggest sustainability challenges.

Between 1990 and 2000 global CO₂ emissions grew by 13 per cent. Over the same period CO₂ emissions from aviation and road transport both grew by 25 per cent.²¹

The Intergovernmental Panel on Climate Change (IPCC) reported that in 1992 aviation was responsible for approximately 2.4 per cent of global CO₂ emissions.²² It is widely recognised, however, that the contribution of aviation to climate change is greater than this because of the additional warming effects of non-CO₂ airline emissions (water vapour, condensation trails and nitrogen oxides) and the burning of fuel at altitude. The overall impact of the industry on the climate is two to five times greater than the impact of its CO₂ emissions alone.²³

Moreover, aviation makes up a far greater proportion of developed countries' contributions to climate change. Therefore, it is developed countries who primarily have responsibility for tackling aviation emissions. In the UK, for example, aviation accounts for approximately 6.3 per cent of CO₂ emissions and about 12.6 per cent of the UK's contribution to climate change.²⁴ In the UK aviation makes up a greater proportion of the country's contribution to climate change than in any other major economy (see Table 2).

The Open Skies agreement negotiated this year between the European Union (EU) and the United States is likely to make matters worse. It allows carriers to fly to any US city from any airport in the EU and vice versa. Analysts have estimated that it could double the number of passengers flying across the Atlantic as a result of lower ticket prices (because of increased competition) and the creation of additional routes – although these predictions preceded steep increases in fuel prices that are likely to dampen this effect.²⁷

The EU's own assessment of the potential effects of this agreement failed to take account of its impact on CO₂ emissions. But the Brussels-based environmental group, Transport and the Environment, estimates that the agreement could add a further 3.5 million tonnes a year to the levels of CO₂ emissions currently created by transatlantic flying.²⁸

Table 2: Aviation emissions by developed economies^{25,26}

Country	Aviation CO ₂ emissions in 2004 (million tonnes)	Aviation's share of country's CO ₂ emissions (per cent)	Estimate of aviation's share of country's contribution to climate change (per cent)
UK	35.5	6.1	12
France	24.1	5.9	11
Netherlands	12.5	4.7	9
US	261.8	4.4	8
Spain	15.5	4.3	8
Australia	15.1	3.9	7
Canada	20.7	3.5	7
Japan	36.3	2.9	5
Germany	24.5	2.8	5
Italy	12.1	2.5	5

Between 1990 and 2006, UK aviation emissions grew by 125 per cent. Analysis by the Tyndall Centre for Climate Change Research published in 2006 projected what would happen if UK aviation emissions continued to grow but less steeply, increasing at half the annual percentage rate recorded in 2004. The Tyndall Centre found that by 2050 aviation would account for over 50 per cent of permissible emissions if we reach greenhouse-gas concentrations of 550 parts per million (ppm), and would consume the entire carbon budget if concentrations have been contained at 450ppm.²⁹

But research suggests that CO₂ equivalent concentrations³⁰ need to stabilise at 400ppm if we are to have a realistic chance of keeping the increase in global temperatures to 2 °C (see Box 1: Climate change – time is running out). It will be impossible for the UK to cut emissions to the extent required to prevent catastrophic climate impacts if aviation emissions continue to grow.

The climate change challenge is becoming more formidable as we learn more from the scientists. For example James Hansen, a NASA scientist, argues that in order to prevent dangerous climate change, we need to get back to atmospheric concentrations of just 350ppm. Given that CO₂ *only* concentrations are approximately 386 ppm at the time of writing this represents an undertaking of colossal proportions.

The impact of peak oil on aviation growth and tourism

Another major challenge confronting the aviation industry, so heavily dependent on oil, is the 'peaking' in global production of oil and gas. The Hubbert Peak theory – also known as *peak oil* or the *topping point* – describes a point in the extraction of oil and other fossil fuels at which world production reaches a peak, levels off and then rapidly declines.

The global peak year will only be known when it has passed, but most estimates suggest that we are either at this point already or very close to it.⁴³ At most it is one or two decades away. Against a background of rising demand, 'peaking' will result in a major shock to the global economy. Before then an increasing gap between production and demand is likely to drive prices up. Indeed, even if oil production has not yet peaked, prices have risen recently as demand has increased ahead of production.

The impact of peak oil will be felt particularly strongly by industries that are dependent on abundant cheap energy. These include transport sectors such as aviation, industrialised food systems, air conditioning and refrigeration, and commodities such as plastics and pesticides. The declining availability of oil and gas means that unless a systemic transition to a post-carbon society is initiated and planned for now, it is likely to happen without our choosing – and with catastrophic impacts on the global economy, poverty levels and human development.

Box 1: Climate change – time is running out

The Earth's climate is changing at greater rates and in patterns that are beyond natural variations. Observers have noted changes to the temperature of the atmosphere, land and ocean; the melting of sea ice and mountain glaciers; sea-level rises; the shifting distribution of rainfall, and the changing length of growing seasons. The rapid increase in human-driven greenhouse gas emissions, mostly from fossil fuels, is a significant cause of these changes.

According to NASA's Goddard Institute for Space Studies, the year 2007 tied with 1998 as the second-warmest year on record.³¹

The warming observed in 2007 is of particular importance because there were a number of factors present that tend to counter the greenhouse effect and lower temperatures, such as low solar irradiance and a stronger than average phase of the *La Niña* phenomenon in the Pacific. This means that the 'background' warming might have been even stronger.

At the time of writing, the concentration of atmospheric carbon dioxide (CO₂) had climbed to a new high of 386 parts per million (ppm). Recent research, however, indicates that beyond an atmospheric concentration of 400 ppm CO₂ equivalent, it is unlikely that we will be able to avert potentially irreversible climate change.³² Once this concentration is exceeded, it becomes more and more likely that we will overshoot a global average surface warming of 2 °C above pre-industrial levels.³³

Even if the rise in global average temperatures can be contained at no more than 2 °C it is possible that we will witness catastrophic effects. For the Greenland Ice Sheet to collapse, for example, there needs to be a local warming of 2.7 °C. The latest climate models suggest that this kind of local warming could occur with a global mean temperature increase of 2 °C or less.³⁴ The disintegration of the Greenland Ice Sheet alone could translate into a rise in sea levels of up to seven metres over the next thousand years.

New and cautious calculations by **nef's** climate change and energy programme suggest that we may have as little as 100 months, starting from August 2008, to stabilise concentrations of greenhouse gases in the atmosphere – before the risk of uncontrollable global warming occurring increases significantly.³⁵

Already high oil prices and the need to move away from fossil fuel dependency are playing a part in pushing up the price of food, threatening the survival of millions in the world's poorest countries. The UN World Food Programme has had to reassess its agreed budget for 2008 after identifying a \$500 million shortfall. It found that the \$2.9 billion originally allocated to food aid for 73 million people in 78 countries would prove inadequate because of spiralling costs. Higher oil and gas prices have contributed to this by increasing the costs of using farm vehicles and machinery, transporting food and manufacturing fossil fuel-dependent inputs such as fertiliser. The push to grow biofuel crops to reduce oil dependency has also exerted upward pressure on food prices by leaving less productive land available to grow food crops.

The human impact of oil price shocks is often at its most severe in developing countries. The International Monetary Fund (IMF) observes, for example, that 30 of the 40 Heavily Indebted Poor Countries (HIPC) are net oil importers. Combined with their precarious economic position and their high levels of oil imports relative to GDP, this makes many of them "among the most seriously affected by higher oil prices".⁴⁴ Against this background, developing countries vulnerable to oil price shocks would benefit if industrialised nations reduce their own demand for oil, including for aviation.

But how are higher oil prices affecting the aviation industry already? The recent dramatic increase in the cost of oil has been described by some as the biggest crisis for the industry since 9/11.

Aviation fuel has doubled in price since the summer of 2007, and the industry has started reporting losses. British Airways has responded by increasing the price of long-haul flights by £60, mothballing some aircraft and cancelling orders for others.

In July 2008 the price of oil reached the record level of \$147 a barrel. At a conference in Istanbul in June 2008, the International Air Transport Association said

Box 2: Measuring emissions from aviation

- When fuel oil is burned, it is converted into carbon dioxide and water vapour. Burning 1kg of aviation oil produces 3.15kg of CO₂
- The CO₂ emissions from an individual flight depend on many factors including type of aircraft, distance travelled, weather conditions, passenger load and flight altitude
- Planes have to burn more fuel during take-off and landing than they do when cruising at a constant altitude – ~24 kg of CO₂ (kgCO₂) per passenger kilometre for take off compared to 0.07 kgCO₂ per passenger kilometre whilst cruising.³⁶ This is why the shortest flights, in which the landing and take-off (LTO) cycle³⁷ represents a greater proportion of flight time, create more emissions per passenger kilometre.
- Because aircraft travel at altitude, it's not only CO₂ that matters. And the non-CO₂ emissions from aviation have a much greater climate impact than if fuel was burned at the surface of the Earth. Recent analyses of the climatic impacts of aviation emissions suggest that the global warming impact is between 1.9 and 5.1 times greater than the effect of aviation CO₂ emissions alone.³⁸ It is worth noting that rail, road and sea-based travel do not have this multiplier effect.
- One important factor is contrails (condensational trails from aviation), which cover around 0.1 per cent of the Earth's surface and make a significant contribution to global high cloud cover.³⁹ However, in regions of high air traffic movements and with atmospheric conditions that are conducive to contrail formation, the coverage fraction can be much higher. Depending on prevailing weather conditions, contrails can enhance cirrus clouds or spread into extended cirrus cloud cover.⁴⁰
- Other emissions include nitrogen oxides (NO_x), water vapour (not related to contrail formation) and soot. Water vapour and soot make much smaller contributions but NO_x causes a significant warming effect. In sunlight it destroys methane (CH₄), a potent greenhouse gas, but it also produces tropospheric ozone (O₃). Ozone is itself a greenhouse gas, and the amount created by NO_x more than nullifies the positive impact of destroying methane, resulting in a net warming effect.⁴¹
- The quoted weighting for aviation emissions does not include the impact of aviation-induced cirrus clouds – line-shaped ice clouds caused by the emission of water vapour and particulates from aircraft exhaust. Aviation-induced cirrus has been excluded from calculations because of a high degree of uncertainty, but if it were to be factored in the impact of aviation could be twice as large as commonly cited.⁴² These clouds reduce the amount of earth-emitted radiation leaving the Earth, producing a net warming effect.

it would cost its members \$6.1 billion should oil continue to trade at over \$135 a barrel for the rest of the year. It also noted that over the previous six months at least 24 airlines had gone bankrupt and more bankruptcies were expected soon. It is no surprise, then, that some now believe the end of cheap flights is nigh.

The impact of oil prices has been offset by some airlines through long-term purchasing strategies for fuel (hedging). EasyJet, for example, has hedged 40 per cent of its fuel needs until September 2008 at \$75 a barrel. But airline profitability will fall once contracts such as these come to an end. According to one report, British Airways is reducing the number of seats it will offer this winter by three per cent, terminating several routes out of Gatwick. It is also reported that Ryanair is planning to ground 20 planes and that EasyJet is going to halve its expansion plans.⁴⁵

Because of their impact on aviation, the record oil prices of recent months are sure to have some impact on the international tourist industry – particularly as fuel generally represents a third of airlines' operational costs.⁴⁶

In 2006 a report from the UN World Tourism Organization (UNWTO) said that rising oil prices in 2005 had pushed up tourism prices to a modest extent – within a range of less than five per cent – but not enough to create a dip in demand. At that time, however, the UNWTO could confidently predict continuing growth in international tourist arrivals against a background of solid global economic growth. It said that oil-price vulnerability could be reduced if the industry and governments acted to strengthen public-private partnerships, improve marketing and promotion,

subsidise investments in energy efficiency and productivity, diversify the range of holidays offered by tourist destinations, and increase support for smaller tourism enterprises in the least developed countries.

In 2008 there are fewer grounds for optimism. The combination of high oil prices with the credit crunch and global economic stagnation means that tourist destinations are less likely to be able to rely on strong growth in long-haul arrivals. We will argue later in this report that developing countries should now look at a significant restructuring of their tourist industries instead of just fine tuning a 'business as usual' approach as the UNWTO appears to advocate.

Failing political leadership

The continuing increase in emissions from the UK aviation industry has been exacerbated by a lack of political action.

In November 2007 Gordon Brown presented his first environmental speech as Prime Minister. He declared his commitment to reducing the UK's greenhouse gas emissions and driving forward an ambitious international agreement on climate change after the first phase of the Kyoto Protocol expires in 2012. A week later, however – in a speech to the annual conference of the Confederation of British Industry (CBI) – he promised to press ahead with the expansion of Heathrow Airport.

“Even as we place strict local environmental limits on noise and air pollution and ensure that aviation pays its carbon costs,” he said, “we have to respond to a clear business imperative and increase capacity at our airports ... our prosperity depends on it. And this week we demonstrated our determination not to shirk the long-term decisions, but to press ahead with a third runway [at Heathrow].”

This kind of contradictory rhetoric is endemic not only in Whitehall but also in Regional Development Agencies and among local authorities. Despite growing evidence that the impact of climate change is going to be far worse than originally anticipated, the UK's central, regional and local governments continue to advocate contradictory positions on climate change and aviation.

With contradictory positions come contradictory policies. Despite the government's stated desire to reduce carbon emissions, its 2003 White Paper on Aviation has committed the UK to a massive expansion in UK airport capacity to encourage and support a predicted doubling of the passengers and air freight handled by UK airports between 2002 and 2020.

Ministers and town halls appear to want to have it both ways – aviation growth on the one hand, emission cuts on the other. The Committee on Climate Change (CCC), however, is busy compiling a report that is likely to show more strongly than ever how untenable this position is. The CCC is gathering the latest scientific research on climate change to help build on the Stern Review and enable the government to reassess its emissions reduction targets.

If this work faithfully follows the lead of the latest international climate science, then the CCC will recommend revisiting the UK's long-term targets for reducing emissions from 60 to more than 80 per cent below 1990 levels by 2050. If it does so then there will be a compelling case for formalising this in the Climate Change Bill going through parliament. The Bill is expected to receive its Royal Assent in late 2008, which will mean that the government could find itself committing to an 80 per cent reduction target at more or less the same time as it is due to give the go-ahead for a third runway at Heathrow. The government seems to think that this target will be deliverable because it does not include emissions from the UK's share of international aviation within its targets.

There is a clear conflict between a government being committed to stretching and legally binding domestic emissions targets and yet placing no restrictions on the industry that has been identified as the fastest-growing source of emissions. A report published by University College London (UCL) in 2007 found in an audit of current UK climate and energy policy that current levels of economic growth mean the UK is already highly unlikely to achieve significant emissions reductions by 2020.⁴⁷ UCL's audit suggested that the government is on course to cut emissions

Figure 1: The rise and rise of Light Crude (NYMEX) price between Oct 2004 and Sept 2008 (US\$ per barrel)



Source: Bloomberg

by between 12 and 17 per cent by 2020 – less than half the target it has set itself. However, this does not include emissions from international aviation and shipping. Given this, the UK's achievement is even more pitiable, and unrestrained aviation growth will make targets even more difficult to achieve.

However, these figures are based on production-based emissions monitoring. Under such monitoring, calculations are based only on indigenous emissions and exports, while those associated with imports are excluded from the national accounts. This method fails to allow for the significant 'embodied carbon' related to imports into industrialised countries. As a result, production-based emissions monitoring significantly underestimates the extent to which richer countries need to cut their emissions overall.

Figures for UK emissions provide a powerful example of this. An investigation published in the journal *Ecological Economics* implies that if UK greenhouse gas emissions were monitored using 'consumption-based' methods (including imports), the UK's apparent progress towards its Kyoto emission targets of 12.5 per cent below 1990 levels would disappear. Instead, over the period 1990–2004, the UK's emissions would be seen to have climbed by eight per cent above 1990 levels. A more recent analysis by Dieter Helm (a professor of Energy Policy at the University of Oxford) published towards the end of 2007 supports these findings.⁴⁸

With a global problem as significant as climate change, we believe the UK government needs to align its aviation and emissions policies and to introduce levels of ambition and consistency that measure up to the scale of the challenge. Without much stronger action there is a risk not only of falling well short of the UK's emission reduction targets but also of lacking the credibility that is needed to provide effective international leadership in climate change policy.

Concerted international action and strong leadership are certainly needed on this issue. While the United Nations Framework Convention on Climate Change (UNFCCC) asks reporting countries to provide information on aviation bunker fuels for international aviation, emissions from international air travel are not even covered by the Kyoto Protocol. Furthermore, aviation was not explicitly discussed in the post-Kyoto negotiations in Bali in 2007. This implies that it is unlikely that aviation will be included in the post-Kyoto agreement which will be sought in Copenhagen in 2009 with a view to bringing it into force in 2012.

Article 2 of the Kyoto Protocol states that limiting and reducing greenhouse gas emissions from international aviation in Annex 1 countries is the responsibility of the International Civil Aviation Organisation (ICAO). However this organisation has repeatedly dismissed an international or even regional emissions trading scheme. Instead its climate change plan focuses on improvements to the carbon intensity of the industry – expressed as CO₂ per passenger kilometre.

Aviation and the UK economy – burden or benefit?

‘Not only is aviation a vital industry in its own right – think Rolls Royce, British Aerospace, British Airways, Virgin, BMI, EasyJet and many others – it is a catalyst for a modern open, trading economy. Good aviation links to the rest of the world attract businesses to the UK. Look at our record of inward investment over the years. Without a dynamic aviation industry, this record would not look nearly so good’

Stephen Nelson, Chief Executive, British Airports Authority, November 2006⁴⁹

‘Heathrow supports 170,000 jobs, billions of pounds of British exports and is our main gateway to the global economy. But for too long it has operated at nearly full capacity, with relatively minor problems causing severe delays to passengers. If nothing changes, Heathrow’s status as a world-class airport will be gradually eroded – jobs will be lost and the economy will suffer’

Ruth Kelly, Transport Secretary, November 2007⁵⁰

Advocates of the aviation industry regard it as a mainstay of the UK economy that must be expanded if the country is to maintain economic competitiveness, attract new inward investment and prosper in global markets. According to a report by Oxford Economic Forecasting (OEF), 520,000 UK jobs depend on aviation. The industry directly employs 186,000 people, and the remaining 65 per cent are supported indirectly by it – in the supply chain, for example, or as travel agents.⁵¹

To properly quantify any net economic benefit to the UK, however, we should also consider what the aviation industry costs the public purse. We need to look at both the economic evidence that the government cites in support of aviation growth, and how this compares with the cost of government subsidy.

The government uses a study by OEF, partly funded by the British Airports Authority, to support its economic argument for the planned third runway at Heathrow.⁵² But a review of this study by the environmental consultancy CE Delft⁵³ found that economic benefits were being overestimated or overstated in many cases, from job creation to additional business flights. CE Delft was critical of OEF’s failure to recognise the large indirect subsidy that the industry receives from the Exchequer each year in the form of tax breaks.

In 2007, the World Development Movement (WDM) calculated that because the aviation industry pays no tax on fuel and no VAT, in effect the public purse is subsidising the industry by £10.4 billion per year.⁵⁴ Projections for future aviation growth suggest that the size of this subsidy could rise sharply to around £17.5 billion.

On the plus side of the equation are the jobs created and sustained by aviation in the UK, and additional indirect benefits such as facilitating international trade

and reducing unproductive travelling time for business journeys. Increasingly, however, there are alternatives. Electronic commerce and communications are making it possible to do business without air travel, and enabling executives to work productively during travel time whether by air, land or sea.

While the industry claims its contribution to the economy is approximately 1.1 per cent of GDP (£11.4 billion in 2004), it has been suggested that this is overinflated. Furthermore, the contribution to the economy does not represent the industry importance, but rather the size of the sector.⁵⁵ If there was less aviation, value added would be generated in other sectors of the economy. Given this, once the subsidy of £10.4 billion is taken into account, the contribution is negligible. More analysis would be needed to quantify any indirect economic benefits of aviation that are more difficult to measure, but we believe these figures show there is a strong case for seriously questioning and debating the economic case for aviation growth rather than accepting industry and government claims at face value. Particularly as the environmental and social costs of the impact of aviation operations are not taken into account in their figures.

Government subsidies of £10.4 billion amount to:

- Nearly 850 times the UK's annual spending on flood defences
- More than 120 times what the government spends each year on research and development for renewable energy.

The £10.4 billion subsidy would also be double the funding necessary to ensure the UK's entire housing stock was insulated.⁵⁶ Less than six months of aviation subsidy could fund home insulation and other energy efficiency measures for nine million homes that have unfilled cavity walls and 12 million homes have under-insulated lofts – while reducing the UK's domestic carbon emissions significantly into the bargain.

The growth of budget short-haul flying between European countries is claimed as an economic benefit to the UK economy by some. In 1999 Oxford Economic Forecasting estimated in research for the UK government and the aviation industry that restricting further growth of UK air passenger demand would result in a 2.5 per cent reduction in overall UK GDP by 2015, resulting in accumulated losses of £30 billion at 1998 prices.⁵⁷

While this figure is still cited, OEF's calculation has been widely criticised for assuming a simple causal link between investment in transport infrastructure and economic productivity.⁵⁸ Another analysis found that a straightforward link of this kind could not be substantiated, indeed a conclusion also made by OEF. The analysis pointed out that generalisations about the effects of transport on the economy are subject to specific local circumstances and conditions.⁵⁹

Despite projected losses from curtailing aviation growth, the experience of the Travelodge low-cost hotel chain paints rather a different picture. Giving evidence to a House of Commons Select Committee inquiry on tourism, the company reported that inward tourism spending declined by 16 per cent between 1995 and 2002, while outward spending increased by 48 per cent. One of the main reasons for this, Travelodge said, was that the wider availability of cheap flights meant more people were choosing to fly abroad for short breaks.⁶⁰

Travelodge's figures indicate a tourism balance of trade deficit for the UK of £18 billion over a seven-year period. This includes a **£4.5 billion deficit for the Midlands** region, £2.5 billion each for the North East and North West, and £1.5 billion for the South West. **These are significant sums of money for regional economies to lose**, yet the Regional Development Agencies responsible for economic development in these regions appear determined to pursue further airport expansion and development at all costs.

Travelodge's analysis suggests that a 10 per cent reduction in overseas flights by UK tourists by 2020 could boost tourism revenue within the UK, creating more than 30,000 jobs.

Box 3: Airport expansion and transfer passengers

The government is hotly pursuing the idea of a third runway at Heathrow airport because the two existing runways are operating almost at full capacity. It wants to ensure not only that there is room to expand passenger numbers overall but also that Heathrow becomes one of the leading European hubs for connecting flights.

In the 1990s the French government decided to subsidise Air France and subsequently built a new hub at Charles de Gaulle. This airport now has four full-sized runways, and by 2010 it will have more than 700,000 flights per year. Amsterdam, meanwhile, has expanded its runways to five. Unless Heathrow also expands, it is argued, it will lose out to other leading European 'transfer hubs' such as these. In the words of the Transport Secretary, Ruth Kelly, "Heathrow's status as a world-class airport will be gradually eroded – jobs will be lost and the economy will suffer".⁶¹

Serious questions need to be asked about the economic wisdom of aspiring to be a major hub of this kind. Without having to deal with so many transfer passengers already, Heathrow would not be operating so close to capacity and would be under less pressure to expand. If expansion goes ahead to accommodate the needs of transfer passengers, big infrastructure spending will be needed for what may turn out to be modest financial return. "What Ruth Kelly and the government do not see," says former British Airways Chief Executive Bob Ayling, "is that transfer passengers, for whom such a hub would be built, spend no money in Britain, at least little beyond the value of a cup of tea."⁶²

In 1992 Heathrow's international transfer passengers – those using the airport to connect between flights without leaving the terminal – made up only 9 per cent of total passenger traffic. By 2006 this figure had risen to 26 per cent, and it is expected to reach 31 per cent by 2010.⁶³

Unlike most passengers using Heathrow, those in international transit do not pay the government's APD. This means that they are making no contribution to addressing the infrastructure and environmental costs of the extra flights into and out of Heathrow that are needed to carry them. More flights mean more congestion in the air and on the roads around Heathrow. They also mean more aircraft noise and emissions. The government is considering the incorporation of transfer passengers into its new aviation duty from 2009, but this is by no means certain.

Airlines have long argued that facilitating international passenger transfers is good for their customers and for the economy because it allows hub airports to offer a greater choice of destinations. In the case of Heathrow, however, the number of destinations served has fallen by 21 per cent since 1990 – despite transfer passenger numbers increasing significantly in the same period.⁶⁴

Aviation and the cheap flight boom – democratising air travel or expanding business as usual?

‘The budget airline phenomenon is profoundly democratic for two reasons. Obviously people who could not afford to fly can now do so. More than this, regions and even countries that suffer disadvantages because of their location are now better able to compete with other luckier places’

Hamish McRae, *The Independent on Sunday*⁶⁵

‘The advent of no-frills carriers does not appear to have had a notable impact in terms of the income profile of passengers. In fact, the profile of UK leisure passengers is similar between no-frills carriers and full-service carriers, and has changed little over the last decade, and although numbers of leisure passengers from all income groups has increased, the majority of the absolute increase has come from those in higher and middle income and socio-economic groups’

Civil Aviation Authority, 2006⁶⁶

A decade ago no-frills airlines such as easyJet, Ryanair, Buzz and BMI baby were unheard of. In April 1997, however, deregulation within the European Union introduced ‘cabotage’ rights – freedom for an airline from one member state to operate a route within another. This enabled scheduled airlines to compete against one another without restrictions on fares, capacity and frequency within the European Economic Area. A new era of cheap flights was born.

For its supporters the cheap flight boom has ‘democratised’ air travel, bringing it within reach of more low-income households. Those who oppose the expansion of mass low-cost aviation risk being accused of denying hard-working families the chance to fly abroad on holiday, or even of contempt for the working class. “Dinner-party disdain for cheap flights is nothing more than old-fashioned snobbery swaddled in environmentalist lingo,” wrote one commentator, “a loathing of the apparently fat, fickle working classes for taking the ‘wrong’ kind of holidays in Spain or Eastern Europe.”⁶⁷

This kind of egalitarian rhetoric provides useful ammunition for the aviation industry in pressing the case for expansion, but to what extent does it reflect a true picture? Are cheap flights really democratising travel or is the aviation growth we are seeing an expansion of ‘business as usual’?

A study published by the Civil Aviation Authority in 2006 concludes that the boom in low-cost flying has increased choice and convenience for passengers outside Greater London.⁶⁸ “For the UK regions there has been a marked change in the availability of flights for leisure and business purposes,” it says. Also highlighted are the potential economic benefits associated with how air travel is “playing a

Box 4: Multiple holidays

This table shows the percentage of UK adults taking a holiday (defined as more than one night away) in the UK or abroad in 2000, 2002, 2004 and 2005, further broken down to indicate numbers of holidays taken.

Base: adults aged +15

	2000	2002	2004	2005
One holiday	30.5	31.4	20.7	19.8
Two holidays	19.2	19.3	23.7	23.9
Three or more	11.3	12.9	20.5	20.6
Total proportion taking holiday(s)	61.2	63.7	65.0	64.2

Source: TGI Survey of 25,000 adults

Based on: GB TGI, BMRB (2000,2002 and 2004) and Mintel (2005)

role in facilitating the increased flows of workers coming into the UK from other EU countries in recent years”.

On the democratisation of outward tourism, however, the study is dismissive. “The profile of UK leisure passengers is similar between no-frills carriers and full-service carriers, and has changed little over the last decade,” it says. It adds that “although numbers of leisure passengers from all income groups has increased, the majority of the absolute increase has come from those in higher and middle income and socio-economic groups”.

The growth in low-budget flying has been fuelled by social change as well as by the availability of cheap flights. The proportion of UK adults taking a holiday has not changed much in recent years but there has been significant growth in the short break market as increasing numbers appear to prefer multiple holidays to the more traditional two-week break (see Box 4: Multiple holidays). According to the UN World Tourism Organization (UNWTO), an increasing proportion of the population of the main tourist-generating countries are ‘time poor, money rich’ – meaning that work pressures may be squeezing the time off that it is possible to take for a single holiday but it is affordable to take additional short breaks.⁶⁹ The UNWTO refers to this as “the profound sociological phenomenon tending towards the shortening of long vacations and the multiplication of short stays”.⁷⁰

The aviation industry contends that if flying were made more expensive, this would be unfair to low-income households. But research shows that it is the comparatively wealthy who predominate among those travelling abroad more often since the advent of low-cost carriers. For example, the average household income of UK leisure passengers travelling through Stansted airport was £54,000 in 2006, according to the CAA.⁷¹ This is significantly greater than the average UK household income of £31,000.

Research at a London airport showed that passengers from the socio-economic groups D and E made up only 7.7 per cent of low-cost passengers during 2005 (for domestic and EU-bound flights) representing 32 per cent of the UK population.⁷² However, wealthier A and B customers accounted for 40 per cent of low-cost passengers while only representing 24 per cent of the population.⁷³ Trips by those in the lower-income bands actually fell between 2000 and 2004.⁷⁴

It is notable from market research that as far as alternative modes of transport are concerned, rail does not inspire a great deal of confidence – particularly in the UK. The Market research company, Mintel, suggests that in order to change this attitude, train services need to be improved significantly. It also says that messages of efficiency, comfort, directness and scenery need to be communicated to

Table 3: Proportion of UK population who have flown in the past year⁷⁵

	<i>Proportion who have not flown in past year</i>	<i>Proportion who have taken one return journey</i>	<i>Proportion who have taken more than one return journey</i>
Total UK population	49%	25%	26%
AB (upper middle class/ middle class)	36%	27%	38%
C1 (lower middle class)	42%	26%	32%
C2 (skilled working class)	53%	25%	22%
DE (working class / no earnings)	68%	22%	10%

Source: IPSOS MORI (2007)

overcome an anti-rail mindset in the UK shaped by years of underinvestment and overcrowding.

Evidence suggests that high-speed trains can provide a quality of service better than or equal to the air equivalent for distances greater than 500km.⁷⁶ Yet according to one estimate, 45 per cent of all European flights are over distances of less than 500km.⁷⁷ Many of these journeys have the potential to transfer to high-speed rail – particularly as recent airport security concerns have led to longer and more inconvenient check-in.

Within three years of the introduction of the Paris-Lyon TGV in 1981, a fall of 17 per cent was reported in air traffic between these two cities.⁷⁸ More than 70 per cent of London-Paris and 64 per cent of London-Brussels trips are now made by Eurostar, and in 2007 BMI discontinued its London-Paris flights.⁷⁹ A recent analysis suggests that flights between London and Manchester have fallen as a result of the £7 billion worth of improvements made to the rail link between the two cities.⁸⁰ The Civil Aviation Authority (CAA) reports that BMI suffered a 26 per cent drop in passenger numbers between Heathrow and Manchester between September 2004 and October 2005.

Aviation and fuel-efficient technology – bright hope or distant dream?

‘Over time, we should see developments in the fuel efficiency of engines. But the technologies to create low-carbon fuels and make major reductions in aviation emissions seem a long way off’

David Miliband, then Environment Secretary, March 2007⁸¹

Some are optimistic that technological improvements will allow air travel to continue to grow into the future while keeping emissions under control – and eventually reducing them overall. This kind of optimism was embodied by the strap line that heralded the new Airbus A380 on its maiden flight from Singapore to Sydney in 2007: ‘cleaner, greener, quieter, smarter’.

Overall fuel efficiency gains of 70 per cent between 1960 and 2000 are often cited as evidence for continued improvements in efficiency. For example the Air Transport Action Group has said: “Building on its impressive environmental record, which includes a 70 per cent reduction in... emissions at source during the past 40 years, the aviation industry reaffirmed its commitment to...further develop and use technologies and operational procedures aimed at minimising noise, fuel consumption and emissions.”⁸²

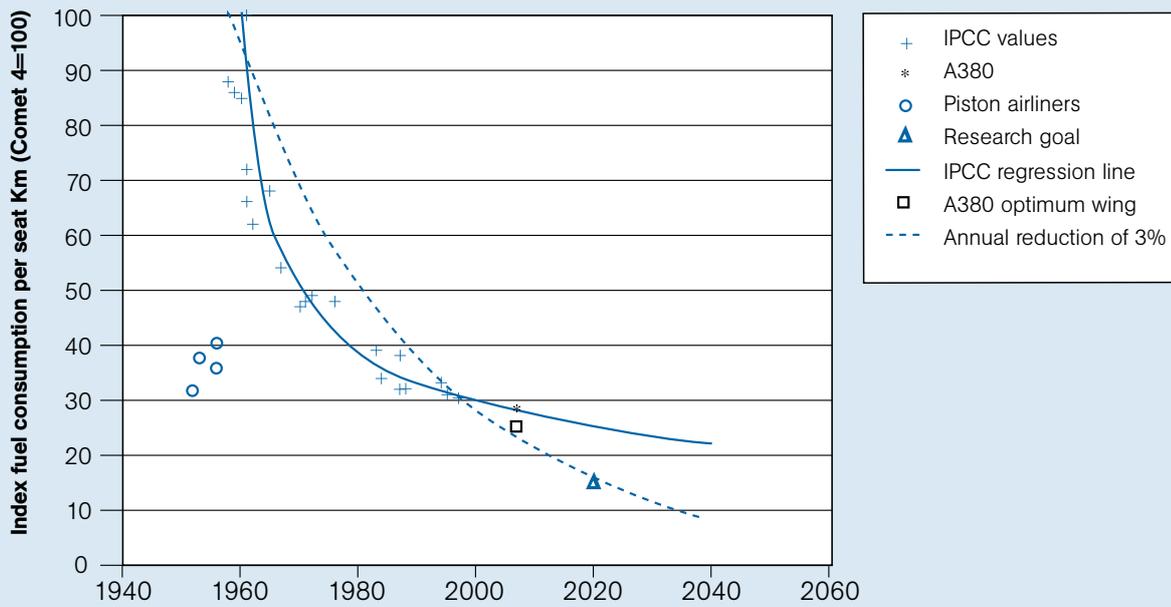
There is little evidence, however, that major improvements will be made in the near future. Despite technological achievements so far, absolute growth in fuel use by aircraft has grown by at least three per cent per year.⁸³ Quite simply, the efficiency improvements of 0.5 to 1.3 per cent a year that have been achieved are being dwarfed by the industry’s annual growth of five to six per cent.⁸⁴ The time it takes to pension off and replace commercial aircraft is long, and any additional efficiency gains anticipated are likely to be wiped out by a continuing increase in flights.⁸⁵

The Advisory Council for Aeronautics Research in Europe (ACARE) has established ambitious goals for improvements to aircraft efficiency. By 2020, it wants the industry to achieve a 50 per cent reduction in CO₂ per passenger kilometre. Of this, 15–20 per cent will be from improvements to engines, 20–25 per cent from airframe improvements and a further 5–10 per cent from air traffic management.⁸⁶ But to achieve these targets, the industry would need to improve its efficiency by over 2.5 per cent per year. In reality efficiency gains of just one per cent have been described as ‘rather optimistic’ given that the jet engine is now regarded as mature technology, and annual efficiency improvements are already falling.⁸⁷

An analysis of projected aviation growth and anticipated improvements in aircraft efficiency suggests that if growth in Europe continues at five per cent, traffic will double by 2020 (relative to 2005). With an ‘ambitious’ one per cent annual improvement in fleet efficiency, CO₂ emissions would rise by 60 per cent by 2020 (and 79 per cent if emission trading did not affect growth). Even if a 10 per cent reduction in CO₂ per passenger kilometre were to be achieved, CO₂ emissions would rise by 45 per cent.⁸⁸

The figure below shows long-haul aircraft efficiency gains since 1950 as an index based on the De Havilland DH106 Comet 4 (the least efficient long-haul jet airliner that ever flew). It shows a sharp improvement in efficiency between 1960 and 1980 but a steady slowing of efficiency gains since then. Further efficiency gains between 2000 and 2040 are likely to be in the order of 20–25 per cent.⁸⁹ Even the performance of the new Airbus A380 fits neatly into the regression, indicating that the 50 per cent more efficient aircraft that some have predicted by 2020 are highly unlikely.

Figure 2: Long-haul aircraft efficiency gains since 1950



Source: based on Peeters et al (2005).⁹⁰

The turnover time for aircraft also counts against a rapid step-change in efficiency. A typical plane may be operated by one of the big commercial airlines in the industrialised world for 25 years, after which its life may be prolonged for a further 25 years through selling it on to other carriers.

A special report on aviation compiled in 1999 for the Intergovernmental Panel on Climate Change asserted that “although improvements in aircraft and engine technology and in the efficiency of the air traffic control system will bring environmental benefits, these will not fully offset the effects of increased emissions from the projected growth in aviation”.⁹¹

It added that “policy options to reduce emissions further include more stringent aircraft emissions regulations, removal of subsidies and incentives that have negative environmental consequences, market-based options such as environmental levies (charges and taxes) and emissions trading, voluntary agreements, research programmes, and substitution of aviation by rail and coach”. It warned that most of these options would lead to increased airline costs and fares, noting that “some of these approaches have not been fully investigated or tested in aviation and their outcomes are uncertain”.

Aviation and tourism in developing countries – pivotal or marginal?

‘If many decide to forgo a long distance trip that would have taken them to Cambodia in order to visit the temples of Angkor, or to Indonesia to visit Borobudur, the guide that would have accompanied them at the site, the driver who was to take them there or the cleaning lady who was to prepare their rooms, will undoubtedly lose their jobs, and it is the economy of a country that is more and more dependent on tourism activity that will be hurt. This guide, this driver, this cleaning lady, each supports a large family. Other jobs throughout the industry would also be threatened – poverty would gain ground’

UN World Tourism Organization, 2007⁹²

‘Tourism is largely an avenue and instrument for the rich and affluent whose wealth has been accumulated in the context of unjust structures and systems of society. Incremental changes in policy with slogans like ‘liberalisation with a human face’ will stop far short of what is needed – an overhauling of tourism practice to guarantee it is just, participatory, and geared to authentic human advancement’

Ranjan Solomon, Executive Director, Ecumenical Coalition on Tourism⁹³

The tourism industry talks up the benefits of tourism to developing nations’ economies – and understandably so. In 2006 international tourism receipts totalled \$733 billion, or \$2 billion a day.⁹⁴ By 2020 the United Nations World Tourism Organization (UNWTO – a UN affiliated research and support group) forecasts that there will be over 1.5 billion tourist visits each year, and that these travellers will spend around \$5 billion a day.⁹⁵

In this section of the report we explore the role of international tourism in the economies of developing countries. We look at the part played by the aviation industry through long-haul tourist flights and the extent to which tourist revenue stays within the economy and supports development. We provide a summary of UK travel to show how tourists from these islands fit into the global picture. Finally, we assess the relationship between UK tourism, aviation and development by examining what the economic impact would be on four popular UK holiday destinations (Kenya, the Maldives, Thailand and the Dominican Republic) if the growth of UK aviation were to be halted. Are tourist flights pivotal for developing countries such as these, or a more marginal contributor to their economies than we are sometimes led to believe?

Tourism for development – for and against

The World Travel and Tourism Council (WTTC), a London-based business consortium, estimates that global employment in the tourism and travel industry will reach 238.3 million in 2008 and that the industry will generate over 9.9 per cent of the world's GDP.⁹⁶ The UNWTO, the WTTC, and non-government organisations such as the Travel Foundation all insist that a business of this scale has much to offer as a way to combat poverty.

The WTCC states that the global travel and tourism industry “can help raise living standards...by stimulating the growth of infrastructure...providing jobs and training for local people and opportunities for entrepreneurs... [and] employing women, youth, the unskilled and people in rural and remote areas, who might otherwise have few opportunities”.⁹⁷

Similarly the secretary-general of the UNWTO, Francesco Frangiali, stated at a UNWTO conference in 2003: “Consider the abject situation of the LDCs [Least Developed Countries], with commodities at rock-bottom levels, agriculture eroded by subsidised competition and services non-existent. Yet they all have tourism. And even more importantly, with attention from the development community, it is an area where they can have genuine comparative advantage and can learn to operate sustainably and profitably.”

Despite the position of these two international organisations, there is a wealth of literature that shows that development through tourism is inefficient, and in some cases has negative economic impacts on the very nations it is supposed to help. The United Nations Environment Programme and the United Nations Conference on Trade and Development have both published reports which question tourism-based development.⁹⁸ Many of the negative economic impacts of tourism are simply manifestations of the current growth and globalisation paradigm, such as leakage of revenues into the coffers of foreign interests and investors and vulnerability to the volatility of a global market.⁹⁹

Some commentators have even compared the financing of tourism infrastructure developments to the ‘structural adjustment’ programmes of the late 20th century because of the negative conditionality imposed on host countries and their people.¹⁰⁰ When capital and support for tourism development are sought from international organisations such as the World Bank, the European Union and the United Nations Development Programme, the recipient government may be required to restructure its economy. One study in the 1990s reported that Commonwealth Caribbean governments had been forced to implement wage cuts, reduce the size of the public workforce, devalue currencies and remove subsidies and import controls.¹⁰¹

Leakage of tourism revenue

The figures for tourist spending in developing countries do not give a true picture of economic worth because so much revenue ‘leaks out’ of the host economy. Leakage rates show the proportion of holiday spending that does not reach or remain in the destination country.¹⁰²

The World Bank has estimated that in the case of developing countries – particularly small island states – up to 55 per cent of international tourism income leaves the region via entities such as foreign-owned airlines, hotels and tour operators, or payments for imported food, drink and supplies.¹⁰³ However, there are a number of analyses that imply that this figure may represent a significant underestimate for some countries.

Research by the UK NGO Tourism Concern and the Leeds Development Education Centre found that for every pound spent by a tourist on a UK tour operator's all-inclusive holiday in Kenya, only 40 pence remained in the country. The analysis also found that only 15 pence was ultimately available to fuel the local economy and serve development.¹⁰⁴

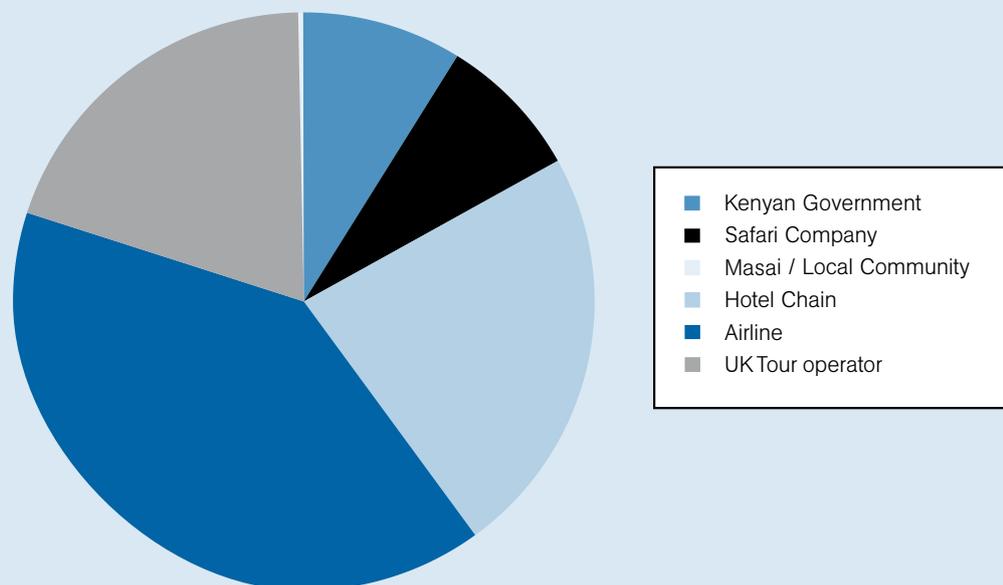
The breakdown of £1 spent by a tourist on such a holiday is illustrated below. It is worth noting that the local community – in this case the Masai – received nothing. All-inclusive holidays often extract a premium from the tourist, but little or no benefit

Table 4: How money leaks away; a Kenyan example

	Sector	Share of £1 tourist expenditure	Initial share	Tourism supporting imports by Kenya	Debt service payments by Kenya to pay for tourism infrastructure	Final share
UK	Tour operator and airline	20p	60p	+10p	+15p	85p
		40p				
Kenya	Hotel chain	23p	40p	-10p	-15p	15p
	Safari company	8p				
	Kenyan government	9p				
	Local Masai	0p				

Source: Tourism Concern, Leeds DEC

Figure 3: How money leaks away (based on Table 4)



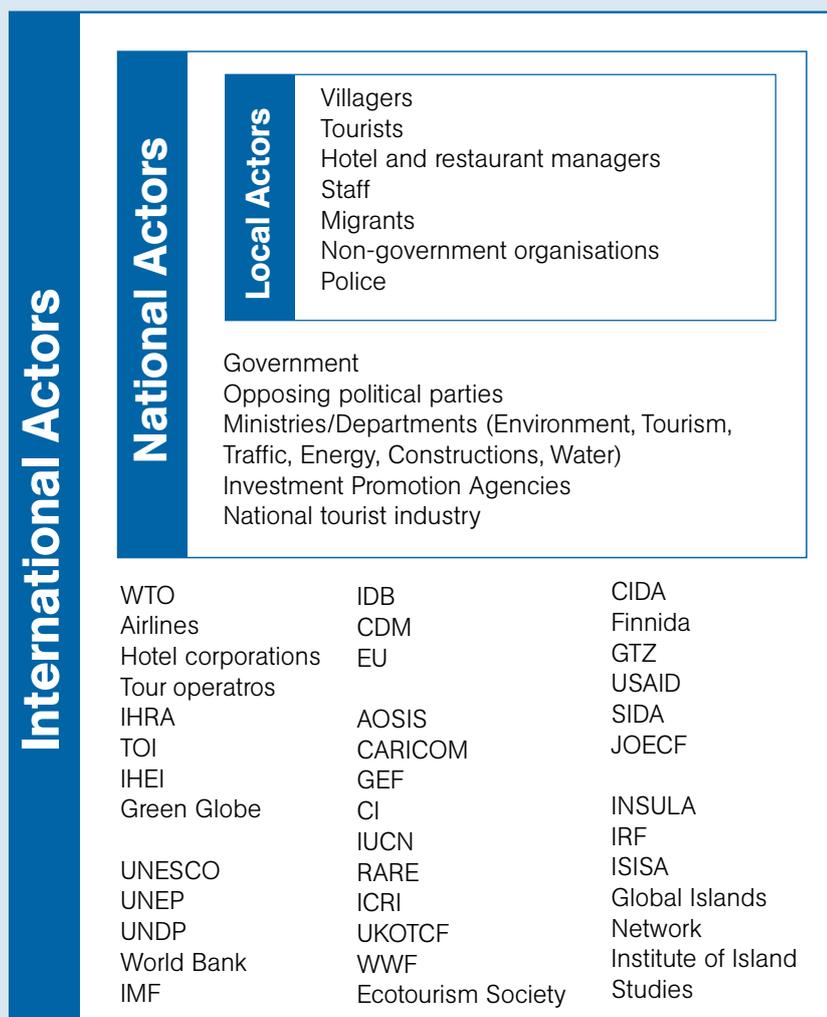
may be passed into the local economy because holidaymakers are encouraged to remain within the cocooned surroundings of the resort.

Another study of tourism 'leakage' in Thailand – frequently cited in the literature – calculated that 70 per cent of all money spent by tourists ended up leaving the country.¹⁰⁵ The Thai study is nearly 20 years old, but a more recent study focusing on Cuba showed that over 75 per cent of tourist revenues were leaking out the Cuban economy.¹⁰⁶ This has also been observed in the Gambia and Commonwealth Caribbean Nations.¹⁰⁷

Significant leakages may be associated with:

- Imports of materials and equipment for construction;
- Imports of consumer goods, particularly food and drink;
- Repatriation of profits earned by foreign investors;
- Overseas promotional expenditure; and
- Amortisation of external debt incurred in the development of hotels and resorts.

Figure 4: A 'non-exhaustive' overview of local, national and international groups involved in tourism planning and decision making



Source: Adapted from Gössling, 2003.

Leakage can occur not only at the point of spending by the tourist but also at the point of subsequent transactions in the local economy. One study that looked at leakage in the Caribbean tourist economies of Antigua, Aruba, St Lucia and the US Virgin Islands identified 'first round' leakages of 30–45 per cent (from the direct spending of tourists) and 'second round' leakages of a further 15–20 per cent.¹⁰⁸ The author suggests this is typical of Caribbean destinations.

Linkages in the tourist economy

If leakages undermine the local economic benefit of tourism, then linkages are their antidote. Linkages are the term used for connections in the local economy between tourist businesses and other enterprises that enable economic benefit to be passed on and multiplied. An ancillary tourism enterprise may benefit from excursions that it is allowed to organise for package tourists, for example. Inter-sectoral linkages are also important – such as when a hotelier buys food from local producers.

We have allowed for the benefit of local linkages and their local economic multiplier effects in calculations of the ultimate benefit of tourist revenue in our four country case studies.

Gross tourism revenue figures do not capture the leakage of tourism-related revenues through, for example, the import of goods and services for tourism-related activities or the repatriation of profits. To assess the tourism industry's contribution to a nation's economy, it is more meaningful and insightful to look at net earnings after deductions have been made for all necessary foreign exchange expenditures. The

Box 5: EU free trade agreements and tourism in Mexico

A report published in 2008 by the World Development Movement¹¹³ shows how the EU has restricted Mexico from intervening in its own tourism industry to prevent leakage.

In 2000 the EU signed a free trade agreement with Mexico. This agreement makes regulations on European companies illegal, such as requirements to work with local companies, employ local people or retain profits within the country.

The Maya Riviera on the Caribbean coast is the main area for tourists coming to Mexico from the EU and US. European multinational companies now operate around 90 per cent of tourism services in the region, stretching from Cancun to Tulum on the Yucatan peninsula. These include the Spanish hotel chains Riu Resorts, IberoStar, Melia, Oasis and Gala and the Italian company Viva.¹¹⁴

Local campaigners complain that the European companies have made local businesses bankrupt through the effective monopolies that they have been able to create. The 'all inclusive' tourism that the European companies sell means that services such as restaurants, bars, shops, car rental and aquatic activities are all provided through European companies.

The influx of foreign companies and tourists has pushed up the cost of living in the area well beyond the scale of local wage rates. Tourism Concern says: "In resorts like Cancun and the Maya Riviera, the cost of living is very high and is not matched by wages. Average salaries are rarely above four dollars a day, while a flat of one or two rooms in Playa can cost 150 dollars a month."¹¹⁵

One estimate is that of the money generated by European tourism companies operating on the Maya Riviera, 92 per cent goes to Europe.¹¹⁶ And because European tourists pay for their Mexican holidays in Europe, to a European company, much of the money never even enters Mexico in the first place.

foreign exchange leakage rate from gross tourism receipts is up to 85 per cent in some African countries.¹⁰⁹

The UNWTO asserted in 2007 that "tourism exchanges benefit primarily the countries of the South". But the experience of many host communities is that it is foreign investors who are often the main beneficiaries. These are usually from countries in transition or industrialised countries. The distribution of benefits tends to favour a few well-established actors at the national or international level, leaving little for the local economy. Cultural exchange, in which leisure tourists experience contact with locals, tends to be superficial in character and to reinforce stereotypes rather than creating insights into other cultures.¹¹⁰

The inefficient 'trickle down' of tourism revenue to local communities has been highlighted in a feature on sustainable tourism in *Developments*, magazine of the Department for International Development.¹¹¹ In it Richard Hammond wrote: "When tourism multi-nationals own every element of the chain – from travel agent to tour operator, airline, hotel, and even local ground transportation companies – local people are deprived of a fair share in profits of tourism; indeed, many earn nothing at all."

However, through the World Trade Organisation¹¹² and bilateral free trade agreements, the EU and the UK government are pushing for developing countries to sign up to rules which would prevent them from intervening in their domestic tourist industries to prevent leakage. The EU wants free access for European companies to developing tourism markets, which would include making it illegal for developing countries to use regulations such as requirements to work with local companies, employ local people or retain profits within the country (see Box 5: EU free trade agreements and tourism in Mexico').

It has been argued by some that tourism may aggravate existing social inequalities. These critics argue that rather than following a neoliberal economic model that assumes growth from which benefits will 'trickle down' (see box 'Growth isn't working'), tourism strategies should focus on equity if the poor are to benefit significantly.¹¹⁷

Table 5: Title

Region	Expressed as percentage of global figures			
	Population	GDP	Market share of tourism arrivals (2005)	Forecast market share of tourism arrivals (2020)
	(2000)		(UNWTO , 2006)	UNWTO
Europe	10.5%	25.2%	53%	45.9%
Americas	13.7%	30.9%	20%	18.1%
...of which North America (USA & Canada)	6.8%	24.9%	15%	12.2%
Asia-Pacific	55.7%	34.1%	18%	25.4%
Africa	13.3%	3.8%	5%	5%
Middle East	6.8%	5.8%	5%	4.4%

The WTO’s own figures (see Table 5) show the extent to which market shares of tourism as a global business are skewed in favour of richer countries. Europe and North America account for barely a sixth of the global population, yet in 2005 they attracted more than two-thirds of international tourist arrivals. **One calculation** from WTO’s own data suggests that in 2005 tourist arrivals to the least developed countries were 6.75 million – corresponding to around 0.9 per cent of all tourist trips made that year.¹¹⁸

Box 6: Growth isn’t working

Recent research by **nef** examined the effectiveness of growth as a means of achieving poverty reduction. This analysis indicated that global economic growth is an extremely inefficient way of achieving poverty reduction, and is becoming even less effective.

Between 1990 and 2001, for every \$100 worth of growth in the world’s income per person, just \$0.60 found its target and contributed to reducing poverty below the \$1-a-day line. To achieve every single \$1 of poverty reduction therefore requires \$166 of additional global production and consumption, with all its associated environmental impacts.¹¹⁹

Given the current, highly unequal distribution of benefits from growth, even to get everyone in the world onto an income of at least \$3–4 per day – the minimum estimate of the level at which low income stops reducing life expectancy substantially¹²⁰ – implies the need for an almost unimaginable 15 planets worth of resources to sustain the requisite growth. Even then, environmental costs would fall disproportionately, and counter-productively, on the poorest – the very people the growth is meant to benefit.¹²¹

There is a danger throughout the global economy, and not least in tourism, of locking in a self-defeating spiral of over-consumption by those who are already wealthy, justified against achieving marginal increases in wealth amongst the poorest members of society.

Box 7: The UNWTO position on climate change

The position on climate change taken by the UN World Tourism Organization, detailed in a UNWTO press release,¹²² contains the kind of contradictions that are also evident between the UK government's aviation and climate change policies. There is acknowledgment of the part played by travel and tourism in causing climate change. But there is also a determination to continue to expand the industry, justified by the need to eradicate poverty.

The UNWTO states that travel to and from the poorest countries that rely heavily on tourism represents only a small proportion of trips, but it acknowledges that these are among the nations most exposed to climate change.

The organisation predicts that tourism will be significantly affected by climate change, and concedes that it is also a contributor. "We are part of the problem, and will be part of the solution," says Francesco Frangiali, the UNWTO's Secretary General.

Tourism is described as a major factor in the war on poverty. For most LDCs and Small Island Developing States, says the UNWTO, tourism is their largest single export and major driver of jobs, investment and economic transformation. Tourism "represents the main economic driving force for several developing states" and must be allowed to grow "responsibly", it asserts.

Our research indicates that these claims significantly overstate the case for tourism's role in poverty alleviation. But to justify its position the UNWTO cites the results of a scientific analysis that it presented at the Bali Climate Change Conference in November 2007 in collaboration with Indonesia's Ministry of Tourism and Culture. This showed that tourism is estimated to contribute some five per cent of global CO₂ emissions, which the UNWTO claims is far below tourism's percentage contribution to the economies of developing nations.

But the picture is far more complex than the UNWTO suggests. While tourism can create large numbers of jobs, for example, this doesn't necessarily mean that it contributes to poverty alleviation – particularly if wages are below \$2 per day.¹²³

Our analysis suggests that halting the growth of aviation in the UK and other developed countries will not cause any significant job losses. It may prevent some jobs from being created but we maintain that this would be better than allowing expansion to continue until large job losses are needed because of increased oil prices or because tackling climate change requires large-scale cuts in aviation emissions.

Table 6: World travel and tourism employment 2001-2006, in thousands of employees

	2001	2002	2003	2004	2005	2006
Direct employment only	72,035	71,761	68,962	71,824	74,183	76,729
% growth		-0.4	-0.33	4.2	3.3	3.4
% total employment	2.9	2.8	2.7	2.7	2.8	
Direct and indirect employment combined	200,553	202,221	201,673	213,156	224,535	234,350
% growth employment	-	0.8	-0.3	5.7	5.3	4.4
% total	8	8	7.8	8.1	8.4	8.7

Source: Euromonitor International

UK tourism and transport trends

How do UK tourism and aviation fit into the bigger picture we have been describing? The charts, graphs and tables on these two pages show the current state of play and help to plot future trends.

As we have seen earlier in this report, the number of journeys from the UK is growing as tourists increasingly favour taking frequent shorter breaks instead of one foreign holiday a year.

More than three-quarters of UK outbound tourism is reliant on flying, using chartered or scheduled flights. According to the Civil Aviation Authority, most of the flights people make from UK airports are within the UK or to other European countries (77 per cent); a similar proportion of foreign travellers to the UK are from European countries. Flights to the United States or Canada account for a further 11 per cent. Countries outside Europe and North America account for only 12 per cent of journeys, and visits to developing countries amount to a small proportion of these.

In 2005, as with previous years, the most significant relationships between individual European countries are Spain/United Kingdom (34.8 million passengers) and Germany/Spain (21.1 million). This reflects the busiest holiday air flows in Europe. These were followed by Ireland/UK (11.8 million), France/UK (11.3 million) and Germany/UK (11.1 million). There are a further eight other country-to-country flows with over five million passengers.¹²⁴

Since the 1960s global air passenger traffic has risen by nearly 9 per cent per year; over twice the growth rate of the global mean Gross Domestic Product.¹²⁵ The cause of this growth is complex because it is the result of a number of interrelated factors. These include:

- Growth of the middle class in Europe and the United States (the CAA estimates that the demand for overseas air travel rises by 1.5 to 1.8 per cent given a one per cent increase in income).
- The falling cost of air travel as a result of engineering improvements, falling fuel prices in real terms and government subsidies. Air fares are around 42 per cent cheaper today than they were ten years ago in real terms.¹²⁶ In 2003 the Department for Transport predicted that the cost of air travel will decline by about one per cent a year until 2020.¹²⁷
- Population growth, which ultimately means more travel. Between 2006 and 2011, the UK population is forecast to grow by 2.2 per cent – an additional 1.36 million people.

There is one overarching reason, however, for the rapid growth in air travel: cheaper and more widely available flights. Over the past decade or so, a particular engine of growth has been the development of scheduled, low-cost 'no frills' airlines.

Table 7: Top 20 tourist destinations – outbound tourism from the UK (2005)

Rank	Country	Visits	% of total trips
1	Spain	16,090,031	27.5%
2	France	5,239,352	9.0%
3	United States	4,344,957	7.4%
4	Ireland	4,210,000	7.2%
5	Italy	3,810,856	6.5%
6	Greece	2,718,721	4.6%
7	Portugal*	1,891,755	3.2%
8	Germany	1,877,949	3.2%
9	Netherlands	1,852,600	3.2%
10	Turkey	1,638,343	2.8%
11	Cyprus	1,391,849	2.4%
12	Belgium	1,078,492	1.8%
13	Canada	906,179	1.5%
14	Egypt	837,950	1.4%
15	Austria	756,971	1.3%
16	Switzerland	709,155	1.2%
17	Australia	707,016	1.2%
18	Thailand	680,978	1.2%
19	Czech Republic	657,110	1.1%
20	India	651,210	1.1%

Source: UNWTO (2007)

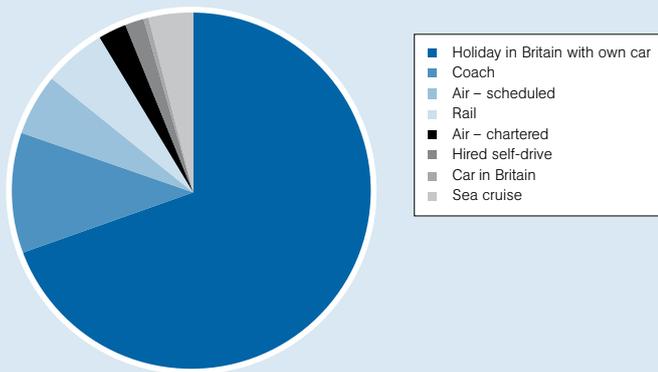
* Missing data – nef estimate based on a four-year average

Since 2000 the volume of flights from the UK has increased by 27 per cent. The largest growth has been seen at those airports that are predominately served by low-cost airlines – which now account for 30 per cent of the seats within the European market.¹²⁸ Some 22 per cent of the UK public now fly more often due to low-cost airlines.¹²⁹ Overall, tourists are now making more trips in total, and substituting air travel for surface travel.¹³⁰

The low-cost airlines are appealing more and more to business travellers too,¹³¹ and low-cost European airlines have stimulated the purchase of holiday homes abroad.¹³²

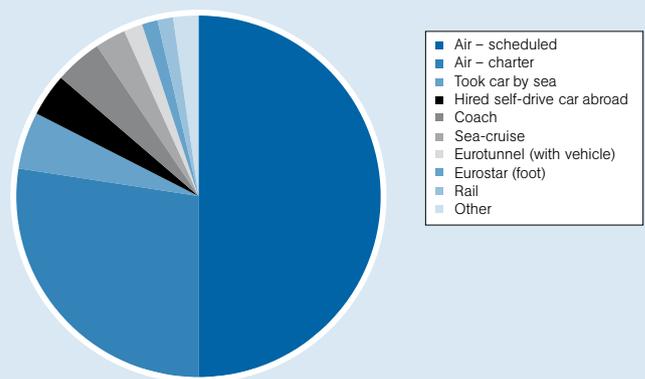
In the light of the booming no-frills market low-cost airlines had anticipated a further increase in demand before the recent rises in the price of oil. EasyJet, for example, expected its current fleet of around 140 aircraft to reach 200 by September 2010.¹³³ Ryanair now has a bigger market share in European aviation than British Airways, and announced 73 new routes in the financial year 2003–04 alone.¹³⁴

Figure 5: Mode of transport for domestic holidays



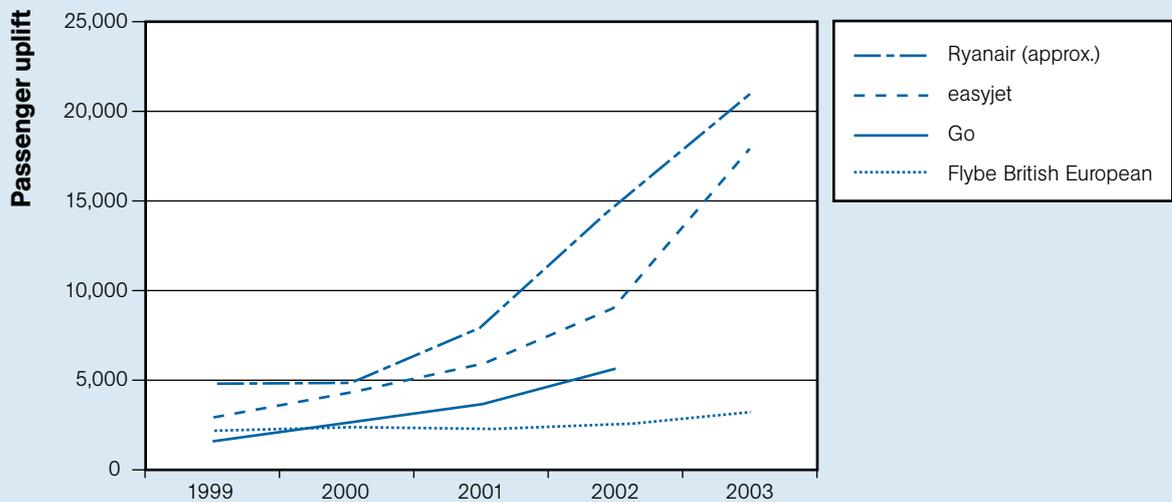
Source: Mintel (2007)

Figure 6: Mode of transport for international holidays



Source: Mintel (2007)

Figure 7: Passenger uplift of main low-cost airlines between 1999-2003, where passenger uplift refers to the number of passenger boarding the aircraft



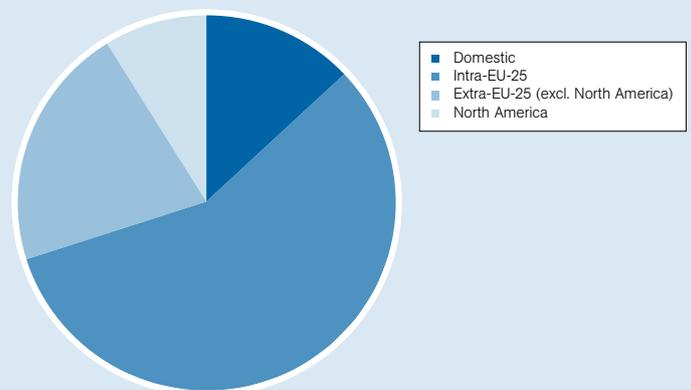
Source: Civil Aviation Authority (2007)

Table 8: Distribution of flights leaving the UK in 2005

EU-25 (including domestic flights)	70%
All European Countries	77%
USA and Canada	11%
Asia and Pacific	4%
Middle East	3%
Africa	3%
Central and South America & Caribbean	2%
New Zealand & Australia	1%

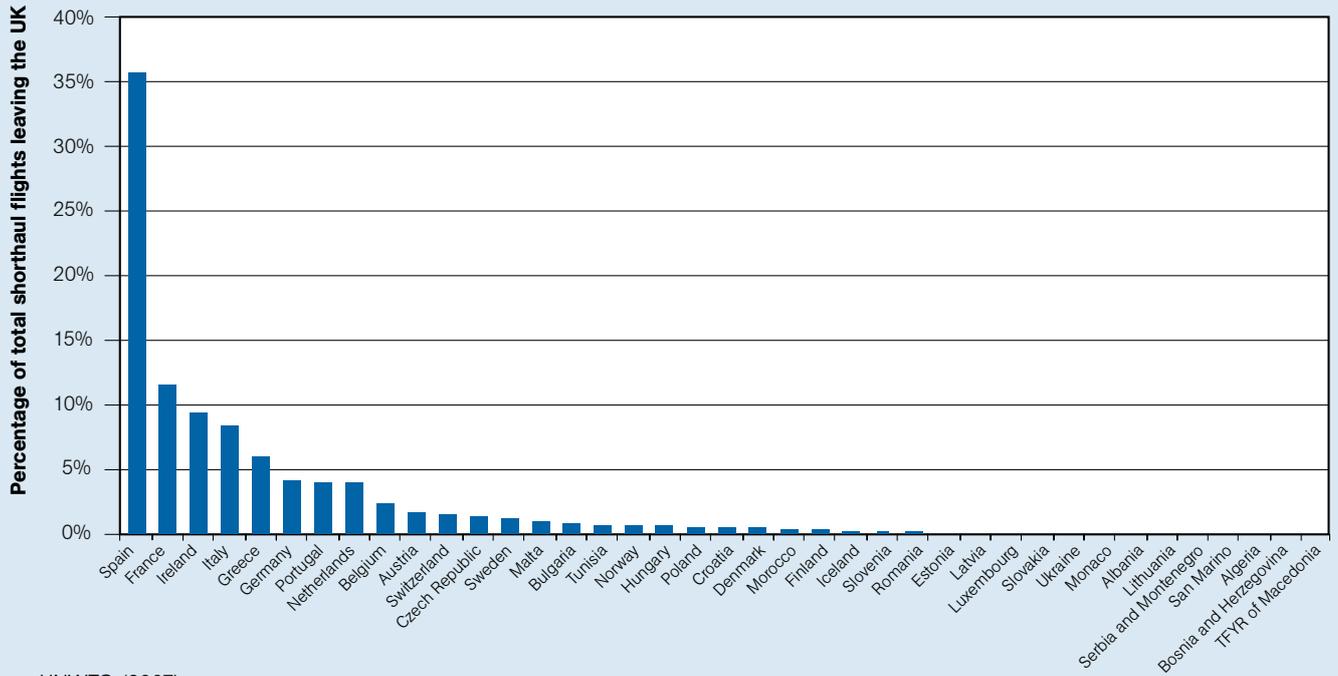
Source: Civil Aviation Authority (2007)

Figure 8: Market share of flights leaving the UK in 2004-05 (based on Table 8)



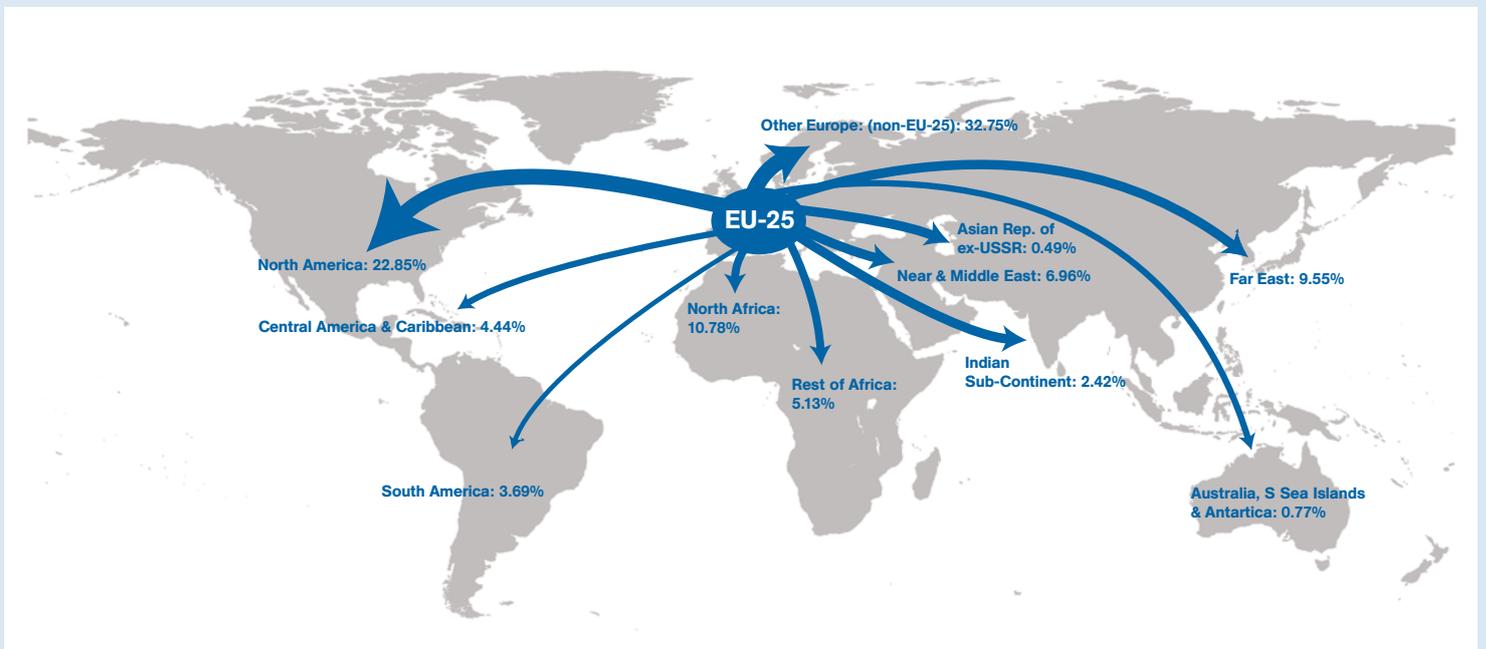
Source: Civil Aviation Authority (2007)

Figure 9: Market share of short-haul flights leaving the UK (2005)



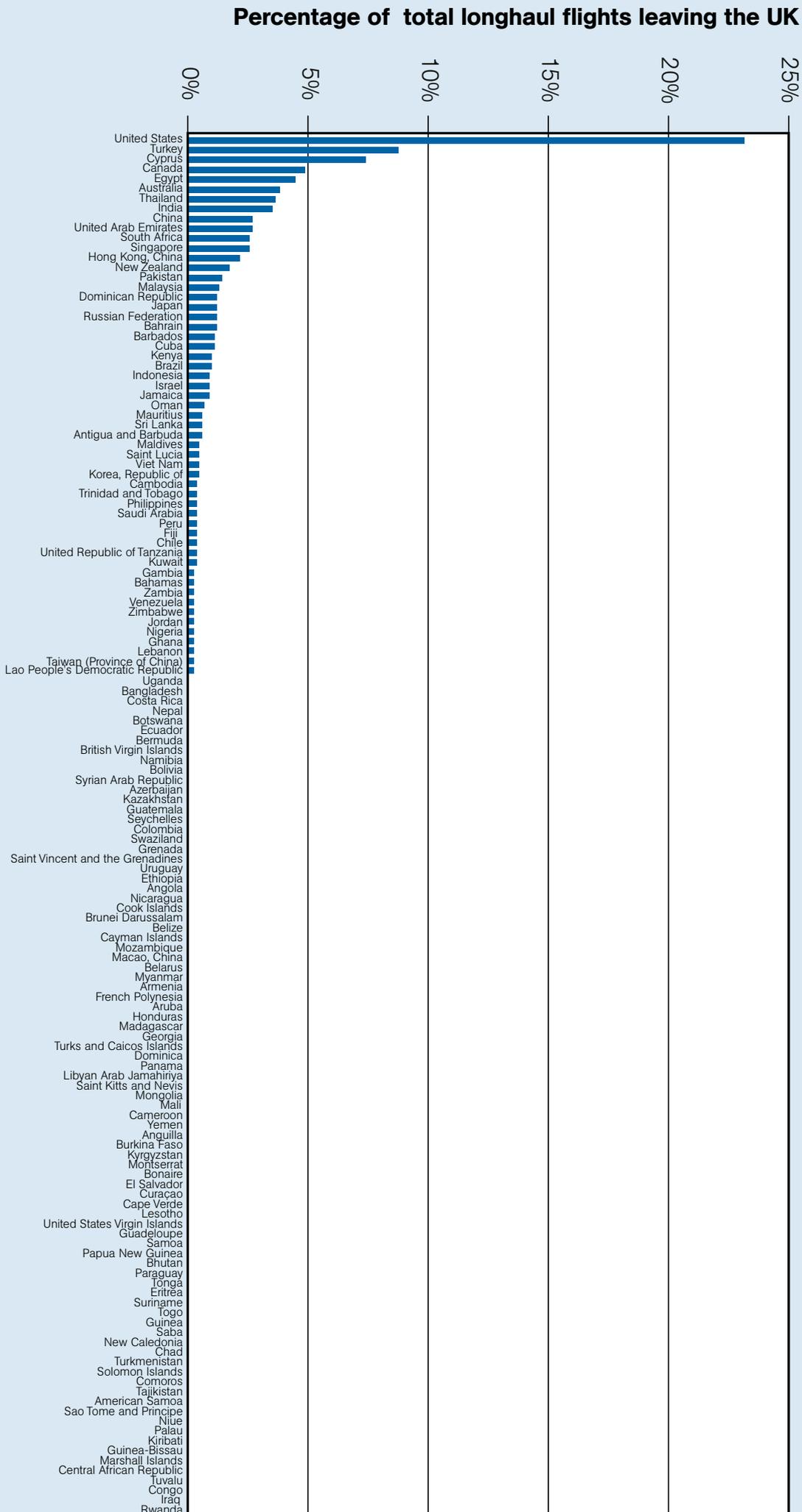
Source: UNWTO (2007)

Map 1: Extra EU-25 transport of passengers:share in world regions – in % of total extra-EU-25 transport in 2005



Source: Reproduced from De La Fuente Layos (2007)

Figure 10: Market share of long-haul flights leaving the UK (2005)



Source: UNWTO (2007)

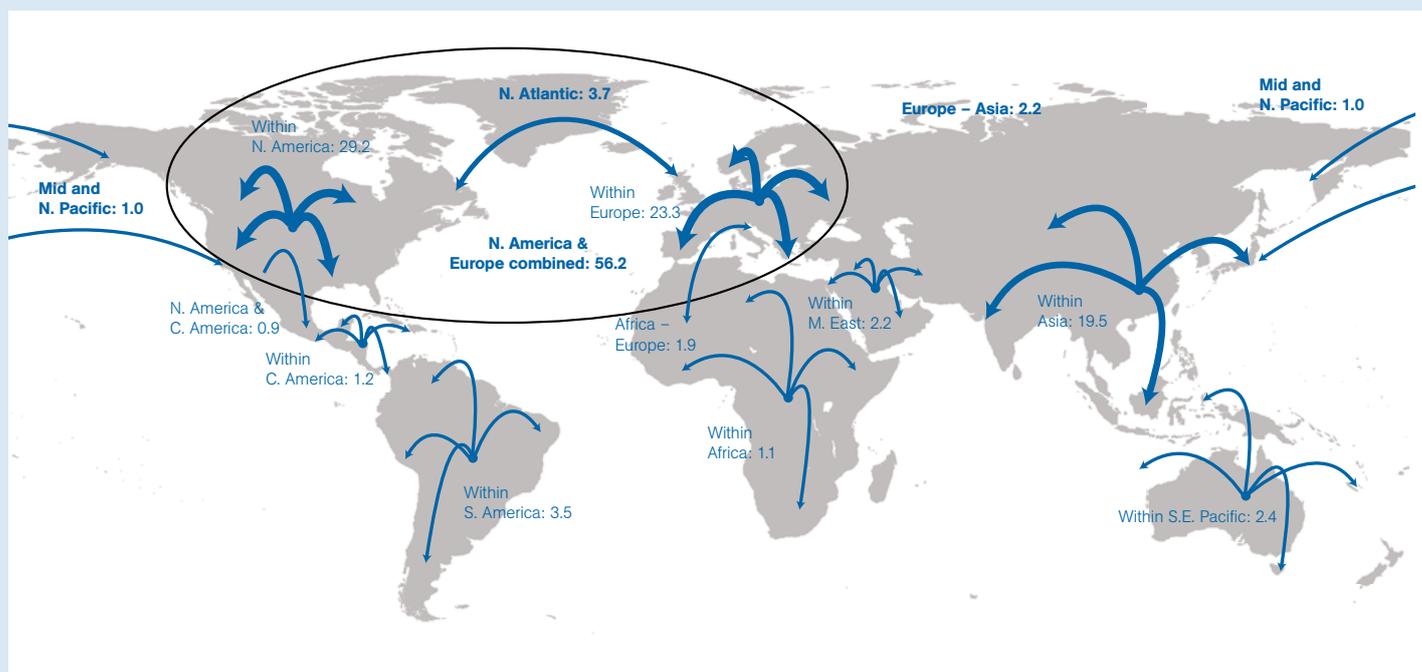
International passenger movements – excluding Europe and North America

Table 9: Percentage of international passenger movements from airports outside the European Union and North America, 2005

Country/ Region	International passenger movements by air (2005, in thousands)	Percentage of total global passenger movements
Southern Africa	1,733	1%
Rest of Africa	1,714	1%
Israel	668	0.4%
Persian Gulf States	568	0.3%
Saudi Arabia	205	0.1%
UAE	2,881	1.6%
Rest of Near and Middle East	1,372	0.8%
South America	379	0.2%
Central America	1,270	0.7%
Caribbean	1,828	1%
Australia	1,211	0.7%
New Zealand	189	0.1%
India	1,579	0.9%
Pakistan	654	0.4%
Rest of Indian sub-continent	827	0.5%
Japan	1,184	0.7%
Hong Kong	1,259	0.7%
Singapore	1,158	0.7%
Thailand	696	0.4%
Rest of Asia	1,612	0.9%

Source: Civil Aviation Authority (2007)

Map 2: Extra EU-25 transport of passengers: share in world regions – in % of total extra-EU-25 transport in 2004



Source: Booz Allen Hamilton (2007) – data from IATA¹³⁵

The impact on developing countries of curbing UK aviation growth

In order to more closely examine the assertions of the tourist industry, we have conducted a simple economic analysis of tourism revenues in a number of developing nations. Claims made about the pivotal role of tourism in economies such as these, by the UNWTO and other tourism organisations, are seriously undermined by our findings. Our analysis is not exhaustive but is a means of illustrating the poor assumptions made by some in the industry.

What we also show is that curbing aviation emissions growth from the UK will have very little impact on the economic development of developing nations that derive a large proportion of their GDP from tourism. We will argue that driving towards a tourism industry that benefits the local economy and local communities would reduce leakage, while offsetting any financial loss from curbing emissions growth from the UK.

In order to assess how curbing growth in UK aviation would affect developing nations, we have estimated what the loss would be of future revenue from tourism if aviation growth were to be halted. Our analysis covers Kenya, the Maldives, Thailand and the Dominican Republic. These four countries have been selected because they represent a good variety (geographically and economically), they receive a high number of British tourists and the proportion of GDP yielded from tourism suggests a considerable dependence on the tourism market. While our figures do not show the total impact of halting growth in aviation globally, they provide a good indication of the scale of impact that might be expected from curbing growth in aviation in developed countries.

For each country we estimate the expected revenue from UK tourist arrivals under a business as usual scenario and compare this with what would happen if UK aviation growth were to be halted. Our projections are based on an assumption that revenues will stay at the same level from 2009 to 2025.

Projections for the 'business as usual' scenario have been made taking UNWTO 2020 Vision forecast data as a reference and extending the forecast to 2025. Growth in travel and tourism is projected using country specific data. Our results are presented in terms of net present value of annual tourism revenue loss. That is, today's value of income not entering the country each year up to 2025.

The scope of the analysis does not allow us to assess the impact that this loss of revenue might have in terms of GDP and employment. Instead, we describe the scale of this impact in terms of the fraction of GDP involved and additional descriptive evidence.

Our analysis takes curbing growth in the number of tourist flights as a proxy for curbing the growth in emissions. While fuel-efficiency gains may take place in the future, the tail-off in fuel efficiency gains over recent years suggests that for the time being this is a reasonable assumption.

The table below illustrates the expected loss of revenue for each country and what it represents in terms of total revenue expected and percentage of GDP.

Country	Annual revenue loss if halting UK aviation growth from 2009 (millions of US\$)	As % of expected revenue if UK aviation growth not halted	As % of GDP
Kenya	570	5.33%	0.09%
Maldives	989	6.78%	4.10%
Thailand	11,179	2.90%	0.22%
Dominican Republic	3,269	4.05%	0.48%

These results indicate that the impact on some heavily tourism-dependent countries such as the Maldives could be significant – but not nearly as significant as the industry might claim. Our figures need to be adjusted to allow for the effects of leakage from the economies concerned, and the effect of this is that the impact of halting aviation growth becomes more marginal.

The results do not show total impact on GDP, which will be higher than the table suggests. If we assume that external revenue will generate growth for twice the value of the income received, then the overall impact of halting UK aviation growth on these national economies would be as follows:

Country	Impact on GDP (% loss)
Kenya	0.18%
Maldives	8.20%
Thailand	0.44%
Dominican Rep.	0.96%

For the three countries in Africa, Asia, Latin America, impact is still below one per cent of GDP. The figure for the Maldives is inevitably higher, as this is the most tourism-dependent of the four economies.

However, as discussed earlier in this report, it is very likely that a significant percentage of tourist revenue will continue to leak from these countries' economies. Taking as a reference average leakage rates for each of the countries featured, the real revenue loss to the country would be:

Country	total revenue loss (millions of US \$) if halting UK aviation growth from 2009	Revenue that leaks out of the country (millions of US\$)			Real revenue loss			
		20%	40%	60%	20% leakage	40% leakage	60% leakage	as a % of GDP
					millions of US\$	millions of US\$	millions of US\$	
Kenya	570	114	228	342	456	342	228	0.07
Maldives	989	198	396	593	791	593	396	3.42
Thailand	11,176	2,235	4,470	6,705	8,941	6,705	4,470	0.17
Dominican Republic	3,269	654	1,308	1,962	2,615	1,962	1,308	0.39

More information on the calculations is provided in Appendix I.

Our findings show that halting growth of the UK aviation industry will impact the economies of developing countries at different levels. As expected the impact will be much higher in those that depend most on tourism. However, all the evidence presented seems to suggest that the overall health of these economies is the main issue of concern. There are many options available to improve the impact of tourism on developing countries which appear to be much more effective than increasing the number of flights and tourists per se.

We believe that tourism strategies for host countries need to focus increasingly on:

- Reducing leakage rates to make every tourist dollar go further;
- Devising ways to increase spending per visitor and the average length of stay;
- Gaining greater control of the supply chain; and
- Diversifying economies so that they are less vulnerable to the fluctuations in visitor numbers and tastes that are prevalent in the tourist industry.

In addition, the EU and UK government must stop pushing developing countries into signing trade agreements that limit the regulations governments can use to gain greater benefit from the tourism industry.

Kenya tourism profile

Key tourism statistics

- In 2007 Kenya's the travel and tourism economy was expected to account for 11.6 per cent of GDP and 509,000 jobs (9.4 per cent of total employment)
- Travel and tourism were expected to grow by 8.6 per cent in 2007 and by four per cent per year in real terms between 2008 and 2017
- Kenya is ranked 88th in the world in terms of the size of its tourist industry and 74th in terms of the relative contribution of travel and tourism to the economy
- Approximately 57 per cent of tourist arrivals to Kenya are from European countries. Twenty-three per cent come from other African nations
- In 2000 the UK market share of arrivals to Kenya was 15.3 per cent.

The basis of the Kenyan economy is agriculture, contributing to over a quarter of GDP and employing over four-fifths of the workforce. Tourism is the dominant industry in Kenya's service sector, accounting for almost 50 per cent of GDP from services. Following a decline in the world prices of tea and coffee, tourism has become the primary gross foreign exchange earner, before 'leakage' out of the economy is taken into account. Although there has been limited exploration of Kenya's oil potential, the country currently has no oil industry of its own. This means it has to import its daily consumption of 50,000 barrels.

Kenya established itself as a mass tourist destination in the 1970s and 1980s when cheap package holidays to coastal regions became popular. Over the past decade the Kenyan Tourism Board has tried to switch its focus away from the cheap package market and to appeal more to the higher-yielding traveller. So far, however, there has been little change in revenue levels or in the number of arrivals. Kenya still receives far fewer tourists than South Africa, its main competitor and infrastructure is still inadequate.

Despite Kenya's wealth of tourism, in terms of natural and cultural attractions, the country has experienced a decade of fluctuating tourist arrivals, with no more than two years of consecutive growth. The tourism industry has been fragile and suffered dips due to political and economic insecurity, under-investment and terrorism. The Likoni clashes in 1997 and the bombing of the US embassy in 1998 had a significant impact, as did the September 11th attacks on the United States in 2001. After the Al Qaeda attacks on Mombassa in 2002 travel advisories issued by the UK, US and Canadian governments against non-essential travel to Kenya which had a dramatic effect on arrivals, tourism receipts and the Kenyan economy. The violence that broke out after the contested Presidential elections of December 2007 has once again highlighted Kenyan tourism's vulnerability to shocks.

Source: Mintel (2004) Travel and Tourism – Kenya, Euromonitor International (2007) Travel and Tourism – Kenya

Analysis

(Figures in US dollars)

Gross GDP 2007–2025	1,082.03 billion
Net present value of GDP 2007-2025	777.21 billion
Gross expected revenue from total tourism 2007-2025 (US\$)	14.5 billion
NPV revenue from all tourism 2007-2025	10.70 billion
Gross revenue loss – total by 2025 from halting UK growth in 2009	0.79 billion
NPV revenue loss – total by 2025 from halting UK growth in 2009	0.57 billion
Percentage of total expected revenue from tourism (NPV), halting UK growth in 2009	5.33%
Percentage of total expected GDP (NPV), halting UK growth in 2009	0.09%

Maldives tourism profile

Key tourism statistics

- Travel and tourism represent the second most important industry to the Maldives after fisheries. In 2005 tourism expenditure was equivalent to 35 per cent of GDP
- In 2007, travel and tourism was expected to sustain 57,000 jobs – 52.9 per cent of total employment
- The industry was expected to grow by 4.7 per cent in 2007 and by 5.6 per cent per year, in real terms, between 2008 and 2017
- The Maldives is ranked 138th in the world in terms of the size of its tourist industry and fifth in terms of the relative contribution of travel and tourism to its economy.

International tourism is the second most important sector of the economy in the Maldives after fisheries. Tourism accounts for more than half of all employment and around two-thirds of export revenue and these figures have been growing.

The industry has previously focused on premium-priced holidays, but since 2005 the government has adjusted its marketing approach. The government is keen to attract more budget travellers as part of a plan to increase visitor numbers more rapidly, and it plans to release 35 new islands for tourist resort development.

Tourism was hit hard by the Asian tsunami of December 2004, which decimated visitor numbers in 2005. International arrivals recovered strongly in 2006, however. There has been strong growth in visitors from Europe, and the islands remain particularly popular with UK holidaymakers.

A significant barrier to tourism growth in the region has been issues of air access, stemming partly from insufficient demand for commercial flights and from limited airport infrastructure. There has been an increase in regional collaboration to address this problem, with a number of new regional initiatives, but according to Euromonitor International, these have not had sufficient political and financial support to date. Long-haul travel to the South Asia region is expected to grow at 6.5 per cent a year between 1995 and 2020, compared to a projected growth rate of four per cent a year for travel within the region. Rates for the Maldives are expected to be in line with this.

Source: Mintel (2004) Travel and Tourism – Thailand, Euromonitor International (2007) Travel and Tourism – Maldives

Analysis

(Figures in US dollars)

Gross GDP 2007-2025	38.93 billion
Net present value of GDP 2007-2025	28.95 billion
Gross expected revenue from total tourism 2007-2025 (US\$)	19.50 billion
NPV revenue from all tourism 2007-2025	14.59 billion
Gross revenue loss – total by 2025 from halting UK growth in 2009	1.40 billion
NPV revenue loss – total by 2025 from halting UK growth in 2009	0.99 billion
Percentage of total expected revenue from tourism (NPV), halting UK growth in 2009	6.78%
Percentage of total expected GDP (NPV), halting UK growth in 2009	4.10%

Thailand tourism profile¹³⁶

Key tourism statistics

- Tourism is an important contributor to the Thai economy, accounting for around 12 per cent of GDP
- Thailand's tourism industry is ranked 33rd in the world in terms of revenue and 73rd in terms of the proportion of GDP it contributes
- The country attracts more than 12 million international tourist visits a year, while Thais travelling abroad make three million tourist trips – a ratio of four arrivals for every departure
- The government announced in 2001 that it wants to make Thailand one of the world's top five tourist destinations by 2020.

After the boom period of the 1980s and early 1990s, the Thai economy suffered the effects of the Asian financial crisis of 1997–8 and unemployment rose steeply. After time Thailand recovered well and was one of the fastest growing economies in East Asia from 2002–4. After the military coup of September 2006, unemployment began to creep up again and 2007 saw growth tail off. The violent clashes in Bangkok and the subsequent state of emergency in September 2008 may spell more instability for the country. Thailand is a very open economy, and as such, its domestic fortunes are strongly linked to external demand conditions, which could also be threatened by a global slowdown.

After Thailand's inbound tourism market exceeded 10 million arrivals for the first time in 2001, the government announced its goal of making the country one of the world's top five tourism destinations by 2020. The Thai tourist industry has had to contend with a number of serious challenges to achieving its aim. Most notable was the Asian tsunami of December 2004 which devastated many of the most popular tourist destinations of the southern peninsula. Additionally, the country has also had to deal with extensive floods, outbreaks of avian flu, political instability and terrorism. Moreover, all this occurred against a background of increasing tourism competition from the likes of China, Cambodia, Laos and Vietnam. However, overall the industry has responded well to these challenges and overall growth has continued.

Recovery from the tsunami was helped by the fact that the Thai government made concerted efforts with government associations and the private sector and the fact that domestic tourism was strong and could shift to unaffected areas of the country. A number of other factors contributed towards growth in the tourism sector such as internet transaction growth, sales promotions and discount packages, new foreign investment in hotel chains and other facilities, the staging of international events in Thailand and the establishment of low-cost airlines in the country from 2004 onwards.

Analysis

(Figures in US dollars)

Gross GDP 2007-2025	9,005.97 billion
Net present value (NPV) of GDP 2007-2025	6,403.21 billion
Gross expected revenue from total tourism 2007-2025	532.88 billion
NPV revenue from all tourism 2007-2025	385.03 billion
Gross revenue loss – total by 2025 from halting UK growth in 2009	15.80 billion
NPV revenue loss – total by 2025 from halting UK growth in 2009	11.18 billion
Percentage of total expected revenue from tourism (NPV), halting UK growth in 2009	2.90%
Percentage of total expected GDP (NPV), halting UK growth in 2009	0.22%

Dominican Republic tourism profile¹³⁷

Key tourism statistics

- The Dominican Republic is the number one tourist destination in the Caribbean, attracting 3.7 million international tourist arrivals in 2005. This represents an increase of 7.2 per cent on 2004
- 37.1 per cent of visitors came from Europe in 2005, and six per cent (221,697) from the UK
- Tourism made up 12.43 per cent of GDP in 2006 – equivalent to around \$2.9 billion
- The country is the 'all-inclusive capital' of Caribbean tourism. Such is the predominance of all-inclusive resorts within its tourism industry that all-inclusive holidays were estimated to account for 72 per cent of accommodation in 2002

The Dominican Republic has close to four million international tourist arrivals each year and is one of the leading tourist destinations in the Caribbean. As with most of the countries in the region tourism is viewed as a key component of economic development policies, yet despite the buoyant tourist industry it remains one of the poorest countries in the Caribbean. The Dominican Republic has entered a free trade accord with the US and Central American nations and the free trade zones have become major employers and sources of revenue for the country. Alongside tourism and free trade zone manufacturing, the other main sector in the economy is telecommunications; agriculture is also significant.

The government has actively encouraged foreign investment. Flexibility and openness has attracted much needed foreign capital, but offering lower taxes and other concessions also means relatively modest public revenue benefits have accrued for the host country.

In recent years tourism has been boosted by a number of factors. Low land and labour costs have helped to further a number of new developments. Tourist arrivals from the United States have increased with the advent of low-cost flights operated by the budget airlines JetBlue Airways and Spirit Airlines in 2004 and 2005 respectively. The government has invested in and modernised certain beach resorts and it levied a \$5 tax increase on tourists to raise key funds. The tourism ministry has orchestrated energetic publicity campaigns across North America and has also looked to new markets further afield, promoting the Dominican Republic as a tourist destination at trade fairs in Russia and Poland.

There are limitations on the benefits of tourism in the Dominican Republic for the local people. The country's tourist capacity is dominated by upmarket, all-inclusive accommodation. While, this ensures higher per capita spending by visitors, it also means high 'leakage' and that little tends to be spent outside the resort. Overall, relatively little of the funds from tourism enter the local economy. Ocean cruises are an area of growth but the average cruise passenger only comes ashore for six hours. Once again the benefit of this to the local economy is limited.

Analysis

(Figures in US dollars)

Gross GDP 2007-2025	1,164.31 billion
Net present value (NPV) of GDP 2007-2025	835.94 billion
Gross expected revenue from total tourism 2007-2025	111.04 billion
NPV revenue from all tourism 2007-2025	80.72 billion
Gross revenue loss – total by 2025 from halting UK growth in 2009	4.61 billion
NPV revenue loss – total by 2025 from halting UK growth in 2009	\$3.27 billion
Percentage of total expected revenue from tourism (NPV), halting UK growth in 2009	4.05%
Percentage of total expected GDP (NPV), halting UK growth in 2009	0.48%

Aviation and emissions-reduction policy – trading or taxation?

'A global carbon market is at the heart of our approach, and that is not the old way of rigid regulation but the modern way harnessing the power of the market to set the global price for carbon, rewarding the most efficient and innovative action to tackle climate change... We have led the debate in Europe to ensure that aviation emissions are included in the EU Emissions Trading Scheme as soon as possible'

Gordon Brown, Prime Minister, November 2007¹³⁸

In 2012, aviation will be included in the European Union Emissions Trading Scheme (EU ETS). The EU, the UK government and some leading airlines favour emissions trading as the primary policy mechanism for getting the aviation industry to address its environmental impact.

The Prime Minister, Gordon Brown, has said that carbon emissions trading is "at the heart of our approach" as his government seeks to tackle climate change.¹³⁹ British Airways has described emissions trading as "the most environmentally effective means of dealing with aviation's climate change impact"¹⁴⁰ and is already participating in the UK government's voluntary emissions scheme.

But while environmental organisations across Europe have welcomed the inclusion of aviation emissions in the EU ETS, it is believed by many to be little more than a political gesture. An impact assessment carried out by the European Commission established that including aviation in the ETS would slow down the rate of emissions growth but would fall well short of stabilising or reducing emissions.¹⁴¹ The Commission found that with the aviation industry covered by the ETS, emissions were still likely to grow by 78 per cent by 2020. This barely softens the projected 83 per cent growth outside the scheme.

Assuming an ETS allowance price of €15 per tonne of CO₂, demand for air travel is projected to increase by 135 per cent over 2005 levels by 2020. This compares with a 142 per cent projected rise in the absence of a trading scheme.¹⁴²

The environmental consultancy CE Delft estimates that an ETS allowance price of €15 per tonne will increase ticket prices by between €1.10 and €3.30 for a short-haul round trip and by €2.10 to €6.40 for a medium-haul trip.¹⁴³ Such modest price increases will clearly only persuade a small minority of people to fly less.

Another reason to challenge the faith being invested in the ETS is the questionable claims of its supporters that emissions can be cut overall through the net effect of more sweeping reductions in other sectors of the economy compensating for growth in aviation. The reasons why such claims are flawed are detailed in Appendix 3.

The effect of other fiscal instruments can be equally weak if they do not significantly dampen demand. An analysis published in 2007 looked at the impact or potential impact of a number of variations on the UK's APD.¹⁴⁴ These included its effect at its 2001 level, the impact of doubling it, and the consequences of implementing a Conservative Party proposal for a Green Miles tax on international tourist flights.¹⁴⁵

Box 8: The elasticity of demand for air travel

To consider the potential impact of fiscal measures on the aviation industry, it is important to get to grips with what consumer behaviour tells us about the elasticity of demand for air travel. The following statistics explore the extent to which higher prices translate into reduced demand (price elasticity) and the extent to which income levels influence buying behaviour as prices fluctuate (income elasticity).

Table: Air travel price elasticities¹⁴⁷

Business (domestic)	Business (international)	Leisure (domestic)	Leisure (international)	Country	Source
-0.2	-0.1	-1	-0.7	Sweden	SIKA (2006)
-1 (average over all sectors – see table below for break down)				UK	Department for Transport (2003)
				Various	Gillen <i>et al</i> (2003)
				UK	Mayor & Tol (2007)

Note: these studies do not differentiate between low-fare scheduled and leisure charter flights, and this distinction may be significant.¹⁴⁸

Elasticity figures are expressed as a positive or negative index. A negative index for price elasticity indicates that a change in price reduces demand. The size of the negative figure shows the extent to which this is the case.

Demand for short-haul flights has a higher negative index than demand for long-haul. In other words, applying an identical percentage increase to short-haul and long-haul tickets will reduce short-haul travel more than it will reduce long-haul trips.

One reason for this is that the longer the distance travelled the less viable or desirable it is to substitute other modes of transport for flying.

Price increases will also dampen demand from leisure travellers more than they will affect business trips. Leisure travellers are more likely to postpone trips to specific locations in response to higher fares, or to shop around for alternative locations offering more affordable fares. Business travellers are likely to have less choice about when and where they travel.

The income elasticity for air travel has a positive index that exceeds one. This reflects the fact that as income increases, consumers are likely to spend more of it on flying off on holiday. This is typical of any 'luxury' purchase. During times of economic stress, tourists are likely to cut back on luxuries and so to take cheaper holidays closer to home.

Ticket prices, however, are not the only driver in air travel demand. One analysis identified that cross-elasticities exist between domestic leisure prices and destination cost levels. Furthermore, the type of travel will have an impact on elasticity. For example, tourists purchasing an all-inclusive or package holiday may have different perceptions about the price of travel compared to those purchasing flights and accommodation separately. Tourists who pay for their holiday accommodation and travel in one payment are less likely to be influenced by the price of flights compared to those who purchase them separately – for whom the price perception related to travel costs may be more acute. This impact is likely to be more significant in recent years due to the rise of independent travel, made possible through increasing internet sales.

Because holidays have become an increasingly high priority for UK citizens, the strength of the economy may have little impact on whether they travel or not. But it will influence expenditure. A weak economy can influence choice of destination, as well as the number of holidays taken throughout the year. According to Mintel, a slowing economy may lead to greater demand for domestic and short-haul holidays, while a strong economy may boost the long-haul market.¹⁴⁹

The authors found that all proposals were likely to have little or no impact on demand. Overall, at its current and past levels, the APD has had no impact on the demand for travel, and no significant impact on curbing emissions.¹⁴⁶

The APD, the authors conclude, is a “revenue-raising tax reform, under the guise of climate policy”. The Conservative counter-proposal is dismissed as “ill-considered populism”. What would work better, then? “A simple carbon tax, as proposed in any textbook, would be far superior.”

The uncomfortable truth for the aviation industry and for policy makers is that the environmental impact of aviation will continue to grow rapidly for the foreseeable future unless more forceful action is taken than the ETS or the APD allow. The growth of the industry is so rampant that it can only be stopped by taxes set at a high enough level to reduce demand significantly.

Conclusions and Recommendations

If emissions are to be stabilised within the range compatible with preventing catastrophic climate change, the aviation industry must be brought within national and international emission reduction targets.

As a first step, developed countries such as the UK need to halt growth in emissions from aviation if we are to stop catastrophic climate change which will hit the world's poorest people first and worst. This could partly be done through limiting the number of short-haul flights in regions such as the EU, without any impact on developing countries.

Our analysis also shows that halting the growth in UK aviation would have little impact on those developing countries that receive a relatively large number of UK tourists. Instead of expanding aviation to increase the benefits of tourism in developing countries, it would be more beneficial to introduce policies that keep more tourism revenues in developing countries.

In the longer term, if or when emissions and air travel are reduced, the impact of this must be managed in a way that enables a transition towards more sustainable models of development for those nations that have pursued models of development based on international tourism.

In the light of this report, we argue that the UK Government should:

Ensure that the Climate Change Bill, currently passing through parliament is fit for purpose:

- Include all emissions from aircraft and shipping in the Climate Change Bill currently passing through parliament;
- Include mechanisms in the Climate Change Bill to ensure that emissions are cut in the UK, rather than allowing industries such as aviation to carry on with business as usual by buying carbon credits to meet reduction targets;
- Revise emissions reduction targets for the UK set out in the Climate Change Bill to 80–90 per cent below 1990 levels; the targets the most up-to-date scientific research suggests are necessary.

Halt planned airport expansion, and ensure that proposed taxes on flights reduce demand for short-haul flights:

- Halt plans for airport expansion in the UK, such as allowing a third runway to be built at Heathrow airport, and a second runway at Stansted;
- The tax on flights set to replace Airport Passenger Duty in 2009 should be set at a proportionally higher rate for short-haul flights than long haul; be varied according to aeroplane type, and include transfer passengers and freight. The evidence suggests that it must be set at a higher rate than the current level of APD if it is to influence behaviour and reduce demand;
- The proceeds from such a UK tax could be split between contributing towards the investment needed for improvements in the rail network, and providing funds to developing countries to help adaptation to climate change and support low-carbon infrastructure.

Play an effective role in managing curbs in aviation effectively so that it does not impact developing nations:

- Where developing nations are dependent to a degree on international travel, curbing aviation must be managed carefully. We believe it makes sense to weight taxation so that one of the main influences on behavioural change – the cost of travel – is applied more stringently to short-haul flights. A tax structure weighted against short-haul flights could stall the growth of the multiple short-break market without significantly affecting long-haul flights to those developing nations reliant on tourism for development;
- The best way to tackle aviation emissions would be an international tax on aviation fuel, set at a high enough level to prevent catastrophic climate change impacts. Much of the revenue from such a tax could go to developing countries to support climate change adaptation and development of low-carbon infrastructure, as well as to compensate for any loss in revenue from a fall in tourism. Unfortunately there has been no sign yet of this materialising through the UN's International Civil Aviation Organization.

Invest in close analysis of the real impact of aviation, and genuine public debate:

- The economic impact of aviation should be examined more closely and objectively, guarding against taking industry claims at face value;
- This closer scrutiny should include a vigorous public debate about how aviation is taxed and how public money is spent.

This report suggests that the airline industry needs to be wrenched from its fossil-fuelled fantasies if we are to have a chance of reducing emissions by the levels required to avert catastrophic climate change. Far from jeopardising economic development in the world's poorest nations, curbing aviation growth may have a significant part to play in reducing emissions that threaten the very survival of hundreds of millions of people in developing countries.

Appendix I: Technical note

Discount rates

For the purpose of this report we used a discount rate of 3 per cent to estimate net present value (NPV). This rate is lower than average discount rates used in most Western economies. For example, the 2002 European Commission guide to cost-benefit analysis recommended a five per cent rate. In the UK the Treasury applies a discount rate of 3.5 per cent. In general, developing countries such as those analysed in this report tend to apply higher discount rates that are likely to be within the 5–10 per cent range. Using a lower discount rate implies higher net present values. This means that our estimates of expected revenue loss per country should be seen as an upper estimate.

Constant and current prices

For the purpose of this report we used constant prices. Comparing data between different years can give misleading results. The use of constant and current prices helps to avoid confusion. Current prices describe the value in terms of the prices that exist at the time of measurement, whereas constant prices help express the price in terms of those existing at a certain point in time.

Inflation

Forecasts that we used, and projections that we made of future revenue, account for inflation because all the data sources were in, or converted to, constant prices. When data sources were in current prices we converted them to constant prices by applying the appropriate inflator.

Tourism data

The analysis in this report is based on data on tourist arrivals by country of origin. Since the UK is a hub for international flights this could have resulted in an overestimate of the number of UK tourist arrivals in the four countries analysed. While care has been taken to prevent this, there is a possibility that the data includes tourists who started their trip in other countries. This would result in an overestimate of revenue loss. In other words, the expected revenue loss to the four countries analysed in this report will be smaller than the results presented.

Appendix II: Forecasts from the UNWTO's Vision 2020 Programme

The UNWTO aims to assist its members in developing forecasting capabilities to support governments and national tourism administrations (NTAs) in tourism marketing and promotion, development planning and the provision of infrastructure and services. To achieve this the organisation organises technical seminars and produces the regular publication *Tourism Market Trends*.

The UNWTO says the world in 2020 will be characterised by penetration of technology into all aspects of life. It will become possible to live one's life within limited exposure to other people, with automated service the norm, and full access to, and exchange of, information on everything possible from one's own home. As a consequence, it argues, people will crave the human touch, and tourism will be the principal means through which they seek to achieve this.

By 2020 it predicts that tourists will have 'conquered' every part of the globe as well as engaging in low orbit space tours, and maybe moon tours. Its *Tourism 2020 Vision* study forecasts that the number of international arrivals worldwide will increase to almost 1.6 billion in 2020. This is 2.5 times the volume recorded in the late 1990s. Although the pace of growth will slow down to a forecast average four per cent a year, it says there are no signs of an end to the rapid expansion of tourism.

Receipts from international tourism (excluding transport) are projected to reach \$2 trillion in 2020. By the same year more than \$5 billion will be spent each day on foreign tourism, excluding the costs of international transport. The UNWTO notes that the long-term view of institutions such as the World Bank is that annual output growth in the developing world will be a mid-to-high four per cent, with that of industrialised countries around 2.5 per cent or better. As a result, it says, global GDP will practically double in the forecast period. This will mean more income spread over larger and new layers of the population in various parts of the world. And an ever-growing share of this income will be spent on travelling abroad.

Despite the great volume of tourism forecasts for 2020, the UNWTO says it is important to recognise that international tourism still have much unrealised potential to exploit. If the international tourist arrivals figures are adjusted to numbers of active international tourists (through the application of factors to take account of tourists visiting more than one country per trip, and multiple trip taking), the proportion of the world's population engaged in international tourism is calculated at just 3.5 per cent. If a further filter is applied to eliminate those persons who through age, illness/infirmary or financial resources are unable to undertake international travel, this level of penetration of the 'real' potential population in international tourism in 2020 can be seen to be seven per cent – truly an industry still in its infancy, according to the UNWTO.

While the *Tourism 2020 Vision* study focuses exclusively on international tourism, domestic tourism remains much more important overall, both in activity and financial terms. Over the forecast period of 25 years, it is anticipated that most industrialised countries will come close to their ceiling for domestic tourism, both in terms of the proportion of the population participating and the extent of their participation. The main growth in domestic tourism will be in the developing countries of Asia, Latin America, the Middle East and Africa where the proportion of the population actively participating in domestic tourism will increase strongly.

The UNWTO forecasters also talk about the future of aviation. They note that commercial jet aircraft technology has made flying to foreign destinations technically possible and affordable for an increasingly large proportion of the population. They add that more fuel-efficient aircraft have progressively reduced

the real costs of international travel. The future developments they predict include ever larger capacity aircraft. They also forecast better availability of appropriate aircraft, that is seats and other facilities and performance related to a wide variety of route types, which permit better 'matching' of aircraft types according to demand. The implication, they say, is yet cheaper air travel, not at the rate of cost reduction achieved in the 1970s and 1980s but nonetheless some additional savings. On the other hand, the UNWTO acknowledges, it will be a challenge to deal with the shadow sides of the anticipated increased demand. Much will depend on capability to address problems related to congestion, delays, pollution and safety.

Appendix III:

Why including aviation in the EU Emissions Trading Scheme will not reduce emissions in other sectors

The UK government argues that, while including aviation in the EU's Emissions Trading Scheme may not have much effect on aviation emissions, it will mean that aviation will have to pay for other sectors to cut by more than would otherwise happen, balancing out the growth in aviation emissions. The following table sets out theoretically how this could work.

Theoretical effect on UK emissions in 2020 of aviation being included in the EU Emissions Trading Scheme

Year	Non-aviation emissions (CO₂eq)	Aviation emissions (CO₂eq)	Extra reductions aviation needs to buy from other sectors (CO₂eq)	Total emissions (CO₂eq)
1990	776.3	42.3	0	818.6
2004/06	659.1	91.7	0	750.8
2020	465.8 (40% reduction on 1990 levels)	136.5	111.1	492.1

In this example, non-aviation sectors reduce their emissions by 40 per cent on 1990 levels by 2020. Aviation emissions grow in line with UK Department for Transport predictions. For the UK to still reduce total emissions by 40 per cent by 2020, aviation emissions would need to be reduced by 40 per cent on 1990 levels by 2020; taking aviation emissions down to 25.4 million tonnes of CO₂eq. Therefore, aviation needs to pay to reduce emissions by 111.1 million tonnes of CO₂ (136.5 – 25.4 – 111.1). Total UK emissions would be 492.1 million tonnes of CO₂eq in 2020, a 40 per cent reduction on 1990 levels.

However, there are three reasons why the inclusion of aviation in the EU ETS will not lead to this reduction in emissions. We set these out in turn below.

1 Permits allocated based on emissions in 2004/06

The aviation sector will be allocated permits to emit the equivalent of 95 per cent of the sector's average emissions from 2004 to 2006. The growth in aviation emissions from 1990 to 2004/06 is not accounted for. While aviation will have to get permits to emit above 2004/06 levels, it will not have to do so for emissions growth before 2004/06.

Furthermore, aviation will be allocated the same level of permits every year; it will not have to reduce emissions. In contrast, every other sector in the EU ETS has been allocated permits based on emissions in 1990 minus a reduction target, and permits allocated or auctioned will continue to fall every year.

By 2020 aviation will only have to pay to reduce any emissions over 95 per cent of 2004/06 levels; 49.4 million tonnes of emission reductions from other sectors, rather than 111.1 million tonnes (see table below). Aviation will not have to pay for the growth in aviation emissions between 1990 and 2004/06 to be reduced elsewhere. Neither will aviation have to contribute to emission cuts below 1990 levels, unlike every other sector.

Effect on UK emissions in 2020 of permits being allocated for aviation on 2004/06 emissions

Year	Non-aviation emissions (CO ₂ eq)	Aviation emissions (CO ₂ eq)	Extra reductions aviation needs to buy from other sectors (CO ₂ eq)	Total emissions (CO ₂ eq)
1990	776.3	42.3	0	818.6
2004/06	659.1	91.7	0	750.8
2020	465.8 (40% reduction on 1990 levels)	136.5	49.4	557.5

2. Only CO₂ emissions from aviation will be included in the EU ETS

Only CO₂ from aviation will be included in the emissions trading scheme; non-CO₂ impacts will not. This means that rather than having to buy permits to cover the growth in all its emissions, the aviation sector will only need to buy permits to cover the growth in CO₂ emissions. This is 19.8 million tonnes of CO₂ between 2004/06 and 2020 rather than 49.4 million tonnes of CO₂eq (see table below). The increase in non-CO₂ impacts of aviation will not be reduced elsewhere.

Effect on UK emissions in 2020 of permits being allocated for aviation on 2004/06 emissions, and only addressing CO₂ emissions

Year	Non-aviation emissions (CO ₂ eq)	Aviation emissions (CO ₂ eq)	Extra reductions aviation needs to buy from other sectors (CO ₂ eq)	Total emissions (CO ₂ eq)
1990	776.3	42.3	0	818.6
2004/06	659.1	91.7	0	750.8
2020	465.8 (40% reduction on 1990 levels)	136.5	19.8	584.4

3. Use of credits from outside the EU

Airlines do not have to pay for equivalent emissions reductions in 'other sectors' in Europe. Aviation will be free to trade within the main EU ETS, which means aviation can meet its emissions through buying permits from outside the EU generated by Joint Implementation and Clean Development Mechanism projects.

Under the proposed continuation of the main ETS scheme, if no global agreement on tackling climate change post-2012 is reached, then a third of required emissions reductions from 2013 to 2020 can be met through purchasing Joint Implementation and Clean Development Credits from overseas. If a global agreement is reached, then half of the additional emissions reductions required under the ETS can be bought from outside Europe. As outlined above, aviation does not have to make any emission reductions, so it is unclear what this means for aviation. However, it is clear that the aviation sector will be able to cover some of its emissions, if not all those above its permit allocation, by buying permits from outside Europe.

Buying credits from outside Europe assumes that climate change can be tackled by reducing emissions in developing countries instead of reducing emissions in the UK and Europe. In reality, cuts in developing countries have to be in addition to the cuts required of industrialised countries. Industrialised countries currently account for 54 per cent of global CO₂ emissions, whilst containing 20 per cent of the world's population. Developing countries account for 46 per cent of CO₂ emissions, and have 80 per cent of the world's population.

To meet global emission reduction targets to prevent dangerous climate change industrialised countries like the UK have to reduce emissions by 40 per cent by 2020 and more than 80 per cent by 2050. And some developing countries have to be assisted in halting the growth in emissions, and in the future reducing them. Such help has to be in addition to large cuts in emissions in rich countries, not instead of cuts in rich countries.

Assuming that the aviation sector buys a third of its emission permits from outside Europe, this means that rather than needing to buy permits to emit 19.8 million tonnes of CO₂ from other sectors in the UK, aviation will only have to buy 13.1 million tonnes (see table below).

The actual effect of including aviation in the Emissions Trading Scheme

Year	Non-aviation emissions (CO₂eq)	Aviation emissions (CO₂eq)	Extra reductions aviation needs to buy from other sectors (CO₂eq)	Total emissions (CO₂eq)
1990	776.3	42.3	0	818.6
2004/06	659.1	91.7	0	750.8
2020	465.8 (40% reduction on 1990 levels)	136.5	13.1	589.2

Even if every other sector were to reduce emissions by 40 per cent on 1990 levels by 2020, and if aviation were included in the ETS, the UK's contribution to climate change will only fall by 28 per cent by 2020.

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Thanks to: David Woodward and Stephen Spratt.

Edited by: Mary Murphy

Design by: the Argument by Design – www.tabd.co.uk

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Registered charity number 1055254

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ISBN 978 1 904882 38 1