DfT Heathrow Consultation – Our Response

Friends of the Earth’s Response to DfT “Adding Capacity at Heathrow Airport” Consultation
Executive Summary

Introduction & Our Approach
Friends of the Earth believes that the Government’s Heathrow consultation is narrowly framed, presents a flawed case for expansion, virtually ignores critical issues like climate change, and fails to address the fundamental question—should we expand Heathrow at all? As a result, rather than answering the questions our response to the consultation focuses on challenging the assumptions on which the Government’s growth forecasts and economic case for expansion are based. It asks why a Strategic Environmental Assessment of the proposals hasn’t been made and examines the long term climate change implications of the Government’s assumptions and consequent expansion policy. Each section concludes with our policy recommendations.

We have not addressed the other environmental impacts of expansion in this response. West London Friends of the Earth have made a submitted a separate consultation response which covers these.

Why the Government’s Case for Expansion is Flawed

Growth Predictions
The Government’s growth predictions assume that the cost of flying will continue to fall, based on highly questionable assumptions that:-

1. The price of oil will fall to $53 per barrel (it is already more than $100).
2. The anomaly of aviation’s virtually untaxed status will continue until 2030
3. The carbon ‘surcharge’ on a flight will remain virtually constant

If more realistic assumptions are used the forecast growth and therefore the need for expansion are unlikely to materialise.

The Economic Case for Expansion
We believe there are four main flaws in the Government’s case if these flaws are corrected there would be no net economic benefit from expansion. They are:-

1. It heavily underestimates the cost of climate change; properly valued, the true cost of climate change is far higher, and using it, the net economic benefit of the whole expansion turns into a net economic cost. The Government uses a unrealistically low carbon price, on two grounds. First many negative impacts are not monetised, and therefore wrongly valued at zero. Second, the Government assumes the rest of the world will take strong action to cut carbon emissions, resulting in low future climate damages. But using this price to determine policy (as it is doing here) gives a strong bias against strong climate policies. It is a self-defeating prophesy. We believe that it is fundamentally flawed policy making to set policy parameters with the assumption that the policy objective is already achieved. If the figure in the Government’s Stern review is used instead there is no net economic benefit from Heathrow expansion.

2. The unrealistic demand forecasts give heavy overestimates of Generated User, Producer and
Government revenue benefits;

3. Its sensitivity analysis is weak, giving a wildly over-inflated view of the precision of its estimates, and;

4. It claims that there will be a net benefit from expansion to the UK economy from tourism – but it is far more likely that the opposite will be the case.

The Government claims that there are net economic benefits to Heathrow expansion, with environmental and social impacts factored in. But more realistic assumptions and values give a very different picture. Climate change costs should be higher. Demand forecasts should be lower. Negative net impacts on UK tourism should be factored in. With these changes the net economic benefit turns into a large net economic cost. The Government's economic case, the prime justification for expansion, does not stack up.

In addition the single net economic benefit figure the Government uses masks critical ethical considerations around Heathrow expansion. It assumes that all benefits and all costs are of equal merit, irrespective of who gets them, and then obscures what are profoundly important ethical questions by reducing all impacts to a single monetary figure. This single figure masks the fact that Heathrow expansion is deeply regressive – the benefits are mainly from Slightly cheaper flights for (mainly) wealthy UK the costs are mainly in the form of the contribution of increased aviation emissions to climate change that will mainly impact on poorer people in developing countries less able to adapt.

**Competition with other EU Hub Airports**

The consultation document claims that the UK economy would suffer without expansion, as Heathrow would be vulnerable to foreign competition from Amsterdam Schiphol (for example) They present no evidence for this claim. The true comparison should be between all the airports serving competitor cities this shows London far outstrips all its competitors in terms of passengers carried and routes served. This is what matters to the business and tourism interests of London.

**Strategic Environmental Assessment**

It is our view that the Government's proposals in relation to Heathrow expansion cannot be developed without Strategic Environmental Assessment (SEA). Plainly this has not yet carried. We would therefore expect the Department for Transport to consult further in respect of SEA before making any final decision on the proposals set out in this consultation document.

**Climate Change**

**Background**

Climate change is probably the biggest challenge facing humanity, the Government's Stern report and the IPCC’s 4th assessment report have highlighted the catastrophic environmental, social and economic consequences if urgent action isn't taken to cut global carbon emissions.

**Aviation Emissions and the Consultation**

Whilst aviation is currently a relatively small source of emissions globally, it is significant UK source and growing rapidly, including the UK's share of international aviation and shipping emissions UK emissions are higher than they were in 1997 and have increased year on year since 2002. Aviation has limited technical abatement options and cannot be ignored. Unfortunately the Government's consultation does virtually that. Under the Government’s assumptions expansion of Heathrow will allow a huge increase in flights and associated emissions (180 million tonnes CO₂ 2020-2080) yet
there is barely acknowledgement of this in the consultation document, no questions are asked and there is no mention of it in the main text.

**Heathrow Emissions and Government Policy**

Whilst Heathrow is a special case in some respects it cannot be considered separately from UK airports as a whole. It is responsible for about 50% of UK aviation emissions. The Government’s forecasts predict a steady increase in emissions from an expanded Heathrow up to 2030. Between 2030 and 2050 there is then inexplicably an unqualified assumption that aviation policy will change, no more capacity will be added, growth and emissions will slow as a result of capacity constraints. This would be an unprecedented policy change. A number of past promises by both the airport operator and the Government to halt expansion have never lasted long. The Government has been pursuing a virtual ‘predict and provide’ aviation policy for many years.

**Heathrow Emissions – If Expansion Continues**

If instead it is assumed that predict and provide continues beyond 2030 our analysis shows that Heathrow alone even with a reduced rate of passenger growth could, by 2050 be responsible for 33.6MTCO2 per annum or 48.5% of the entire annual UK allowance if an 80% cut by 2050 target is adopted in line with the latest climate science. Furthermore these figures do not include a multiplier for Non CO2 impacts nor do they apportion emissions to UK citizens who make the majority (77% in 2005) of return flights. It is clear that a continuation of a virtual ‘predict and provide’ policy for Heathrow is totally incompatible with a climate change policy designed to make the UK play its part in preventing dangerous climate change. A change of policy is essential, we believe now is the right time.

**Aviation and the Climate Change Bill**

The Government’s climate change law is progressing through parliament and is likely to become law during 2008 but it currently excludes the UK’s share of international aviation and shipping emissions. Government policy is to allow increases in aviation emissions and allow them to be offset by reductions elsewhere in the economy. In practice this is not happening as noted above and we believe this will be virtually impossible within a constrained UK carbon budget but logically it requires all sources to be included in the UK Climate Change Law from the start. Internationally agreed methods for recording emissions from international aviation and shipping already exist the Government should use these to incorporate these sources in the new law from the start.

**Friends of the Earth's Policy Recommendations**

1. **Abandon Airport Expansion**

   London's business and tourism interests are adequately served by London's airports. We believe now is the right time to abandon the virtual ‘predict and provide’ policy adopted hitherto with regard to the provision of capacity at Heathrow. Continued expansion isn't compatible with meeting climate change targets and does not deliver a net economic benefit. Instead Friends of the Earth recommends that expansion at Heathrow and other UK airports is abandoned and the aviation white paper is revised to reflect this on its periodic progress review in 2009.

2. **Include Aviation Emissions in the Climate Change Law and Control Aviation Emissions with Fiscal Measures**

   We welcome the proposed introduction of the APD replacement ‘Aviation Duty’ from late 2009 this
tax will provide a valuable complementary measure to the incorporation of aviation in the EU ETS. It should be set at such a level so as to at least stop further increases in aviation emissions. It will also provide a policy measure to enable the Government to control the UK share of international aviation emissions when they are included in the climate change bill as we believe they should be from its commencement.

3. **Revise Development Policy Appraisal Assumptions**

Any future policy appraisal of development proposals (whether airports or unrelated) must use far more realistic estimates of benefits and costs. In particular the Government must use the cost of carbon figure from the Treasury’s Stern review which reflects the reality that the world is not on a path to reducing carbon emissions to tackle climate change, and that currently non-monetised impacts have real (and huge) value. The Government has used a policy appraisal method which blindly focuses on a single number stifles and obscures political and public debate around what are critical issues for UK society. Who wins and loses, what they win and lose, how to treat uncertainty, how to count impacts which have no easy monetary value - these are all central issues for good and effective policy making, but all of these issues are inherently and unacceptably degraded and ignored by a focus on a single number. We need a different, more open approach to taking decisions. The flaws in the Heathrow consultation need to spark a far-wider review and change to the Government’s whole approach to policy-making.
Main Response

Why the Government’s Case for Expansion is Flawed

1 The Government’s Case

The Government sets out the following economic benefits and costs for Heathrow expansion:

<table>
<thead>
<tr>
<th>Economic Benefit/Cost</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generated user benefit</td>
<td>+ £9 billion</td>
</tr>
<tr>
<td>Producer benefit</td>
<td>+ £5 billion</td>
</tr>
<tr>
<td>Government revenue</td>
<td>+ £3 billion</td>
</tr>
<tr>
<td>Climate costs</td>
<td>- £4.8 billion</td>
</tr>
<tr>
<td>Building costs</td>
<td>- £6.8 to 7.6 billion</td>
</tr>
<tr>
<td>Tourism</td>
<td>Positive, but not quantified</td>
</tr>
<tr>
<td>Other costs/benefits</td>
<td>- £0.3 billion</td>
</tr>
<tr>
<td>Total net economic benefit</td>
<td>+ £5.1 to 5.9 billion</td>
</tr>
</tbody>
</table>

“Generated user benefits” are the economic benefits to future passengers who will have chosen to take a flight in future because flying is cheaper with extra capacity. Because flying is cheaper for them, they take a flight, which expands their consumer choices, this benefit is apportioned a monetary value using the economic theory Consumer Surplus Theory.

Producer Benefit and Government Revenue are also calculated using this theory. These benefits are due to extra revenue to airport operators and greater tax revenue to Government from greater passenger numbers.

Climate costs are a monetary estimation of the damage caused by the additional emissions of greenhouse gases from aircraft using an expanded Heathrow.

Building costs are simply an estimate of the cost of building the runway and supporting infrastructure.

Other costs/benefits include issues such as monetary valuations of the damage caused by extra noise pollution.

Tourism costs are discussed – there are possible net benefits or costs depending on, for example, whether there will be more additional UK tourists going abroad than there are foreign tourists visiting the UK, and their relative levels of spending. DfT says these figures are uncertain, but says it is likely there will be a net benefit.

All these figures are summed over the period 2006-2076, and expressed in 2006 prices.

Apart from the building costs these benefits and costs are all at least partially derived from
assumptions about future demand for aviation, which are set out in new Air Passenger Demand Forecasts, but also on assumptions such as (for climate change) future plane fuel efficiency, and new guidance from DEFRA on the monetary value to place on a tonne of carbon dioxide emissions.

2 Five Flaws in the Governments’ Case

Here we focus on five main flaws in the Government’s case:

- It assumes that all benefits and all costs are of equal merit, irrespective of who gets them, and then obscures what are profoundly important ethical questions by reducing all impacts to a single monetary figure;
- It heavily underestimates the cost of climate change; properly valued, the true cost of climate change is far higher, and using it, the net economic benefit of the whole expansion turns into a net economic cost.
- Its demand forecasts are unrealistic, which gives heavy overestimates of Generated User, Producer and Government revenue benefits;
- Its sensitivity analysis is weak, giving a wildly over-inflated view of the precision of its estimates; and
- It claims that there will be a net benefit to the UK economy from tourism – but it is far more likely that the opposite will be the case.

We note that this is not an exhaustive list – there are other dubious aspects to the methodology, for example:

- The inclusion of benefits to foreign tourists in the “generated user” section, totalling many billions, when HM Treasury guidance says these should not be included;
- The assumptions for the costs of building the runway – such projects are prone to cost-overruns;
- The very low monetary values assigned to air pollution and noise. Air pollution is valued at zero, noise pollution at a maximum of £330 million summed over 70 years, with only the noise for the worst affected people accounted for. The noise value works out as compensation equivalent to the cost of a mars bar a day for the most affected households. Not that they will be compensated;
- The issue of whether the £3 billion “benefit” to Government revenue is genuinely a benefit – it is in reality a simple transfer from UK consumers to the Treasury. This figure comes from a theoretical model whose relevance to the real world is very questionable;
- The Government generates its benefits by comparing Heathrow expansion with an unrealistic “do-nothing” assumption, which would not hold in the real-world. This inflates the generated user, producer and Government revenue benefits. Expansion should be compared with an alternative strategy, such as restricting flights to say 90% of capacity to deal with delays, and a strong strategy to promote teleconferencing and improve rail links;
The Government estimates delay reduction benefits at Heathrow, and monetises them \(^{11}\), but does no similar exercise for calculating and monetising the extra delays and carbon impacts from extra road congestion \(^{12}\), and

- Part of the climate costs appear to be counted as a benefit as well. The Government says that revenues from Air Passenger Duty should count as “part of the aviation industry’s contribution to meeting its climate change costs” \(^{13}\). But the Government is also counting these same revenues as a benefit in its “economic benefit” section \(^{14}\).

3 Flaws in Detail

3.1 It Matters Who Wins and Loses

A major problem with the net £5 billion pound figure is that it conveniently hides the issue of who wins and loses. The Heathrow expansion, in the Government’s own terms, is deeply regressive. The majority of the benefits are to “generated users” beyond 2030 who take additional flights. In other words, the benefits go to already very wealthy (in world terms) UK tourists getting a slightly cheaper flight. Summed over millions of flights over many decades, such small sums add up to an awful lot. In comparison, the vast majority of the costs will be due to climate change, which will overwhelmingly hit the poorest people and countries, those least able to adapt to or prevent climate change impacts. These costs are not trivial (unlike a slightly cheaper flight) – they involve loss of livelihoods, increased risk of disease and death, loss of drinking water, and greater risk of catastrophic weather events. In other words the benefits are individually small, to already wealthy people, whereas the costs are individually very serious, to already very poor people. This crucial ethical issue should be openly debated, politically, but the use of this methodology effectively hides it behind one number, which the consultation is telling people to accept uncritically.

3.2 Climate Change Impacts are Down-Played

Greenhouse gases like carbon dioxide and methane stay a long time in the atmosphere, ranging from decades to centuries. The damage from a tonne of carbon dioxide emitted now depends on what sort of future there is. If in future we have strong policies to stop climate change, a tonne of carbon dioxide emitted now will cause low damage. If in future we ramp up our use of fossil fuel, the cost of a tonne emitted now will be very large.

The Government’s new guidance assumes that the world’s Governments, including the UK, will put in place strong climate change policies which prevent the worst climate change damage. This leads them to use a figure of £19 for the damage from a tonne of carbon dioxide emitted now \(^{15}\). The figure assuming “business-as-usual” figure used in the Stern Review is £53 per tonne \(^{16}\).

The clear danger with this £19 figure is that the Government guidance says this figure is to be used in all UK policy appraisal. Its use is therefore a driver of UK climate policy and UK climate emissions. Using a low figure means that climate change is given lower weight, and means that it is actively preventing the strong policies on climate change that are necessary to deliver the Government’s assumption that the worst of climate change will be prevented.

This is circular reasoning of the worst kind – for example, if world Governments decided that it was even more important to stop climate change, then they would be assuming even less future damage, and so an even lower damage cost of carbon would be appropriate, making it even less
likely that policies would be delivered to meet the Governments’ intended goal. Using this policy approach of assuming a bright future actively prevents that future from happening. It is rather as if before a war, ministers said, "We’ve looked into the future, and decided we’re going to win. So we’ve factored that result into our plans and decided we don’t need to spend any money on bullets or planes".

It is far more appropriate and reasonable to assume a business-as-usual future, and ratchet down the damage cost as it became apparent that policies were actually delivering the carbon reductions needed to prevent climate change. Doing this means a more appropriate figure to use for Heathrow’s extra climate costs would be £14 billion\textsuperscript{vii}, £9 billion more. As the current estimate of total net benefits of the whole expansion is just under £6 billion, this £14 billion figure has the effect of turning the Heathrow expansion into a net cost of £3 billion.

This is not the only underestimate in the climate change costs. The Stern figure is itself an major underestimate for two reasons. First, it only includes monetary valuations for certain types of climate change impact. For example, damage to ecosystems such as coral reefs and rainforests are not valued, and there is a whole category of impact called “socially contingent effects” which is largely unvalued. “Socially contingent” effects are described by the Stern Review as “large-scale, ‘second-round’ socio economic responses to the impacts of climate change, such as conflict, migration and the flight of capital investment” (p150). The Stern Review is explicit that its values “given what is excluded…should be regarded as rather conservative estimates of costs” (p153). The recent DEFRA guidance also concedes this point, saying “the incorporation of socially contingent impacts of modelling would increase the social cost of carbon” (p9).

Second, the Stern Review figures are based on models based on science which is a number of years old. The model is cited as being from 2003, using science older than that. In recent years the science of climate change has moved forward, and it now accepted that the damage associated with given concentrations of greenhouse gases is likely to be a good deal higher than previously predicted. Given both these underestimates – on coverage of impacts and use of science, it would seem more realistic to use a far higher price than the given £53 figure in Stern, and more prudent, particularly given the Government’s commitment to the precautionary principle. A lower bound would seem to be around £100 at a minimum. This would make the overall climate change costs of Heathrow expansion over £25 billion, rather than the £5 billion given.

3.3 Demand Forecasts are Too High

The Government’s most recent forecasts assume that UK demand for flying (already the highest per capita in the world) will increase from 228 million passengers per annum (mppa) to 480 mppa by 2030.

This result is a factor of many things, such as people’s future income, and the future cost of flying. The future cost of flying assumption in particular seems a huge underestimate – for example Figure B1 of the forecasts shows (see graphs below) that they are assuming that the real cost of both short and long haul flights will decrease by around 20% by 2020. This seems difficult to square with the reality of oil prices and the Government’s commitment to tackle climate change.
The DfT assume that oil price “falls from $64 per barrel in 2006 to $53 per barrel in 2030 with most of the decline occurring by 2012”\(^{xviii}\). However at the time they published this report in 2007 the price was over $90 and has since gone over $100. Their oil price assumptions are not realistic.

Similarly, the carbon surcharge element of the above graph barely changes in 25 years. This is despite overwhelming evidence about the damage from climate change and the increasing political will to tackle it, largely through the price mechanism. It is also despite the signs that aviation will be
included in a European wide emissions trading scheme which will need to be setting increasingly stronger caps delivering a larger and larger price for carbon permits if it is to be effective.

**Aviation and the Emissions Trading Scheme**

The Government asserts that incorporation of aviation into the EU Emissions Trading Scheme will ‘deal’ with aviation’s climate impacts and models the ETS’ impacts into the demand forecasts by assuming a small carbon surcharge in its forecasts of future air fares. This is based on the DEFRA shadow price of carbon of £19/tCO₂ (2000) resulting in an almost constant “carbon surcharge” (Figure B1 of the demand forecasts). However this is an unrealistic assumption.

If the EU ETS is to make an effective contribution to meeting an EU Carbon target necessary to limit temperature rise to 2°C phase 3 onwards of the scheme will have to be a radical improvement over the first two phases. This will mean strict caps that create a shortage of carbon permits therefore driving up the price considerably with a knock on affect on air fares and therefore demand.

Shell recently proposed that a carbon price of close to $100 is necessary in the EU ETS to drive the necessary business investment decisions that will cut emissions.[ii]

The European Commission’s own impact assessment estimates that the current aviation EU ETS proposal will hardly affect air fares or demand but it assumes a low carbon price and substantial access to external CDM/JI credits as is the case in phase 2.[iii] In the scenario with no access to CDM/JI equilibrium carbon prices would be between five and seven times higher with a consequent impact on air fares.

The EU is committed to stabilising temperature increase to 2°C, this will require at least an 80% cut in emissions by 2050 across the economy, in our view it should mean limiting access to external credits to emissions reductions additional to the 80% target. In line with the principle of subsidiarity laid down in the Kyoto Protocol.

The Government should model demand forecasts with carbon prices under this scenario which inevitably will be much higher.

Different assumptions about the price of fares would give lower demand projections – both removing the need for Heathrow expansion and also the economic justification for doing so – lower demand would have the effect of heavy reductions in the “generated user” and other benefits in the Government’s net benefit calculation.

### 3.4 Other Assumptions tell a Different Story

The Government attempts some sensitivity analysis – looking at whether different assumptions change the basic story[iv]. There is an assumption that as people get richer, they will fly more – as has happened in the past. DfT rightly acknowledge that this link will weaken. They call this “market maturity”. They analyse this effect for many different passenger types, and conclude[v] that “the impact…is to reduce the central national forecasts by 18% in 2030”. This is clearly a major impact, equivalent to around 100mppa. However this largest of impacts on the forecasts has had no sensitivity analysis. Different assumptions would change the overall demand figure greatly.

The climate change figure does have a sensitivity analysis – with a higher carbon cost demand falls by 5mppa. However the higher cost they model is only 20% higher (following DEFRA
guidance). This is ridiculously small; there is greater uncertainty in the method DEFRA uses to work out how many dollars there in a pound, before issues such as climate uncertainty, valuation difficulties and omitted impacts are considered. A far more realistic “higher” cost to model would be 400% higher, as outlined above. This too would have a major bearing on the demand forecasts.

Similarly, the GDP figure does have a sensitivity analysis, but at the very low rate of plus or minus 0.25% onto GDP growth projections. Assuming even 0.5% less would change the demand for aviation by 70 mppa, more than the Heathrow expansion.

Finally, the DfT analysis treats all of the possible different values independently – only one variable is ever changed at the same time. This is not a realistic real-world assumption.

The bottom-line is that the sensitivities and uncertainties in the demand forecasts are far greater than the DfT makes out. The 480 ppmv figure could with other equally plausible assumptions be a great deal lower. With lower demand forecasts all the generated user, producer benefit and Government revenue figures in the net economic benefit calculation are all lower.

3.5 The UK Economy will Lose more than Win from Tourism

The Heathrow consultation claims that expansion “may well generate net tourism spending to the UK. This would be between £0.4 billion and £3.2 billion”. The opposite is far more likely.

The UK currently runs a major economic deficit from flying. There are far more UK tourists and business people flying abroad on holiday and working than there are foreigners coming to the UK. Overall, in 2004 foreign visitors arriving by air spent nearly £11 billion in the UK in 2004, but UK residents flying out spent £26 billion abroad – a loss to the UK economy of £15 billion pounds.

Net tourism deficit in future will depend on both net passenger numbers leaving the UK, and growth in spending.

For net passenger numbers, the difference looks set to increase. For example the DfT’s forecasts shows that UK business and leisure passengers at Heathrow would increase from 34m in 2005 to 64m in 2030, and foreign business and leisure passengers would increase from 17 to 35 million. In other words, people going out increases by 30 million, people coming in increases by 18 million.

For growth in spending, the Government’s argument appears to be that it predicts that foreign tourist spending in the UK will increase far faster than UK tourist spending abroad. It bases this on an assumption that world GDP is growing faster (3.8% a year) than UK GDP (2.5%). However, this world figure is skewed by very fast growth in, for example, China and India. But most foreign visitors to the UK do not come from China and India, they come from the USA and Europe, where GDP growth is similar to the UK.

The combination of these factors is that net passenger numbers out looks set to increase and relative spending will be largely constant, and so it is far more likely that overall the UK’s already huge tourism deficit will increase – a further big hole in the “net economic benefit” conclusion.

4. Competition with other EU Hub Airports

The consultation document claims that the number of destinations served by Heathrow has fallen by 20% since 1990, that the airport is vulnerable to foreign competition from Amsterdam Schiphol (for example) and that not expanding will damage UK interests across the whole economy. In our view these claims are inaccurate and do not tell the whole story. The true comparison should be between all the airports serving competitor cities. This is because what matters to the business and
tourism interests of London is that the City is accessible from a wide range of destinations not whether it is a good place for transfer passengers to change planes. Transfer passengers might be good for BAA’s airport retail income but they do not contribute to UK aviation taxes or do any other business in the UK. Taking London’s airports as a whole in 2004 they served 350 destinations and carried 128 million passengers compared to only 73 million (Paris’ airports), 51 million (Frankfurt’s airports) and 42 million (Amsterdam’s airports).

Conclusion & what needs to change
The Government claims that there are net economic benefits to Heathrow expansion, with environmental and social impacts factored in. But more realistic assumptions and values give a very different picture. Climate change costs should be higher. Demand forecasts should be lower. Negative net impacts on UK tourism should be factored in. With these changes the net economic benefit turns into a large net economic cost. The Government’s economic case, the prime justification for expansion, does not stack up.

Just as important though is that a policy appraisal method which blindly focuses on a single number stifles and obscures political and public debate around what are critical issues for UK society. Who wins and loses, what they win and lose, how to treat uncertainty, how to count impacts which have no easy monetary value - these are all central issues for good and effective policy making, but all of these issues are inherently and unacceptably degraded and ignored by a focus on a single number. We need a different, more open approach to taking decisions. The flaws in the Heathrow consultation need to spark a far-wider review and change to the Government’s whole approach to policy-making.

Strategic Environmental Assessment
It is our view that the Government’s proposals in relation to Heathrow expansion cannot be developed without Strategic Environmental Assessment (SEA). Plainly this has not yet carried.

In particular, the specific questions being consulted upon by the Department for Transport at this stage are clearly too narrow to meet the requirements of SEA legislation and the Government has given no indication that the present consultation is intended to do so.

In addition, there is no assessment of the proposal against relevant environmental protection objectives such as climate change; or objectives relating to population and human health.

In contrast, a consultation under the SEA regime would require the Government to identify other relevant plans, programmes and environmental protection objectives relevant to the proposals; consult on the scope of the SEA; develop and refine alternatives and assess effects; and prepare an Environmental Report and consult on it. In short, SEA would require a much more detailed and holistic assessment of the strategic aspects of the proposals than has taken place as of yet. We would therefore expect the Department for Transport to consult further in respect of SEA before making any final decision on the proposals set out in this consultation document. We shall be writing to the Department for Transport separately about this issue.

Further, Heathrow is located adjacent to the Southwest London Waterbodies Special Protection Area (SPA), so designated for its migrating birds. In our view the proposals for Heathrow Expansion should be subjected to appropriate assessment as a result.
Climate Change and the Implications of the Governments’ Growth Assumptions

In the section above we have explained how in our view the Government’s growth assumptions are flawed. But in the next section we illustrate the emissions implications if the Government’s assumptions and current ‘predict and provide’ aviation policy for Heathrow and the UK as a whole were to continue beyond 2030.

1. Introduction

Climate change is – quite simply – the most important issue on earth. Climate change is of great relevance to aviation because aviation already contributes some 10% of the UK’s greenhouse gases (GHG) emissions and it is a rapidly rising source.

Emissions from Heathrow represent nearly half of the UK’s aviation emissions. An increase in capacity and emissions of nearly 50%, as proposed by the government, is thus of great significance in the context of climate change.

It is therefore remarkable, and indeed reprehensible, that the consultation document says virtually nothing about climate change itself. It is not mentioned in the main text, notably ‘Policy context’ and ‘Meeting the environmental tests’. The only appreciable mention is in Appendix B, where emissions are considered just as one cost among many that are taken into account when estimating the economic benefit of Heathrow in terms of NPV (Net Present Value). We contend that there are major flaws in this economic assessment approach - see “Why the Government’s case for Expansion is Flawed” above.

There are no questions asked about climate, despite the fact that a large proportion of the 238-page consultation document is devoted to environmental impacts (largely noise and air pollution). In our view, the absence of climate change from the consultation casts grave doubt on the credibility of the exercise. Nonetheless, we are responding to the consultation and we are, most particularly, responding on the issue of climate change.

2. Scope and Structure of Comments

There is no comment in the consultation document on the climate change implications of expanding Heathrow and no questions are posed. We have therefore structured this response in way that seems most convenient in the context of the issue.

The climate impact of Heathrow cannot be considered in isolation from the impacts of UK aviation generally. This response therefore addresses the issue of UK aviation emissions generally. The key document is ‘UK air passenger demand and CO2 forecasts’ published by the DfT in Nov 2007. There was no consultation on this document, but some of the comments here are directly relevant comment on that document as well as on the Heathrow consultation. We therefore ask that this response on climate change is regarded as formal.

In this response, references to table numbers such as 3.7 and K13 refer to ‘UK air passenger demand and CO2 forecasts’ as do references to “the document”. Other references, especially paragraph references and table numbers of the form FOE/x, refer to this response.
3 Climate Change

Climate change is happening and is recognised by many as being a major threat to human lives and livelihoods and to all the planet’s other life-forms. The debate about whether human activity is causing climate change is, for all practical purposes, over.

Drastic cuts in emissions are necessary to avoid dangerous and irreversible warming. These are the stark conclusions of the IPPC (Intergovernmental Panel on Climate Change).

The UK government accepts this and has stated that taking action on climate is a priority and that the UK is, and intends to remain, a world leader on the issue.

In recognition of this (and in response to public pressure), the government is introducing a Climate Change Bill to Parliament. This bill has all-party support, although there are differences of opinion about some of the provisions of the bill.

The bill proposes a 60 per cent cut in UK CO2 emissions, compared with a 1990 baseline, by 2050. However, the proposed cut of 60% by 2050 cannot be taken in isolation – a rapid downwards trajectory of emissions is needed, starting from now. This is because CO2 builds up in the atmosphere (it has an average lifetime of 100 years or more) and therefore it is cumulative emissions, rather than those in any one year, that determine CO2 concentrations. Unless action starts now, it will be virtually impossible to reduce emissions fast enough in the latter part of the next 43 years (beginning 2008 to end 2050 is 43 years) to reduce annual emissions by 60% (let alone even deeper cuts - see below).

The most up-to-date scientific evidence from IPCC and others indicates that a target to limit CO2 concentrations to 550ppm is unlikely to prevent a temperature increase of 2°C or more. Instead, a 450ppm target is desirable requiring reductions in developed countries of at least 80% from 1990 levels. The Prime Minister has said, for this reason, that the government will consider whether a revised target should be set. Hilary Benn announced on 18/2/08 that a new target will be set by end 2008.

There is no doubt that limiting temperature rise to 2°C will be very challenging; all people, all countries and all sectors of the economy need to play their part.

Emissions from civil aviation make up a significant proportion of the UK emissions already. But most significantly, emissions are rising very rapidly, unlike virtually all other sectors of the economy. It is therefore essential that aviation plays its part in reducing the UK’s total emissions.

4. UK’s Emissions and Targets – Excluding International Aviation

The UK estimated emissions of CO2 in 2006 were 556.5 million tonnes (mt) compared with 589.5 mt at 1990XXIV. This is a reduction of 5.6%.

As noted in section 2 above, reductions of at least 60% and probably 80% are needed. These are reductions at 2050 compared with 1990 levels. An 80% cut from 1990 to 2050 implies a cut is needed of between 2006 and 2050 of 78.8% \[ \{(100 – 5.6) – 20 / (100 – 5.6)\} \]. This corresponds to an average from 2006 to 2050 of 3.5% pa (compound). The reduction from 1990 to 2006 was just 0.4% - so a vastly increased rate is needed from now on.
These figures show clearly that progress since 1990 has been totally inadequate and that far more now needs to be done. These cuts exclude international aviation and also international shipping. However, as argued below, the same depth of cuts need to be made for the total UK emissions including international aviation and shipping.

5. UK Aviation Emissions – DfT Forecasts

CO2 emissions from aviation were forecast in the paper ‘UK air passenger demand and CO2 forecasts’ (pages 50-71). The method used is described in Appendix 1, where a summary table of result is given (Table FOE/1). In summary, CO2 emissions are forecast by the DfT to rise from 37.5mt in 2005 to 58.0mt in 2030 but then suddenly level off to reach only 60.3mt in 2050.

There is much debate about whether the passenger forecasts which underpin the CO2 forecasts are valid. The section above “Why the government’s case for expansion is flawed” of this response argues that the forecasts are too high because a number of optimistic or unrealistic assumptions have been made. However, for the purpose of these calculations of emissions, the government’s figures (up to 2030) are taken. The reason being that they demonstrate the implications of current Government policy and the need to change it.

6. Friends of the Earth’s Re-Forecasting of Emissions using Government Assumptions

We accept the forecasts for 2030 as being consistent with the Government’s assumptions and current policies but we do not accept that those assumptions are realistic (as explained above). Beyond 2030 the consultation document assumes a dramatic policy shift from ‘predict and provide’, and that as a result passenger growth at Heathrow will be severely constrained by lack of capacity. Below we have assumed this unexplained policy reversal does not occur, that the Government continues with a policy of virtual predict and provide such that slight capacity constraints mean demand continues to be only slightly less than unconstrained.

The revised figures are shown in Table FOE/2 in Appendix 2.

7. Aviation’s Share of Total UK Emissions – DfT Estimates

Table K1 of ‘UK passenger demand and CO2 forecasts’ calculates aviation’s share of UK emissions. It is assumed that the UK emissions, excluding international aviation, are cut by 60% from 1990 levels at 2050. The results are 6.4% at 2005 and 20.6% at 2050. There are also calculations for 2020, where two alternative levels of cut (on the way to 60%) are postulated. The use of two figures seems to complicate matters unnecessarily, but, far more importantly, there is no calculation for 2030. 2030 is a key date, being the timescale for the government’s aviation policy and it thus of great importance that the public should be able to see what implications the policy has for CO2 emissions.

The second part of Table K1 repeats the calculations for GHGs as whole, using an RFI of 1.9 for aviation. RFIs for other sources are allowed for in the calculations, but are not shown explicitly. Aviation’s share of emissions is then 9.9% at 2005 and 29.0% at 2050.
The results are:

<table>
<thead>
<tr>
<th>Year</th>
<th>Aviation % of UK CO2 emissions</th>
<th>Aviation % of UK GHG emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>6.4</td>
<td>9.9</td>
</tr>
<tr>
<td>2020</td>
<td>10.3 to 11.1</td>
<td>15.0 to 15.9</td>
</tr>
<tr>
<td>2030</td>
<td>20.6</td>
<td>29.0</td>
</tr>
</tbody>
</table>

Table FOE/8. Aviation as % of UK emissions according to DfT

8. Aviation’s Share of Total UK Emissions - Shortcomings

There are some very important shortcomings in the DfT estimates:

a) The 2050 aviation emissions are unjustifiably low.

b) The target 60% cut is only applied to emissions excluding international aviation.

c) There are no calculations on the basis of 80% cuts.

These points are addressed in turn.

a) The reasons why the 2050 aviation emissions are unjustifiably low (using the Government’s assumptions) are described in 6 above, where the Friends of the Earth correction is described. The effect is to increase emissions in 2050 by 14.8%.

b) The government has already accepted that a 60% cut in UK’s emissions by 2050 is necessary in order for it to play its part in avoiding the worst consequences of climate change. This is based on the advice of its own scientists including the Royal Commission for Environmental Pollution and those around the world, reporting through and mediated by the IPCC. There is no suggestion from these scientists or IPCC that the 60% cut does not need to include the UK’s share of international aviation. It is therefore unhelpful and misleading to publish figures that purport to show aviation’s share of emissions when the denominator of the equation allows for massive increases in aviation emissions outside target for overall cuts.

c) As noted in section 3, there is a developing consensus among scientists that 80% cuts are needed rather than 60%. This has been acknowledged by government and the Prime Minister.

9. Aviation’s Share of Total UK Emissions – Friends of the Earth’s Calculations

Friends of the Earth has re-worked the DfT’s figure for CO2 emissions to take account of the above shortcomings. The calculations are shown in detail in Appendix 3.

Friends of the Earth has also re-calculated the DfT figures which include other GHGs and an RFI of 1.9 for aviation. The calculations are shown in detail in Appendix 4.
A summary of the results follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Method</th>
<th>Aviation % of UK CO2 emissions</th>
<th>Aviation % of UK GHG emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>Historical</td>
<td>2.8</td>
<td>4.3</td>
</tr>
<tr>
<td>2005</td>
<td>Historical</td>
<td>6.4</td>
<td>9.9</td>
</tr>
<tr>
<td>2050</td>
<td>DfT method</td>
<td>20.6</td>
<td>29.0</td>
</tr>
<tr>
<td></td>
<td>DfT method with FOE revision of emissions</td>
<td>23.0</td>
<td>32.0</td>
</tr>
<tr>
<td></td>
<td>(correction ‘a’)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FOE method with FOE revision of emissions</td>
<td>28.5</td>
<td>43.7</td>
</tr>
<tr>
<td></td>
<td>– 60% cuts (corrections ‘a’ and ‘b’)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FOE method with FOE revision of emissions</td>
<td>56.9</td>
<td>87.5</td>
</tr>
<tr>
<td></td>
<td>– 80% cuts (corrections ‘a’ and ‘b’ and ‘c’)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table FOE/9. Aviation as % of UK emissions according to Friends of the Earth.

While each of the corrections - a, b and c - makes a modest difference, when they are all applied, they make a massive difference at 2050. They show that the DfT figures hugely under-state aviation’s contribution to UK emissions by 2050.

The implications of aviation’s share 58.9% of allowed UK CO2 emissions are very significant, but bringing in the other GHGs means that no less than 87.5% all the UK’s allowable GHG emissions could be used up if aviation is not controlled. The implications for both aviation and climate change policy are thus even greater - see section 11.

There has been increasing recognition of the fact that the majority of passengers flying to and from the UK are British. Some 77% of passengers in 2005 were British (Table G2) and is forecast to decline slightly to 75% in 2030. We assume that this gradual decline continues so that in 2050, 73% of passengers are British. It is assumed that the figure was 77% in 1990.

It can therefore be argued that UK should be allocated 73% of all emissions from international flights instead of the 50% assumed in the DfT calculations and the Friends of the Earth re-workings. 50% of emissions would only be fair if 50% of passengers from were from the UK and 50% were foreigners. (Although this argument has much validity, it should be recognised that the principle is not applied in other sectors. For example, emissions from manufacturing are allocated to the country where manufacturing takes place, not where the goods are consumed.) Also
although the thrust of these figures is clear, it should be noted that the percentages are less reliable than the previous ones that were based on a 50% apportionment. This is because the 77% and 73% apportionments do not distinguish between domestic and international aviation and they do not include transfer, for which figures are not given in Table G2.

The emission %s for a selection of the figures in the above two tables have been re-calculated on the basis of an allocation of emissions according to the % of UK passengers.

<table>
<thead>
<tr>
<th>Year</th>
<th>Method</th>
<th>Aviation % of UK CO2 emissions</th>
<th>Aviation % of UK GHG emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>Historical</td>
<td>4.1</td>
<td>6.3</td>
</tr>
<tr>
<td>2005</td>
<td>Historical</td>
<td>9.3</td>
<td>14.1</td>
</tr>
<tr>
<td>2050</td>
<td>DfT method</td>
<td>27.0</td>
<td>36.8</td>
</tr>
<tr>
<td></td>
<td>DfT method with FOE revision of emissions (correction 'a')</td>
<td>29.9</td>
<td>40.2</td>
</tr>
<tr>
<td></td>
<td>FOE method with FOE revision of emissions – 60% cuts (corrections ‘a’ and ‘b’)</td>
<td>40.1</td>
<td>61.2</td>
</tr>
<tr>
<td></td>
<td>FOE method with FOE revision of emissions – 80% cuts (corrections ‘a’ and ‘b’ and ‘c’)</td>
<td>78.6</td>
<td>122.5</td>
</tr>
</tbody>
</table>

Table FOE/10. Aviation as % of UK emissions according to Friends of the Earth: emissions apportioned according to nationality of passengers

The difference is considerable (as one would expect, given that the allocation of international aviation is increased by about half as much again). The most telling figure is 122.5%. This figure tells us that if aviation is allowed to grow under a ‘predict and provide’ scenario and emissions are apportioned in proportion to UK passengers, it will be physically (mathematically) impossible to achieve 80% cuts by 2050.

10. Heathrow’s Emissions

The DfT estimates that Heathrow was responsible for 18.2 mt of CO2 in 2005 and is forecast to produce 24.0 mt in 2030 – an increase in about 6mt. The increase is largely due to the effect of a third runway and the extra flights, but it is compounded by the changes that would be expected even if there were no third runway.

The DfT also compares the CO2 emissions expected with a 2-runway airport with the 3-runway airport. At 2030 CO2 emissions are 16mt with 2 runways and 25mt with 3 runways, a difference of
9mt. This is the figure which has been widely quoted and has been noted as being equal to the entire emissions of Kenya (before the current troubles). At 2050 CO2 emissions are 15mt with 2 runways and 22mt with 3 runways, a difference of 7mt.

The 2030 figures have some validity because they compare the two most likely situations at 2030, namely a 2-runway and a 3-runway Heathrow. But the situation at 2050 is far more hazy. The consultation assumes that a new runway could be available by 2020 but, due to pent-up demand, that it would be largely full by 2030. It is therefore reasonable to assume that BAA and the government would start pressing for a 4th runway (and 7th terminal) to be operational around or soon after 2030. Indeed, the Chief Executive of BAA has virtually given notice of this. The emissions at Heathrow at 2050 could therefore be far higher than estimated by the DfT.

The situation could be even more extreme than a 4th runway and 7th terminal implies. The DfT paper does not show unconstrained demand by airport, but examination of the constrained figures suggests that there would be demand and therefore lobbying for a 5th runway (and 8th terminal) to be in operation by 2050.

The DfT has said that the figures for CO2 emissions at Heathrow should not be taken in isolation, but that the impact on UK aviation emissions as a whole should be considered. On this basis, a third runway at Heathrow adds about 4 mt CO2 at 2030. At 2050, the additional amount due to a third runway is still 4mt but, as noted above, there could be a fourth and even a fifth runway if the present ‘predict and provide’ policy continues.

11. Heathrow’s Emissions as a Proportion of UK Emissions

Heathrow’s proportion of aviation emissions can be readily calculated, given Heathrow’s and the UK aviation’s emissions. Details are given in Appendix 6 (Table FOE/5). Heathrow’s proportion of the UK’s total emissions can also be readily calculated – details are in Appendix 7. The results are:

<table>
<thead>
<tr>
<th>Year</th>
<th>Heathrow CO2 and GHG emissions as % of UK aviation</th>
<th>Heathrow CO2 emissions as % of UK total</th>
<th>Heathrow GHG emissions as % of UK total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>48.5%</td>
<td>3.1%</td>
<td>4.8%</td>
</tr>
<tr>
<td>2050 (assuming no further expansion at Heathrow beyond R3)</td>
<td>31.8%</td>
<td>17.1%</td>
<td>27.8%</td>
</tr>
<tr>
<td>2050 (assuming further expansion at Heathrow beyond R3)</td>
<td>48.5%</td>
<td>27.1%</td>
<td>42.4%</td>
</tr>
</tbody>
</table>

Table FOE/11. Heathrow emissions as a proportion of UK total emissions
It should be noted that these could be considered significant under-estimates, because, as noted previously, all these figures are calculated on the basis of apportioning emissions equally between the UK and the distant country instead on being apportioned in proportion to the nationality of the passengers.

As shown in section 11, Heathrow alone would contribute a large proportion of the entire UK’s allowable emissions by 2050. Expansion beyond the present two runways represents a large part of this. It is therefore necessary to abandon plans to expand Heathrow.

12. Aviation and the Climate Change Bill

A climate bill is shortly starting its passage through Parliament. The current provisions seek a 60% cut in CO2 emissions by 2050, as compared against a 1990 baseline. But crucially, the UK’s share of international aviation emissions (and international shipping emissions) are left out of the targets. As described in section 5(a), there is no scientific or logical justification for leaving aviation out of the targets.

Ministers and civil servant use two main arguments to defend the exclusion of aviation from the targets.

The first argument is that aviation is an international activity; therefore international agreements are needed to effect change and emissions are outside government control. This is not so. The UK government and the EU have almost complete power to control aviation in their respective countries. While there are international regulations and treaties aiming to prevent unilateral action, these are mainly aimed at preventing discrimination between carriers of different countries. They do not prevent action to prevent local environmental damage or to control emissions. The fact that there are planning conditions at airports, that there are night flight restrictions, that there are noise charges, that there is APD (Airport Passenger Duty), and that an ETS is being implemented all attest to the fact that individual countries can control international flights using their airports.

The second main argument used by ministers and civil servants is that there is no internationally recognised way of allocating emissions between countries. This is simply untrue. The UK and other countries measure and report on a regular basis international aviation emissions as a “memo item” to UNFCC. The convention is that all outgoing flights are allocated to the country of departure. (This is equivalent to dividing the emissions of all flights between any pair of countries equally between those countries.) In any case the climate bill is UK legislation and does not require the agreement of any other country or international body.

The Government frequently states that aviation emissions growth can be balanced by additional cuts in other sectors, if this is the case then it should have no issue with including the UK’s share of international aviation (and shipping) emissions in the climate change bill from the start. At present it is resisting doing this.

13. Conclusions and Policy Implications

Aviation’s share of the UK CO2 emissions under current government policy and assumptions are calculated by Friends of the Earth from government data be 56.0% at 2050 and 87.5% of all GHG emissions at 2050 if an overall 80% cut is to be achieved (table FOE/9 in section 9). This means that either:
a) all sectors other than aviation will need to cut their emissions by at least 95% from 1990 levels

b) Government policies on aviation will change such that aviation emissions do not increase as currently forecast, or

c) the UK will fail to meet its obligations on climate change.

It is thus clear that under the Government’s growth assumptions ‘predict and provide’ will have to be abandoned at some point if an 80% emissions cut is to be achieved.

If the emissions attributable to UK passengers are taken - the ‘moral’ approach - as opposed to splitting emissions equally between the UK and the distant country - the ‘legalistic’ approach above, aviation’s share of emissions are greater still. (Tables FOE/9,10). On this basis, aviation’s share of UK allowable GHG emissions is a staggering 122.5%. In other words, it will be physically (mathematically) impossible to achieve a target of 80% cuts by 2050. The only answer is to address the growth in aviation’s emissions by changing aviation policy. In our view, the imperative of urgently addressing climate change means the policy change needs to happen now.

As shown in section 11, Heathrow alone would contribute an impossibly large proportion of the entire UK’s allowable emissions by 2050. Expansion beyond the present two runways represents a large part of this. It is therefore necessary to abandon plans to expand Heathrow. It is necessary because of the emissions themselves, but it is also necessary because of the message it will give out to the rest of the world.

A government decision to cancel Heathrow expansion would broadcast to the rest of the world that the UK means business in the fight against climate change.

The Government must also include the UK’s share of international aviation (&shipping) emissions in the climate change law from the outset. The proposal to replace Air Passenger Duty with the ‘per plane’ based ‘Aviation Duty’ from 2009 is welcome. This tax should be used in the absence of an effective ETS to control aviation emissions.
Appendices

Appendix 1 – DfT forecast of aviation’s CO₂ emissions

CO₂ emissions from aviation were forecast in the ‘UK air passenger demand and CO₂ forecasts’ published by the DfT in November 2007 (pages 50-71). The approach, in simplified terms, is to forecast passenger traffic, estimate present fuel use per passenger or passenger km, forecast a rate of improvement of fuel efficiency and use these to estimate emissions up to 2030. Allowance is made for other factors, such as freight-only flights and improvements in operational efficiency in air traffic control. The following table summarises the key figures.

<table>
<thead>
<tr>
<th>Year</th>
<th>Unconstrained passenger demand (m)</th>
<th>Constrained Passenger demand (m)</th>
<th>CO₂ m tones (mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>228</td>
<td>228</td>
<td>37.5</td>
</tr>
<tr>
<td>2010</td>
<td>270</td>
<td>270</td>
<td>42.0</td>
</tr>
<tr>
<td>2015</td>
<td>335</td>
<td>310</td>
<td>????</td>
</tr>
<tr>
<td>2020</td>
<td>385</td>
<td>375</td>
<td>50.0</td>
</tr>
<tr>
<td>2025</td>
<td>440</td>
<td>410</td>
<td>??</td>
</tr>
<tr>
<td>2030</td>
<td>495</td>
<td>480</td>
<td>58.9</td>
</tr>
<tr>
<td>2040</td>
<td>??</td>
<td>540</td>
<td>61.1</td>
</tr>
<tr>
<td>2050</td>
<td>??</td>
<td>580</td>
<td>60.3</td>
</tr>
</tbody>
</table>

Table FOE/1

‘Unconstrained demand’ is the demand that would be realised if there were no airport capacity constraints at any airport. ‘Constrained’ demand is the demand that is realised if capacity is added in line with the policy in the government’s White Paper of 2003. It can be seen that at 2030, constrained demand is only 3% less [100 x (495 – 480) / 495] than unconstrained demand. The policy is therefore virtually ‘predict and provide’ at a national level. (It can be argued that the policy is not ‘predict and provide’ at the detailed level in that capacity is not necessarily provided to meet the demand that arises at every airport. However, where there is unsatisfied demand at one airport, the normal response is for the demand to be ‘diverted’ to a nearby UK airport. This means that the total UK traffic and emissions are unchanged.)

The unconstrained demand figures above are called the ‘central’ forecasts, these being considered by the government as a best estimate. In addition to the central, ‘low’ and ‘high’ forecasts are given as ‘sensitivity tests’. However these are only 5% or 6% different from the central forecasts and
Friends of the Earth does not consider they in any way represent the range of uncertainty. See ‘Why the Government’ s Case for Expansion is Flawed’ above.

There is much debate about whether the passenger forecasts are valid. Earlier in this response we argue that the forecasts are too high because a number of optimistic or unrealistic assumptions have been made. However, for the purpose of these calculations of emissions, the government’s figures (up to 2030) are taken. The reason being that they demonstrate the implications of current government policy and the need to change it.

These forecasts make the following explicit or implicit assumptions:

- Very little restraint due to limiting airport capacity (see above)
- Cost of oil is constant at $53 per barrel (it is over $100 now)
- No physical or regulatory constraints for environmental reasons
- No general revenue-raising taxes such as VAT or fuel tax (the government is now claiming APD is an environmental tax)
- Climate costs charged at a highly ‘optimistic’ cost of £70 per tonne
- Small carbon surcharge on flights as a result of incorporation of aviation into the EU ETS
- No attempt to charge full environmental costs for noise and air pollution
- No attempt to charge for social costs such a loss of heritage, loss of landscape, blight, sterilisation of land, dislocation of communities, health impacts (some could be included in environmental costs) and third party risk.

It must be emphasised that Friends of the Earth does not agree with these assumptions on future policy; they are used to demonstrate the climate implications of current government policy, of which a third runway is an integral and key part.

Fuel efficiency is of equal importance to passenger forecasts in determining CO2 emissions. The expected improvements in fuel efficiency are therefore a matter of much importance and debate. The aviation industry and its supporters claim that great improvements have been made over the years and that even greater improvements may be achieved in future. However, IPCC (Inter-Governmental Panel on Climate Change) and independent commentators make more sober assessments. It is generally agreed that an improvement of between 1% and 2% pa is realistic, with a figure around 1% with a ‘business as usual’ scenario in future and nearer 2% if there is ‘forcing’ by means of technological, regulatory and economic measures.

The government forecasts a modest rate of increase of 29.7% between 2005 and 2030 (Table 3.4 of the paper), which is equivalent to a compound rate of 1.03% pa. We consider this reasonable and that the government is right not to be swayed by highly optimistic or ‘aspirational’ forecasts from the industry. Given that there are no ‘forcing’ measures apart from the EU ETS on the horizon a rate of around 1% pa seems reasonable.

Appendix 2 - Friends of the Earth’s re-forecast of CO2 emissions

While we accept the forecasts for 2030 as being consistent with the Government’s assumptions and policies, we emphatically do not accept the forecasts for 2050, because they assume a dramatic policy change which suddenly takes effect after 2030. The paper says that these forecasts use a “simpler, yet still robust” methodology. We accept that a simpler method beyond 2030 is necessary and that the forecasts in later years are inevitably prone to more error. However, we consider the emissions forecasts from 2030 to 2050 are seriously flawed. They show
a sudden slowing of growth from 2030 to 2050 that cannot be justified unless an unprecedented policy change takes place.

After 2030, the paper forecasts that passenger growth will slow: “.. capacity constraints begin to bite again, so that growth in passenger demand slows.” It appears the government is assuming that its ‘predict and provide’ policies, confirmed in the 2003 White Paper, will be continued for many years and then suddenly abandoned. No justification is given for this policy about-face.

A more consistent approach would be to assume continuation of the present government policy beyond 2030, namely only slight capacity constraints such that constrained demand continues to be only a few % below unconstrained demand. The constrained capacity and CO2 emissions are re-calculated on the assumption of no about-face in policy at 2030, as described below.

The constrained forecasts are analysed in the table to show the growth rates in 5-year bands up to 2030. It is then assumed the growth rate will continue after 2030 in the same way as before, namely declining but declining progressively less fast. The net effect is that over the period from 2030 to 2050 the growth is 39% compared with 105% between 2005 and 2030. Despite this massive reduction in growth rate, our estimated constrained demand at 2050 is 14.8% larger than the DfT’s figure.

<table>
<thead>
<tr>
<th>Year</th>
<th>Constrained passenger forecast – normal font means from Table 2.11; italics means derived here</th>
<th>Annual growth rate over 5 years (linear) - normal font means from Table 2.11; italics means derived here</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>228</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>270</td>
<td>3.7%</td>
</tr>
<tr>
<td>2015</td>
<td>320</td>
<td>3.7</td>
</tr>
<tr>
<td>2020</td>
<td>375</td>
<td>3.4</td>
</tr>
<tr>
<td>2025</td>
<td>430</td>
<td>2.9</td>
</tr>
<tr>
<td>2030</td>
<td>480</td>
<td>2.3 (rates trended down from here onwards)</td>
</tr>
<tr>
<td>2035</td>
<td>528</td>
<td>2.0</td>
</tr>
<tr>
<td>2040</td>
<td>576 cf DfT of 540</td>
<td>1.8</td>
</tr>
<tr>
<td>2045</td>
<td>622</td>
<td>1.6</td>
</tr>
<tr>
<td>2050</td>
<td>666 cf DfT of 580, ie 14.8% higher</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Table FOE/2
CO2 emissions can be calculated by a simple pro-rata. The emissions estimated by the DfT for 2050 are 60.3 Mt. If the passengers are in fact 14.8% higher than the DfT assumes, the CO2 emissions will be, to a first Approximation, also 14.8% higher, namely 69.2 mt.
Appendix 3 – Aviation emissions as a % of total UK CO2 emissions

The following table shows in detail calculation of the % of UK CO2 emissions represented by aviation in 1990, 2005 and 2050. For 2050, there are 4 different methods of calculation – see main text for the rationale.

<table>
<thead>
<tr>
<th>Year</th>
<th>Scenario</th>
<th>Aviation – International</th>
<th>Aviation - Domestic</th>
<th>Aviation - Total</th>
<th>UK total incl Dom</th>
<th>UK incl Dom and Int</th>
<th>Aviation %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>Historical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.7 (Inv)</td>
<td>1.2 (Inv)</td>
<td>16.9 (C+D)</td>
<td>592.4 (Inv)</td>
<td>608.1 (C+F)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Historical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>35.0 (E-D)</td>
<td>2.5 (DfT email)</td>
<td>37.5 (K1)</td>
<td>554.2 (K1)</td>
<td>589.2 (K1 or C+F)</td>
<td></td>
</tr>
<tr>
<td>2050</td>
<td>DfT method</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>56.2 (G-H)</td>
<td>4.1 (E-C)</td>
<td>60.3 (K1)</td>
<td>236.9 (K1; note 1)</td>
<td>293.1 (K1 or C+F)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DfT method with FOE revision of emissions (correction ‘a’)</td>
<td>64.5 (note 2)</td>
<td>4.7 (note 2)</td>
<td>69.2 (note 2)</td>
<td>236.9 (K1; note 1)</td>
<td>301.4 (C+E)</td>
<td>23.0</td>
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<tr>
<td></td>
<td>FOE method with FOE revision of emissions – 60% cuts (corrections ‘a’ and ‘b’)</td>
<td>64.5 (note 2)</td>
<td>4.7 (note 2)</td>
<td>69.2 (note 2)</td>
<td>243.2 (note 3)</td>
<td>28.5 (E/G)</td>
<td></td>
</tr>
</tbody>
</table>
### Abbreviations and codes

A to H – column numbers  
Dom – domestic  
Int – international  
Inv – DEFRA inventory, End note XXIV  
K1 Table K1 in 'UK passenger demand and CO2 forecasts'

### Notes

1. This figure corresponds to the 1990 figure reduced by 60% (592.4 x 0.4).

2. The total aviation emissions forecast has been increased by 14.8% from the DfT figure for reasons described in **. It has been assumed that this uplift Appendix equally to Int and Dom - while this may not be accurate, any resulting error will be very small.

3. The 2050 target with the FOE method is a 60% cut on 1990 figures (608.1 x 0.4)

4. The 2050 target with the FOE method is an 80% cut on 1990 figures (608.1 x 0.2)
# Appendix 4 – Aviation emissions as a % of total UK greenhouse gas emissions

The following table shows in detail calculation of the % of UK GHG emissions represented by aviation in 1990, 2005 and 2050. For 2050, there are 4 different methods of calculation – see main text for the rationale. The government’s radiative forcing factor of 1.9 x CO2 for aviation is used.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year</td>
<td>Scenario</td>
<td>Aviation – International</td>
<td>Aviation - Domestic</td>
<td>Aviation - Total</td>
<td>UK total incl Dom</td>
<td>UK incl Dom and Int</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aviation - International</td>
<td>Aviation - Domestic</td>
<td>Aviation - Total</td>
<td>UK total incl Dom</td>
<td>UK incl Dom and Int</td>
</tr>
<tr>
<td>1990</td>
<td>Historical</td>
<td>29.8 (note 1)</td>
<td>2.3 (note 1)</td>
<td>32.1 (note 1 or C+D)</td>
<td>721.7 (note 2)</td>
<td>751.5 (C+F)</td>
<td>4.3 (E/G)</td>
</tr>
<tr>
<td>2005</td>
<td>Historical</td>
<td>66.5 (G-F)</td>
<td>4.7 (E-C)</td>
<td>71.2 (K1)</td>
<td>656.3 (K1)</td>
<td>722.8 (K1 or C+F)</td>
<td>9.9 (K1 or E/G)</td>
</tr>
<tr>
<td>2050</td>
<td>DfT method</td>
<td>106.9 (G-H)</td>
<td>7.7 (E-C)</td>
<td>114.6 (K1)</td>
<td>288.7 (K1)</td>
<td>395.6 (K1 or C+F)</td>
<td>29.0 (E/G)</td>
</tr>
<tr>
<td></td>
<td>DfT method with FOE revision of emissions (correction ‘a’)</td>
<td>122.7 (note 3)</td>
<td>8.8 (note 3)</td>
<td>131.5 (note 3)</td>
<td>288.7 (K1)</td>
<td>411.4 (C+E)</td>
<td>32.0 (E/G)</td>
</tr>
<tr>
<td></td>
<td>FOE method with FOE revision of emissions – 60% cuts (corrections)</td>
<td>122.7 (note 3)</td>
<td>8.8 (note 3)</td>
<td>131.5 (note 3)</td>
<td>300.6 (note 4)</td>
<td>43.7 (E/G)</td>
<td></td>
</tr>
<tr>
<td>'a' and 'b')</td>
<td>[122.7] (note 3)</td>
<td>[8.8] (note 3)</td>
<td>[131.5] (note 3)</td>
<td>[150.3] (note 5)</td>
<td>[87.5] (D/E)</td>
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<td></td>
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<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FOE method with FOE revision of emissions – 80% cuts (corrections 'a' and 'b' and 'c')</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table FOE/4

Abbreviations and codes

RF – Radiative forcing (index)

See Appendix 2 for other abbreviations and codes

Notes

1. CO2 figures multiplied by 1.9

2. FOE does not have CHCs corresponding to CO2, which would require RF figures for sources other than aviation. However, a 1990 figure can be inferred from the DfT figure for 2050, which presumably represents a cut of 60\%. The 1990 figure is thus \(288.7 \div 0.4 = 721.7\).

3. The total aviation emissions forecast has been increased by 14.8\% from the DfT figure for reasons described in Appendix 6. It has been assumed that this uplift applies equally to Int. and Dom - while this may not be accurate, any resulting error will be very small.

4. The 2050 target corresponds to the inferred 1990 figure reduced by 60\% (751.5 x 0.4).

5. The 2050 target corresponds to the inferred 1990 figure reduced by 80\% (751.5 x 0.4).
Appendix 5 - Heathrow’s emissions

Table 3.7 of ‘UK passenger demand and CO2 forecasts’ shows that Heathrow was responsible for 18.2 mt of CO2 in 2005 and is forecast to produce 24.0 mt in 2030. That is an increase in about 6mt. The increase is largely due to the effect of a third runway and the extra flights, but it is compounded by the changes that would be expected even if there were no third runway.

Table G13 compares the CO2 emissions expected with a 2-runway airport (‘maximum use’ scenario) with the 3-runway airport (scenarios ‘s05’, ‘s12s2’, ‘s12s2mm1‘ or ‘s12s2mm2‘). At 2030 CO2 emissions are 16mt with 2 runways and 25mt with 3 runways, a difference of 9mt. This is the figure which has been widely quoted and has been noted as being equal to the entire emissions of Kenya (before the current troubles).

Corresponding figures to those in G 13 are given in Table G14 for 2050. As noted above, the UK forecasts for 2050 assume a complete about-face in government policy in 2030. While the total figures are therefore highly questionable, the difference between a 2-runway and 3-runway Heathrow should be reasonable as it depends on the respective capacities at Heathrow and not on total demand/capacity at UK airports. At 2050 CO2 emissions are 15mt with 2 runways and 22mt with 3 runways, a difference of 7mt. The somewhat lower figures for 2050 than 2030 are presumably accounted for by improved fuel efficiency but compounded by other factors such as increased passenger throughput due to larger planes etc.

The 2030 figures have some validity because they compare the two most likely situations at 2030, namely a 2-runway and a 3-runway Heathrow. But the situation at 2050 is far more hazy. The consultation assumes that a new runway could be available by 2020 and, due to pent-up demand, would fill up very rapidly, being full before 2030.

It is therefore reasonable to assume that BAA and the government would start pressing for a 4th runway (and 7th terminal) to be operational around or soon after 2030. Indeed the Chief Executive virtually gave notice of this where he said at hearing by the London Assembly in January 2008 that, unlike his predecessors, he would make no promises about not expanding Heathrow further. The emissions at Heathrow at 2050 could therefore be far higher than estimated by the DfT.

The situation could be even more extreme than a 4th runway and 7th terminal implies. The DfT paper does not show unconstrained demand by airport, but examination of the constrained figures suggests that there would be lobbying for a 5th runway (and 8th terminal) to be in operation by 2050.

The DfT has said that the figures for CO2 emissions at Heathrow should not be taken in isolation, but that the impact on UK aviation emissions as a whole should be considered. Table G15 shows that at 2030 the third runway at Heathrow would give rise 57mt for the UK (scenario ‘s05’) compared with 53mt with 2 runways (scenario ‘s02’), a difference of 4mt. This assumes that there is no second runway at Stansted (scenario ‘s05’). If there is a second runway at Stansted, the UK emissions are than 59mt, a difference of 6mt. So a third runway at Heathrow adds 4mt and a second runway at Stansted adds a further 2mt.
Table G15 also shows that effect of a third runway at 2050. Heathrow would give rise 58mt for the UK (scenario ‘s05’) compared with 54 with 2 runways (scenario ‘s02’), a difference of 4mt. This assumes that there is no second runway at Stansted (scenario ‘s05’). If there is a second runway at Stansted, the UK emissions are than 60 or 61mt, a difference of 6 or 7mt. So a third runway at Heathrow adds 4mt and a second runway at Stansted adds a further 2 or 3mt. However, as noted elsewhere in this document, these figures are highly questionable. By 2030 there could be a 4th and 5th runway, in which case the increase of emissions could be far higher.

Appendix 6 - Heathrow’s emissions as a proportion of UK aviation emissions

The CO2 emissions from Heathrow in 2005 and 2030 are shown in Table 3.7 and these can be expressed as a % of the total UK emissions.

As noted in Appendix 5 above, a figure for Heathrow in 2050 has been given in Table G15, but ignores the possibility of a 4th and 5th runway. Also, the total UK figures forecast by the DfT are questionable and have been amended by Friends of the Earth as described in Appendix 2.

As no figures are provided by DfT for the unconstrained demand for Heathrow, it is not possible to calculate directly from DfT data Heathrow’s emissions if it were expanded to meet demand up to 2050. However, rough estimates can be made.

It is clear that demand is strong at Heathrow and the DfT considers it will remain so. It is for this reason that a new runway in 2020 would be largely full by 2025. Given this strong demand, it is reasonable to assume that the demand for Heathrow will increase roughly at the rate that demand is increasing elsewhere in the UK. Heathrow’s current (2005) proportion of 48.5% of UK emissions is already suppressed by shortage of capacity (as compared with demand) and the figure of 42.3% at 2030 is also going to be suppressed by shortage of capacity with 3 runway. It is therefore reasonable to assume that if capacity were provided to meet all demand at 2050, the emissions at then, as a % of the UK, could be as high as now, namely 48.5%. The table below shows the position.

<table>
<thead>
<tr>
<th>Year</th>
<th>Heathrow (mt)</th>
<th>Total UK aviation (mt)</th>
<th>Heathrow as % of UK aviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>18.2</td>
<td>37.5</td>
<td>48.5%</td>
</tr>
<tr>
<td>2030</td>
<td>24.9</td>
<td>58.9</td>
<td>42.3%</td>
</tr>
<tr>
<td>2050 - assuming no further expansion at Heathrow beyond R3</td>
<td>22 (Friends of the Earth figure)</td>
<td>69.2 (Friends of the Earth figure)</td>
<td>31.8%</td>
</tr>
<tr>
<td>2050 - assuming expansion to meet demand at Heathrow beyond R3</td>
<td>33.6</td>
<td>69.2</td>
<td>48.5%</td>
</tr>
</tbody>
</table>

Table FOE/5
Figures for total GHGs are not provided by the DfT. However, the proportion of total GHGs to CO2 for Heathrow will be very similar to the rest of UK aviation. (There will be a slight difference because of Heathrow’s larger proportion of long-haul as the planes spend proportionally longer at cruising height where water vapour and NOx cause a larger proportion of radiative forcing.)

**Appendix 7 - Heathrow’s emissions as a proportion of total UK emissions**

The contribution of Heathrow to the UK’s aviation emissions in Appendix 6 above and the contribution of aviation to the UK’s total emissions in Appendices 3 and 4 enable Heathrow’s CO2 contribution to total UK emissions to be readily calculated:

<table>
<thead>
<tr>
<th>Year</th>
<th>DfT method - 60% cut by 2050 ignoring aviation</th>
<th>FRIENDS OF THE EARTH – 60% cut by 2050</th>
<th>FRIENDS OF THE EARTH – 80% cut by 2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>3.1%</td>
<td>3.1%</td>
<td>3.1%</td>
</tr>
<tr>
<td>2050 - assuming no expansion at Heathrow beyond R3</td>
<td>6.6%</td>
<td>9.1%</td>
<td>17.8%</td>
</tr>
<tr>
<td>2050 - assuming expansion of Heathrow beyond R3</td>
<td>10.0%</td>
<td>13.8%</td>
<td>27.6%</td>
</tr>
</tbody>
</table>

**Table FOE/6**

Corresponding %s can be worked out for GHGs:

<table>
<thead>
<tr>
<th>Year</th>
<th>DfT method - 60% cut by 2050 ignoring aviation</th>
<th>FRIENDS OF THE EARTH – 60% cut by 2050</th>
<th>FRIENDS OF THE EARTH – 80% cut by 2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>4.8%</td>
<td>4.8%</td>
<td>4.8%</td>
</tr>
<tr>
<td>2050 - assuming no expansion at Heathrow beyond R3</td>
<td>9.0%</td>
<td>13.9%</td>
<td>27.8%</td>
</tr>
<tr>
<td>2050 - assuming expansion of Heathrow beyond R3</td>
<td>14.1%</td>
<td>21.2%</td>
<td>42.4%</td>
</tr>
</tbody>
</table>

**Table FOE/7**
It should be noted that these could be considered under-estimates. As noted previously, government figures and most of the figures in this response are calculated on the basis of apportioning emissions equally between the UK and the distant country. If emissions were apportioned in proportion to the nationality of the passengers, the % emissions would be even greater. The proportion of UK passengers at Heathrow is 64% and is forecast to remain at that level in 2030 (Table G2). It is therefore a reasonable assumption that it will be around 64% at 2050. Table FOE/10 shows the large change when this approach is used to calculate national figures. There will be a significant effect for Heathrow, but it will be less dramatic because the proportion of UK passengers is less (64% at Heathrow compared with 73% nationally at 2050).

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ENDNOTES

1 A fact acknowledged by the Airport operators Association “The major cities in the UK all have significant connectivity at their disposal
ii Table 4.25 page 79 of DfT, 2007. Air passenger Demand and CO2 forecasts. November, DfT.
www.dft.gov.uk/pgr/aviation/environmentalissues/ukairdemandandco2forecasts/airpassdemandfullreport.pdf
and pages 125-129 of the main Heathrow consultation document
iv Main consultation, section 2.45
v DfT 2007. Air Passenger Demand and CO2 forecasts.
www.dft.gov.uk/pgr/aviation/environmentalissues/ukairdemandandco2forecasts/airpassdemandfullreport.pdf
vi See chapter 3 of DfT, 2007. Op Cit
viii Section 5.25 + note 4 of www.hm-treasury.gov.uk/media/3/f/green_book_260907.pdf, which says "All impacts (including costs and benefits,
both direct and indirect) on non-UK residents and firms should be identified and quantified separately ...Generally, proposals should not proceed if, despite a
net benefit overall, there is a net cost to the UK”
ix Only noise over 57 dBA Leq is costed, despite Government guidance giving costs for noise change as low as 45 dBA Leq.
http://www.webtag.org.uk/webdocuments/3_Expert/3_Environment_Objective/3.3.2.htm#s5
x Friends of the Earth has commissioned research on the validity of using Consumer Surplus Theory for transport Appraisal, due Spring 2008.
xi DfT, 2007. annex H 1.3
xii DfT 2007. annex H 1.34
xiii DfT, 2007 section 2.32
xv In 2000 prices.
xvi Stern actually used £65, but DEFRA are using a different methodology from Stern for converting dollars to pounds – the original research gave a price in year
2000 dollars. £53 is the figure DEFRA give for Stern using their conversion methodology.
xvii Multiplying the existing £5 billion figure by 53 and dividing by 19.
xviii DfT 2007, section 2.29
“Firms will act on CO2 only if it’s cost triples” the Guardian 15.02.08

78% of the effort required by the phase 2 cap could be met by CDM/JI credits

Annex B Section 1.27 of DfT 2007, op cit

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These figures come from Government and civil aviation authority data, referenced at http://www.foe.co.uk/resource/briefings/regional_tourism_deficit.pdf

DfT, 2007. Table G2 page 111


http://business.timesonline.co.uk/tol/business/industry_sectors/transport/article3234502.ece