airportwatch

BRIEFING

Carbon emissions – and a new runway

What are the main actions needed to restrict the growth of aviation's greenhouse gas emissions?

- **Whether or not a new runway is approved, the Government must show how emissions from UK aviation can be brought back to their 2005 level by 2050. That level is 37.5 MtCO2/year, which is the maximum level the Committee on Climate Change says is compatible with the Climate Change Act.**

- **Aviation should, beginning with the 5th Carbon Budget, be formally included in carbon accounting under the Climate Change Act**

- **Government should commission work on how to take account of aviation's non-CO2 effects in its climate change policy**

Why are carbon emissions an important issue for airport expansion?

The aviation sector in the UK currently accounts for around 6% of the country's total carbon emissions.[i] In contrast to many other sectors, there is very little scope for decarbonising aviation. It will not be possible to fly planes on renewably sourced electricity. Though aircraft are becoming gradually slightly more fuel efficient, the rate of improvement is slowing down. It is not likely to keep pace with growth in passenger numbers, resulting in an overall emissions increase from the sector, compared with the level today. The industry has been growing fast, with a blip over several years caused by the recession.

While other parts of the economy will have to decarbonise, aviation will become a larger and larger proportion of the UK's total carbon emissions. It could account for 25% or more of the UK total by 2050.[ii]

Are there legal carbon targets that UK aviation has to meet?

No, not exactly. It is messy as far as aviation is concerned. The UK Climate Change Act 2008 says thatinternational aviation has to be taken into account but there is nothing legally binding. The Act requires international aviation and shipping emissions be "taken into account" [iii]whensetting the 5 year carbon budgets. The emissions have not been included in the first 4 carbon budgets covering the period 2008 – 2027. Though they are not formally included, carbon budgets for other sectors so far allow headroom for aviation emissions of up to 37.5 Mt by 2050.

One way to ensure that aviation emissions are properly accounted for as part of the UK's overall climate target would be to formally include them in the carbon budgets. The Government must take a decision on this issue in 2016, as part of its consideration of the 5th carbon budget.

The Department of Energy and Climate Change ('DECC') is still to decide whether international aviation will be included in the 5th carbon budget, 2028 – 2032.[iv]

AirportWatch argues that international aviation and shipping should be included in the UK's 5 year carbon budgets, and not merely "taken account of"

What is the level of aviation emissions recommended by the CCC for 2050?

The Committee on Climate Change (CCC), the Government's advisers on climate change, recommended in December 2009 that total annual emissions from aviation in the UK (domestic and international) should beno higher in 2050 than they were in 2005. That level **was 37.5 MtCO2**(milliontonnes CO2). [v]The CCC estimated that between 2009 and 2050, the aviation industry might become about 35% morefuel efficient in "carbon intensity." The figure of 37.5MtCO2 was the level of aviation emissions in 2005, which was also useful, as itfitted within the period 2004 – 2006 that was the baseline for the European ETS (Emissions Trading System).

The CCC considered 37.5 MtCO2 the maximum level of aviation emissions that could be allowable, consistent with the target of cutting UK emissions by 80% by 2050 and given feasible emissions reductions in other sectors. They assume that other sectors could cut emissions by 85% - which they describe as "at the limits of what is feasible". In July 2013 similar advice was given to the Airports Commission (AC).[vi]

The limit for the carbon emissions for UK aviation has been set at 37.5 MtCO2 per year. If that limit is breached, the UK risks failing to meet its legally binding target under the 2008 Climate Change Act.

How much carbon does UK aviation emit now, compared to the 37.5 MtCO2level?

Carbon emissions from UK international aviation[vii] in 1990 were about15.7 MtCO2 (with 1.4 Mt CO2 from domestic flights)[viii] making a total of 17.1 MtCO2. By 2005, the carbon emissions from UK aviation had grown to 37.5 MtCO2, which is about doubletheir level in 1990. (All the figures are just for departing flights, as that is the internationally recognised method ofapportioning emissions from flights). They were about 34 MtCO2 in 2012 (a fall due to the recession).

How much of that total UK aviation carbon is emitted by Heathrow; how much by Gatwick; and howmuch by regional, airports?

The DfT [ix]estimates that in 2010 Heathrow flights emitted 18.8 MtCO2. That was 56%of the UK aviation total that year of 33.4MtCO2. Therefore each runway causes the emission of around 9.5 MtCO2 per year.

By contrast, 2010 flights from Gatwick (onerunway; mainly short haul flights) emitted 3.9 Mt CO2, which was 12% of the UK aviation total.The carbon emissions of all other UK airports made up 32% of the total.

How much carbon is expected to be emitted by a new Heathrow or Gatwick runway?

Put very simply, probably somewhere between an extra 3 -9 MtCO2 per year. That depends on the extentof improvement over time in carbon efficiency per plane, the fleet mix and the mix of destinations.

Traditionally Heathrow has a large number of long haul destinations, and Gatwick does not. It is notunreasonable to believe Gatwick might have a much larger proportion of long haul, if it had a 2nd runway and effectively became about the size that Heathrow is now. So assumptions that the emissionsfrom a Gatwick runway would be much smaller than those from a Heathrow runway may be unreliable.

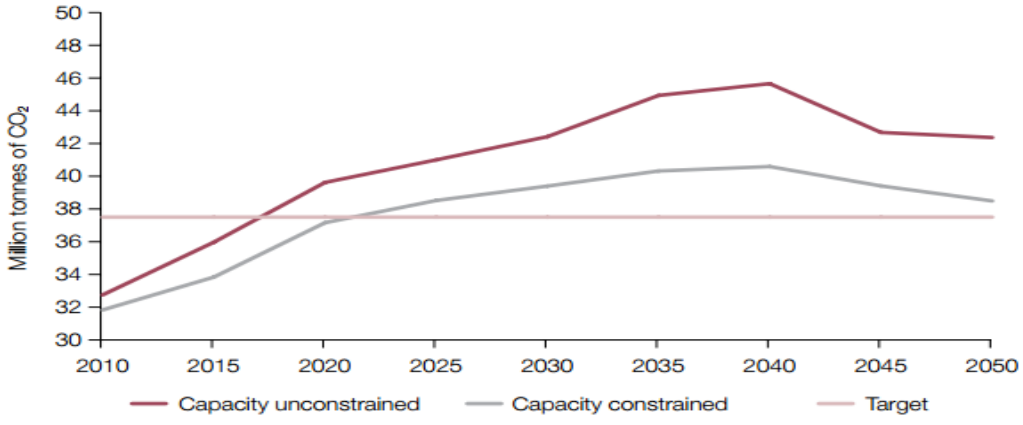
An extra Heathrow runway, intensively used, could bring the airport's carbon emissions up to around 26 MtCO2 per year (comparable to the emissions of a small country) and accounting for around 70% of the total CO2 available to UK aviation under a carbon cap of 37.5 MtCO2.

The DfT forecasts and the Airports Commission forecasts both indicate that UK aviation would exceed its limit of 37.5 MtCO2 before 2050, EVEN IF NO NEW RUNWAY IS BUILT. Adding a new runway only makes that more certain, and puts the UK's legally binding carbon targets at risk.

What does the Airports Commission (AC) say about a new runway and carbon emissions?

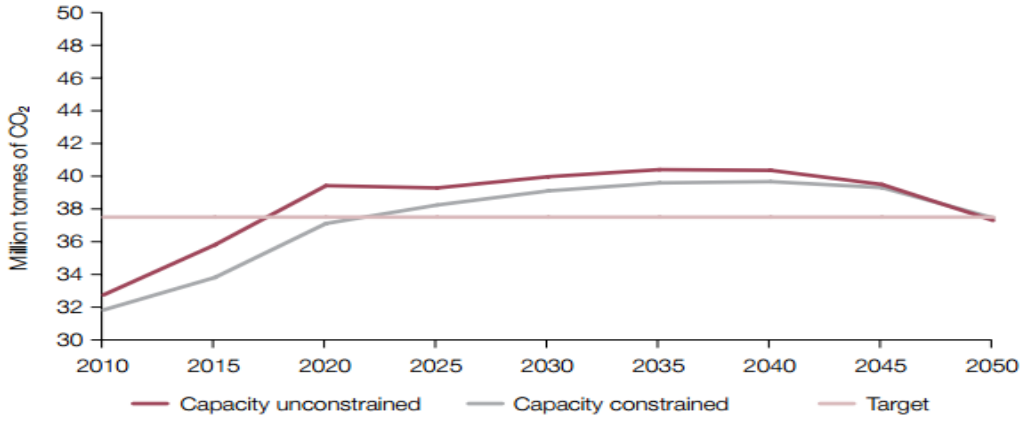
The Airports Commission's own figures[x] show in most of their scenarios that UK aviation carbon emissions go substantially over the 37.5 MtCO2 cap, even without a new runway.

Figure 5.4 Departing CO_2 forecasts without a carbon cap (carbon traded)



5.20 **Figure 5.5** shows the effect of increasing carbon prices to achieve the carbon cap, without making any additional or operational adjustments. The 37.5MtCO_2 target would be exceeded before it is achieved in 2050.

Figure 5.5 Departing CO_2 forecasts with carbon capped



https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/266670/airports-commission-interim-report-appendix-3.pdf

Airports Commission: Interim Report. Appendix 3: Technical Appendix. December 2013 Pages 71 & 72

At the time of its interim report, in December 2013, the Airports Commission produced revised forecasts of demand. They were 4 sets of national passenger forecasts – unconstrained / constrained and carbon traded / carbon capped. 'Unconstrained' forecasts assume there will be no constraints on runway capacity anywhere; 'constrained' forecasts assume no new runway capacity is built. The forecasts were considerably lower than the DfT's.

'Carbon traded' assumes carbon permits are traded on a carbon market. The carbon traded forecasts by the Commission led to CO2 emissions that were above the 37.5 Mt target. Detailed

carbon forecasts were not published, but figures for unconstrained (42.4 Mt CO2) and constrained (38.5MtCO2) passenger demand at 2050 are buried in the interim report appendix.

The Commission therefore produced 'Carbon capped' forecasts, which showed how much demand would need to reduce in order to meet the carbon cap. (The method was to progressively increase the assumed price of carbon and build it into the price of tickets, thereby reducing demand.) Without restrictions on runway capacity, ie unconstrained, the decrease in demand is 16%.

Even with no new runways, CO2 emissions resulting from the AC's forecasts for 2050 are greater than the 37.5 Mt target. The AC nonetheless recommended a new runway in the SE. It can thus be seen clearly that the Commission ignored the CO2 target when making its recommendation.

The graphs above, from the Airports Commission's Technical Appendix, December 2013, show how even with no new runway ("capacity constrained") carbon emissions rise well above the 37.5MtCO2 level. Somehow, with optimism, they seem to conveniently return to the target level by 2050, falling after 2040 through unknown and unspecified future policies.

These figures show that, unless blind faith and optimism are placed on future aviation developments, the UK cannot add a new runway in the South East, as well as allowing its regional airports to expand, **and** stay within its aviation carbon ceiling of 37.5 $MtCO_2$ per year.

How much carbon is likely to be emitted even with no new runway?

In January 2013 the Department for Transport (DfT) published its latest passenger and CO2 forecasts.[xi]The estimate of CO2 at 2050 was 47.0 Mt, well above the target of 37.5. This was for a 'constrained' scenario, ie no new runways in the UK, and just the expansion of air travel over time at all the UK's airports. The Airports Commission's figures (see above) also show the limit being exceeded, even with no runway.

Have the non-CO2 impacts of air travel been ignored?

Aircraft contribute to climate change not only by their carbon emissions, but also by other effects of thegases from their fuel combustion high in the atmosphere. These are called non-CO2 impacts, and includenitrogen oxides and water vapour. These impacts are also referred to as radiative forcing. The science about how much these increase the climate impact of airtravel is complicated and details are still unclear. But the impact may be to as much as double the CO2 itself.

The Commission has not included these impacts, saying that "options to reduce them will need to be developed over the comingyears."[xii]

Up till 2011 the DfT included a multiplier of 1.9 for the non-CO2 effects of air travel. In the DfT's "UK AirPassenger Demand and CO2 Forecasts", published in January 2009, a multiplier of 1.9 for "radiative forcing" was used.[xiii] Then, in the DfT Aviation Forecasts in August 2011[xiv], the multiplier is no longer used and in the DfT'sJanuary 2013 Aviation Forecasts there is not even a mention of radiative forcing. But the DEFRA/DECC carbon emission factors produced in 2012 and in 2013 both continue to usethe 1.9 multiplier.[xv]

Though there remains some uncertainty about the science, this does not seem to be sufficient justification for entirelyignoring the non-CO2 effects. If aviation's non-CO2 emissions were to be taken into account, with a multiplier of 1.9, this would meanan approximate doubling of the climate impact of the CO2 alone, produced by aviation. Taking the non-CO2 effects properly into account would mean a new runway in the South East could not be justified.

In order to more accurately and honestly account for the climate impact of UK air travel on climate, Government should commission work on how to take account of aviation's non-CO2 effects in its climate change policy. Continuing to ignore the issue is not acceptable.

What possible measures could be taken to keep UK aviation emissions below the limit, if a runway is built?

There are a number of possible measures that could be deployed to bring emissions within the target:

- Restrict growth at regional airports
- Not use the full capacity of the new runway
- Increase the price of tickets to reduce demand for air travel - and hence emissions.
- Introduce mandatory fuel efficiency measures

Each of these would demand a big policy shift and none are recommended by the Airports Commission. They are all highly problematic – and they throw into the severest doubt the Airports Commission's recommendation to build a new runway.

What would be the costs of failing to control aviation CO2?

In addition to advising on the 37.5 MtCO2 limit, the CCC also recommended that a revised economic appraisal should be carried out in which the price of carbon is increased in such a manner that emissions are reduced to keep within that limit. That means the cost of air travel would have to be increased, to curb demand, which means less growth, and smaller profits. The Airports Commission claims technical difficulties have prevented this being done earlier, and said it will do some further work. But the results will not be disclosed until after the Commission makes its final recommendation (1st July 2015)thereby preventing any public scrutiny.

The technical difficulty they have is that the carbon cost will "dominate" (the Commission's word)[xvi] the economic assessment. That means the net economic benefit would become negative, fatally undermining the AC's runway recommendation.

What can be done to limit aviation to 37.5 MtCO2 under the Climate Change Act?

- Ideally, effective international action will be taken, for example by regulating emissions using a charge or levy. Unfortunately the EU Emissions Trading System (ETS) was prevented from working.[xvii] There are hopes some market based mechanism will be agreed by ICAO,[xviii] but in reality, even the most optimistic outcome from the current talks would fall a long way shortof the action required to keep UK emissions to a level consistent with our climate target.

- If attempts were made to regulate aviation emissions using carbon taxes or charges the prices required would be impossibly high. For instance, while the price per tonne of carbon is now around £5, it would need to rise to over £1,000. That is not realistic.

- In fact, therefore, limiting the growth of airport capacity – by not adding another runway - is one of the few actions the Government can realistically take to help limit emissions growth.

In the absence of international measures to limit aviation CO2 emissions, or policies to restrict demand for air travel, avoiding the growth of airport capacity – by not adding another runway - is one of the few actions the Government can realistically take to help limit emissions growth

What would be the implications of building a new runway and allowing emissions to increase beyond 37.5 Mt?

We don't know. Neither the Airports Commission nor the Committee on Climate Change nor the Government has ever made this clear. The CCC's view is that an 85% average emissionscut from

non-aviation sectors is at the limit of what is feasible. [xix]Lord Deben, (CCC Chairman) said: "there is limited confidence about the scope for this." If aviation was permitted any further leniency on its CO2 emissions than is already planned for, it would require an impossible level of carbon reduction effort would be required from other sectors.

Whether or not a new runway goes ahead, the Government must show how emissions from aviation can be brought back to their 2005 level by 2050 (ie. 37.5 MtCO2 / year.

Might future governments decide to ignore the 37.5 MtCO2 limit for UK aviation?

There is always the possibility that a future government could renege on environmental legislation if business interests complain it damages the economy. However, the atmospheric level of CO2 rising rapidly each year, and is now above 400ppm.[xx] With ever growing global concern, it could be difficult politically for any government to change course. The Queen's Speech said the UK would seek effective global collaboration to combat climate change. In February David Cameron signed a statement that: "Climate change is one of the most serious threats facing the world today."[xxi] The government is proud of the lead it has given through the Climate Change Act.[xxii]

The carbon issue is a serious obstacle for UK aviation.
The environmental (including carbon) and economic arguments against a new runway at either Heathrow or Gatwick are so strong that the case for not building a new runway should be re-considered.

AirportWatch is an umbrella movement uniting the national environmental organisations, airport community groups, and individuals opposed to unsustainable aviation expansion, and its damaging environmental effects, including climate change and noise.

If you would like more information, or to discuss the issues, please get in touch.
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Briefing from AirportWatch (June 2015).
Briefings on other aspects of the runways debate are available at **http://tinyurl.com/MP-Briefings**

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