Implications of South East airport expansion for regional airports

Aviation Environment Federation, June 2014

Key findings

- Building a new runway in the South East would in practice mean that airport capacity elsewhere would need to be reduced in order for UK aviation to keep within carbon limits required by the Climate Change Act. This could involve closure of a number of regional airports.
- Government policy, however, supports the growth of regional airports, and official forecasts anticipate that they will grow by over 200% between now and 2050. Many airports in fact consider Government figures to be conservative. With politicians from all main parties having made commitments to supporting regional economic growth, capping or reducing aviation activity outside the South East would therefore require very significant hurdles to be overcome.
- By contrast, with full utilisation of current airport capacity, it would be challenging but achievable to keep aviation emissions to a level compatible with the Climate Change Act.

Introduction

The Airports Commission – set up to advise Government on aviation connectivity – concluded in its interim report at the end of 2013 that at least one new runway should be built in the South East and that climate change considerations need not preclude this. But the Committee on Climate Change has made clear in order to keep aviation emissions to a level compatible with the Climate Change Act, the overall level of passenger demand growth and Air Transport Movements (ATMs) will need to be constrained.

The next Government, in deciding whether or not to implement the advice of the Airports Commission, will need to balance the potential advantages of a new runway against the disadvantages and risks. While the Commission has reached its decision to recommend expansion regardless of any future analysis it may undertake concerning regional airport impacts, we question whether a new runway can be built in the South East without unacceptable consequences.

The analysis in this report – being based on information and figures that are currently in the public domain and on modelling by the Airports Commission and Government – does not provide detailed forecasts of the impact of a given runway option for particular airports. Instead it highlights the scale of the challenge in squeezing aviation expansion into climate constraints, with a particular focus on implications for regional airports. The scenarios for future demand that we have used are entirely illustrative and do not represent recommendations or anticipate actual policy positions.

Policy context

The Climate Change Act ensures that the UK remains on track to deliver at least an 80% emissions cut by 2050 based on 1990 levels. The same commitment has been made by all G8 nations, having been agreed to represent developed countries' share of the global emissions reduction required to limit global warming to no more than 2 degrees. The Act, which received such wide and cross-party political support when it was passed in 2008 that only 5 MPs voted against it, legislates that by 2050 total UK emissions may not exceed 160 Million tonnes of CO2. A series of carbon budgets ensure delivery of the long term target, overseen by the independent Committee on Climate Change.

Emissions from international aviation and shipping are not yet formally included in carbon budgets due to disagreement at the global level about how to allocate them to nations, but the Committee on Climate Change is required by the legislation to take these emissions into account when setting carbon budgets for other sectors. The CCC has always maintained that in order to deliver the fundamental objective of the Act for the UK to play its part in limiting the risk of dangerous levels of global warming, emissions from all sectors, including aviation, must be counted.

The Committee's approach has been to assume that by 2050 CO2 emissions from flights departing from the UK would be around the level that they were in 2005, namely 37.5 Mt (around 120% growth compared with 1990), and for other sectors of the economy to deliver 90% emissions cuts by 2050[1] compared to their 1990 levels in order to make up for the shortfall. Aviation –currently responsible for around 5% of UK CO2 emissions – will be responsible for around a quarter of national CO2 emissions by 2050 under this approach. Since CO2 emissions per air passenger are set to fall somewhat over time as a result of technological and operational improvements in aviation, around a 60% growth in air passengers would be possible between 2005 and 2050 without increasing emissions, the CCC has calculated.

In December 2013, the Airports Commission – set up to advise Government on future airport capacity needs and reporting immediately after the next election – argued in its interim report that a new runway should be built at Gatwick, Heathrow, or possibly on a new Thames Estuary site following further consideration of the feasibility of this option. This would be possible, the Commission claimed, without breaching the CO2 limits.

But while this is theoretically true, in reality – as the CCC's work has always made clear – there would need simultaneously to be limits imposed on other airports[2]. Not only would these airports be unable to grow to capacity, but measures would be required to prevent them from growing to the

[1] See for example page 76 of *Building a low carbon economy*, CCC 2008 http://archive.theccc.org.uk/aws3/TSO-ClimateChange.pdf

[2] The Committee's 2009 report *Meeting the UK aviation target* advised that in order to limit growth in air passengers to 60%, rather than the 200% increase that could arise between 2005 and 2050 in the absence of a carbon price and with unconstrained airport infrastructure, Government action would be required. The Committee avoided making any direct policy recommendations but noted that even the introduction of carbon trading for aviation – which has proved to be so politically difficult to implement that the coverage of aviation emissions under the EU ETS has been massively scaled back – would be insufficient, with further restraint required. The report says "The policy instruments which could achieve this restraint include a carbon tax on top of the forecast carbon price, limits to further airport expansion, and restrictions on the allocation of take-off and landing slots even where airports have the theoretical capacity available." (Executive Summary page 23).

levels currently predicted in official forecasts (which are already much lower than many airports' own ambitions) and in some cases a reduction compared with today's levels of air traffic would be needed. By contrast, the latest Government policy document on airports, the Aviation Policy Framework, makes no specific airport recommendations but sets out its general support for the growth of regional airports.

Neither the CCC, nor the Government, nor the Airports Commission has indicated either which airports should be constrained in order to meet climate objectives while building a new runway or what alternative package of policy measures could or should be implemented to limit emissions.

The Airports Commission's vision of a more London-centric airports system

The Airports Commission's recent call for evidence on regional airports did not directly discuss the possible implications for regional airports of South East expansion under a carbon cap. But it did make clear that while the Commission maintains its firm support for a new South East runway to bolster the UK's connectivity to emerging markets, it would not be opposed to some scaling back in capacity elsewhere. The paper suggests that:

- Consolidation of the UK's regional airports into fewer, larger airports could enhance regional connectivity, since larger airports serving bigger catchment areas could attract a wider range of services.
- As regional airports cater predominantly – and increasingly – to tourist travellers, their wider economic contribution to the UK is questionable, since they facilitate outbound as well as inbound tourism, with the former facilitating the spending of British money abroad (the phenomenon environmental organisations have called the 'tourism deficit')
- A drop in domestic travel connecting the regions with London – the other mainstay of regional airport traffic – has both preceded and outlasted the recession and may be related to long-term changes in the market arising from competition from improved rail services, the development of long haul routes from regional airports (such that passengers have no need to hub through London), and the relative attractiveness of overseas hubs.

The Commission's approach on this point, however, seems out of step not just with the commitment in Government policy to support regional airport growth but also with concern among leading politicians of all major parties about the need to 'rebalance' the UK economy by supporting regional economic growth.

Methodology

The majority of our analysis in this report uses the latest aviation forecasts from the Department for Transport, published in 2013. While the Airports Commission conducted its own forecasting in preparation for the interim report, we have, for two reasons, chosen not to use this for our main analysis. First, while the Commission has clearly conducted CO2 modelling of the airports system (see graph on p 7) it has not, unlike the Department for Transport, published airport-specific CO2 forecasts, which were essential for our calculations. Second, the Airports Commission is an

independent body advising Government. While it is at liberty to produce its own evidence, the Government has yet to indicate whether or not it will adopt the alternative forecasting methodology developed by the Commission. The 2013 DfT forecasts therefore remain the most recent official figures.

Estimating emissions from a new runway

The Airports Commission has now received detailed submissions from the proposers of all short-listed runway options, as well as in relation to a possible Thames Estuary site, and will publish its consideration of these in the autumn. While this analysis is likely to include the Commission's own forecasts of the carbon implications of the various options, it is possible for the purpose of this analysis to estimate these emissions now using existing Government CO2 forecasts. Sensitivity analysis comparing this with Heathrow's own estimate is included in Annex 1.

While our calculation is based on figures relating to Heathrow, we make no assumption about the new runway being at Heathrow rather than at Gatwick or in the Thames Estuary. Given both the Government's specification that the Airports Commission focus on maintaining the UK's hub status, and the focus throughout the Commission's work on the value of connectivity to emerging markets, however, Heathrow's current mix of predominantly long haul travel, together with some short haul and domestic aviation seems likely to provide a reasonable proxy for the anticipated use of a new runway. Gatwick's current focus on short haul leisure travel suggests that using historic emissions figures for Gatwick as the basis for likely emissions from a new runway would generate an underestimate. Wherever in the South East a runway is located, both the CO2 emissions from its flights and therefore the scale of impact on allowable CO2 from regional airports would be similar (assuming that each would result in a net increase of only one runway).

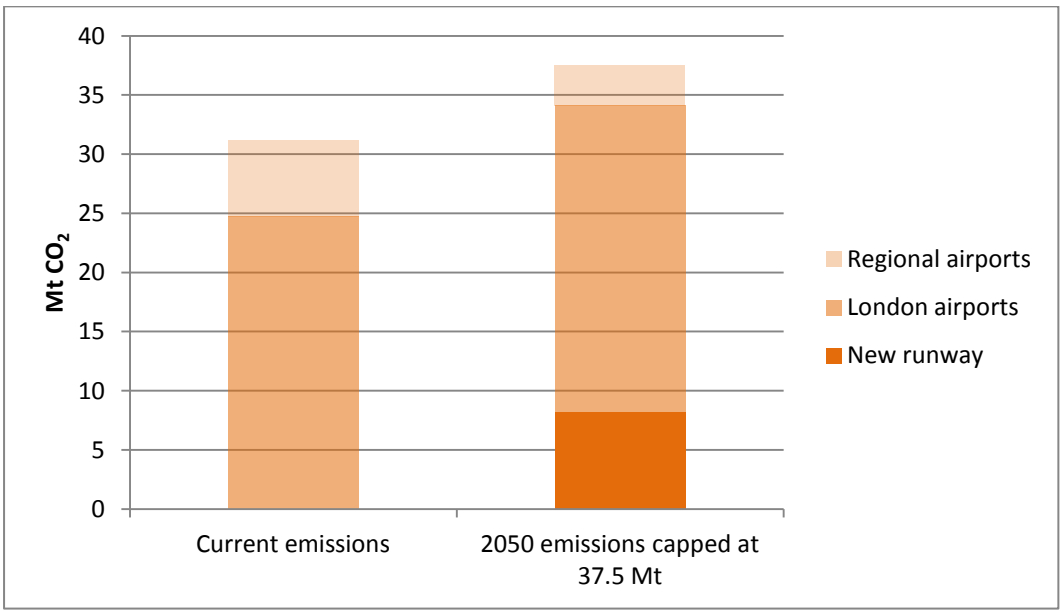
Our estimate of emissions from a new runway uses DfT forecasts of CO2 per passenger from Heathrow by 2050 with its current two runways together with Heathrow's own estimate of 2050 passenger numbers with a new runway. The figure for passenger numbers is slightly lower than the Airports Commission's estimate of unconstrained demand from Heathrow if a carbon cap was introduced. Emissions from ground-based sources are not included (but are likely to be small compared with emissions from flights). Our approach assumes that the future mix of traffic at a 3-runway airport is similar to the traffic mix that would operate from a 2-runway Heathrow.

Our calculations are summarised in the table below:

DfT forecast (2013) of emissions from Heathrow in 2050 with two runways	18.2 Mt CO2
DfT forecast (2013) of passengers from Heathrow in 2050 with two runways	92.9 million
Heathrow Airport forecast of passengers from the airport in 2050 with three runways	134.6 million
Implied total emissions from Heathrow in 2050 with three runways	26.4 Mt CO2[3]
Implied total emissions associated with a new runway	**8.2 Mt CO2**

[3] Heathrow with a third runway would therefore take up over 70% of the total CO2 available to UK aviation under a carbon cap

The chart below illustrates the proportion of total emissions that could be taken up by a new runway using this estimate, as well as how the emissions split between London and the regions could be impacted.



How aviation emissions are divided between London and regional airports both today and under a possible future scenario in which London airports fill to capacity but carbon is capped, requiring regional airports to be heavily constrained

Illustrative scenarios for regional airport activity with a new runway

In order to build some possible airport scenarios and test them against the emissions cap of 37.5 Mt, we have used 5 key sets of statistics:

1) Our estimate of emissions from a new runway (8.2 MtCO2 as explained in Annex 1)
2) Forecasts of CO2 from major UK airports in 2050 if traffic were to be kept at current levels. Since efficiency will improve over time, emissions associated with a given airport would fall by 2050 if traffic were kept constant. We have estimated 2050 emissions for this scenario by applying the DfT's efficiency assumption of 0.8% annually to the emissions per passenger in 2010 (this being the latest year for which DfT CO2 estimates by airport are available). Passenger numbers are from the CAA, in line with DfT practice.
3) Forecasts of CO2 from major airports in 2050 based on the DfT's 'constrained' (no new runways) model
4) Maximum airport capacity figures in million passengers per annum as estimated by the Airports Commission
5) Our 2011 analysis for WWF-UK on maximum airport capacities based not just on runway limits but on existing planning permissions and terminal facilities.

Airports have been categorised as either 'London' or 'regional' using the Airports Commission's categorisation, namely that Heathrow, Gatwick, Stansted, Luton, London City and Southend are all London airports and others are regional.

AEF illustrative scenarios for future UK aviation emissions, showing the potential impact of a new runway, with the emissions target shown as a red horizontal line

NOTES:

- In Scenario 1 - Latest Government Forecast, no new runway – the total national CO2 figure would reach 47 Mt if emissions from Assisted Power Units, freight and residual sources were included, but it is not possible to divide these emissions between regional and London airports based on publicly available data.
- In Scenario 2, an unspecified number of new runways are built.
- The DfT figure of 18.2 for CO2 emissions from a 2 runway Heathrow operating at maximum capacity has been used in all relevant scenarios.

Scenario 1: DfT Business as usual (47 Mt CO2)

As a baseline, it is helpful to note that even without building any new runways ('capacity constrained'), and assuming a continuation of Air Passenger Duty and the introduction of carbon trading for all flights departing the UK, emissions are forecast to substantially overshoot the 37.5 Mt target unless additional action is taken. The DfT 'constrained' scenario allows for incremental growth in terminal facilities if required.

Scenario 2: DfT no limits on airport capacity (56.4 Mt CO2)

The latest DfT forecasts did not include CO2 figures associated with unconstrained airport expansion. They did, however, include passenger forecasts under an unconstrained model. To estimate the associated CO2 emissions, we have multiplied these figures by airport by airport averages for emissions per passenger based on the constrained model. This scenario results in the largest overshoot of the target and is included to illustrate the significance of capacity constraints in controlling emissions. Our estimate excludes emissions associated with freight and ground-based aviation sources (estimated at 1.7 Mt in the constrained scenario).

*Scenario 3: New runway plus UK aviation network reduced to 4 airports only (*40.6 Mt CO2)

In this scenario, the policy approach would be to limit UK aviation only to those airports at which demand is likely to be strongest. A new runway would be built at either Heathrow or Gatwick and their existing runways used to capacity, in line with DfT forecasts. Manchester and Birmingham would also be used to their maximum capacity but all other airports would close. Even with these constraints, aviation emissions would overshoot the target.

Scenario 4: New runway but other London capacity reduced, regional airports grow to full capacity (48.5 Mt CO2)

An alternative approach would be to focus on the Government's commitment to support growth at regional airports. Having allowed for one new runway to be added and for two other London runways to operate either at Heathrow or with a traffic mix comparable to that of Heathrow today, all other London runways and airports would close. Regional airports are, by contrast, assumed to reach full capacity. This would result in a large overshoot of the aviation emissions target.

Scenario 5: New runway but other London capacity reduced, regional airports grow to their current forecast (45.8 Mt CO2)

This adopts a similar line to scenario 4 but scales back regional airport growth such that rather than reaching their maximum capacity regional airports are assumed to grow only to the level currently forecast by the Government's constrained model. (In reality regional airport forecasts would of course change if London airports were to close so the assumption is entirely illustrative.) This scenario would still, however, overshoot the target.

Scenario 6: New runway and London fills up, but no growth in regional airports (38.5 Mt CO2)

In this scenario the Government, recognising the strong demand for aviation in London and perhaps focussing on long-haul business connectivity, allows London airports to grow to capacity alongside the addition of a new runway. But to control emissions, regional airports are not permitted to grow beyond current levels. Given the data available (in particular the latest year for which the Government has forecast airport-by-airport CO2), we have used 2010 figures as a proxy for current levels.

While 'no growth over today's levels' may not sound like a particularly stringent control, as discussed in the next section it contrasts with a Government prediction of more than 200% growth in regional airports between now and 2050, so would in fact represent a dramatic reduction in the traffic many regional airports are currently anticipating. This scenario would bring aviation emissions close to the target, though there would still be an overshoot.

Scenario 7: New runway and London fills up, but regional airports close (34.1 Mt CO2)

This scenario is the only one of those illustrated that brings in which emissions fall below the target level, assumes that London airports, including a new runway, are the only ones in operation. The emissions headroom of 3.4 Mt CO2 could, however, be swallowed up by the inclusion of just one additional (regional) airport. Manchester and Birmingham are both already expected to exceed this emissions level by 2050 in the Government's 'constrained' scenario.

Scenario 8: No new runway, and other airports grow only within current planning limits

In 2011, AEF undertook research for WWF titled *Available UK airport capacity under a 2050 CO2 target for the aviation sector*[4]. It included detailed assessment of the UK's existing airport capacity defined not only in terms of maximum runway capacity but also current terminal infrastructure and planning permissions. This tighter definition of 'current capacity' than that used by DfT meant that our forecasts for maximum possible passenger throughput were lower than those in Government forecasts. The research found that if existing capacity was used to the maximum levels possible within current planning permissions, passenger growth of around 60% would be possible – exactly matching the level CCC had concluded was possible within a carbon cap of 37.5 Mt CO2.

By substituting the DfT's constrained passenger forecasts with our 2011 estimates of maximum passenger throughputs based on our tighter definition of constraint, we find that associated total CO2 emissions fall just below the 37.5 Mt threshold[5]. This suggests that the easiest way to ensure that UK aviation emissions are adequately controlled would be to impose a moratorium on airport expansion.

[4] http://www.aef.org.uk/?p=1393

[5] Some developments (for example at Southend, Birmingham and Luton) have taken place in the past three years which could increase somewhat the total available capacity but undertaking a full review of planning permissions was outside the scope of this analysis.

The implications of a "no growth" assumption for regional airports

Forecasts of growth at regional airports have been significantly scaled back in recent years, both by Government and by airports themselves, as is evident from revisions to airport master plans since the recession. Nevertheless, constraining airports to their 2010 levels of demand would mean curtailing very significantly the levels of growth currently predicted by the Department for Transport, the Airports Commission, and airports themselves.

The table below indicates the forecast levels of growth, in million passengers per annum (mppa), for London and regional airports as given by the DfT and the Airports Commission, with the DfT predicting that even with no expansion in current airport infrastructure and with aviation covered by a carbon trading scheme, regional airports would grow by 203% between 2010 and 2050. The Airports Commission, using an alternative methodology, predicts significantly lower growth at regional airports and their recent call for evidence indicates some of the possible reasons for the Commission's view that there are significant challenges for these airports in returning to earlier growth rates (see page 3). Nevertheless, the Commission forecasts an overall growth in demand at non-London airports of 147% between 2010 and 2050.

	2010 actual (mppa)	2050 forecast DfT constrained (mppa)	Percentage growth anticipated by DfT	2050 forecast Airports Commission constrained traded (mppa)	Percentage growth anticipated by Airports Commission
London airports	135.8	199.6	47	198	46
Regional airports	81.9	247.9	203	202	147

Airports' own traffic forecasts are published in the context of their master plans, which are designed to inform local people, planners, and airport shareholders about airports' future development plans. The significance of these plans in the local authority planning system – and specifically in considerations about land being earmarked for future use – was reaffirmed in 2012 by the National Planning Policy Framework. It is therefore important to highlight that regional airports' master plans consistently predict higher growth rates than those in official forecasts, and that this remains the case despite significant downgrading of many airports' traffic forecasts since the recession.

Newcastle Airport for example, which published a revised master plan in 2013, predicts that by 2030 it will be serving 8.5 mppa, in contrast with the DfT's estimate of 5.1 mppa, specifically stating that "We consider that the DfT forecasts underplay the potential of regional airports"[6]. Glasgow Airport's master plan, updated in 2011, predicts 16.4 mppa by 2040, compared with the DfT's figure of 9.7 mppa and Edinburgh expects 20.5, as against 17. Many airports have not updated their master plans since before the economic downturn and therefore continue to use figures that are even higher compared with DfT forecasts.

[6] http://www.newcastleairport.com/masterplan

Are there other ways for aviation to comply with the Climate Change Act?

Is the 37.5 Mt target level too demanding?

It is sometimes argued, for example by the industry body Sustainable Aviation, that rather than imposing a sector-specific emissions cap at UK level, the industry should instead be permitted to meet any emissions target imposed on it through unlimited purchase of carbon credits from international markets. The Airports Commission's modelling of how the airports system might operate within climate constraints therefore includes both a 'carbon capped' model run – where UK aviation emissions do not exceed 37.5 Mt in 2050 – and a 'carbon traded' scenario, where no UK cap is applied but the sector is included in a global emissions system. But there are a number of reasons why the latter approach would be problematic.

- Including aviation in our long term national-level target to bring emissions down to a total of 160 Mt by 2050 but allowing the sector to take up an even larger proportion of the total carbon pie than already assumed would place practically impossible burdens on other sectors that would be extraordinarily expensive to achieve.
- As no international carbon trading system for aviation yet exists, and even the modest step of including the sector in the EU's Emissions Trading system has been effectively blocked beyond application to intra-EU flights, allowing emissions to grow unabated in the hope that they will be reined in in future would be a highly risky strategy.
- Letting carbon traders manage the UK's climate strategy would be a bit like letting bankers run the economy. While there could undoubtedly be a role for an effective market-based mechanism for aviation emissions, it would be foolish to sit back and hope that the market will sort out emissions and that airlines will have perfect foresight in relation to potentially sky high carbon prices if the market runs its course. To ensure that markets work, the Government needs to take appropriate planning and investment decisions. This applies as much to aviation as to all other sectors of the economy, which is why the Climate Change Act was first introduced into legislation.

In fact, there are a number of ways in which the 37.5 Mt target could be regarded as not tough enough, and as potentially requiring further tightening.

- 37.5 Mt by 2050 represents around 120% growth compared with 1990 level**s**, as against the 90% cuts expected from most other sectors of the economy, many of which are far less discretionary than air travel. Propensity to fly correlates closely with income, so it is primarily higher earners who benefit from its lenient treatment compared with other sectors. Neither CCC nor the Government has ever produced analysis demonstrating improved environmental or economic efficiency or social benefit arising from allowing aviation more generous terms than other sectors of the UK economy.
- There is no safety net for non-CO2 impacts in a planning assumption based on either CO2 or CO2equivalent, the latter of which takes account only the Kyoto basket of gases. While climate scientists have yet to agree on the ideal metric to take account of aviation's non-CO2 impacts – principally NOx and water vapour – researchers reporting to the UN on this issue are engaged actively in resolving this difficulty. In the meantime, existing research strongly indicates that aviation emissions are around twice as harmful in terms of global warming as CO2 alone. Future

inclusion of non-CO2 impacts would therefore be very likely to significantly tighten the cap on aviation emissions.

- The 37.5 Mt target focuses on a particular point in time – 2050 – with nothing to prevent aviation emissions from growing above this level in the interim. Indeed, modelling by both the Committee on Climate Change and the Airports Commission anticipates that the level would be exceeded in the intervening years. Since CO2 accumulates in the atmosphere the total emitted over the next few decades is far more significant than the level emitted in 2050, so a strong case could be made for interim targets.

Are there other ways to achieve the 37.5 Mt target aside from restricting capacity?

Airport capacity restrictions are regarded by some as a crude and economically inefficient measure for managing emissions. Yet the reality is that even after all other feasible alternatives have been implemented, an emissions gap remains to be closed unless demand is constrained by supply and neither the Committee on Climate Change nor Government nor the Airports Commission has ever been able to say what package of policy measures would be required to meet a target of 37.5 Mt for aviation emissions by 2050.

The Department for Transport considered the marginal abatement cost of a number of possible aviation emissions mitigation measures as part of its 2011 response to the 2009 CCC report on aviation[7]. The report argued that "if all policies assessed were successfully implemented, and each of them achieved the central estimate of emissions savings, UK aviation emissions could be reduced by about 20 million tonnes of CO2 (MtCO2) in 2050. This would reduce the estimate of total UK aviation emissions in 2050 (in the absence of further government intervention) under our central baseline forecast to about 30 MtCO2 in 2050."

But the measures considered for analysis (early fleet retirement, introduction of a regulatory CO2 standard for aircraft, achievement if international fuel burn goals, operational improvements, incentives for biofuel use, and the provision of environmental information to passengers) have all been taken into account already in DfT and Airports Commission estimates of future carbon efficiency from aviation. The CCC's 2009 analysis rigorously reviewed these and other measures and concluded that a 0.8% average annual efficiency improvement could reasonably be assumed, and the Department for Transport's latest figures reach the same conclusion. Implementing all the policy measures considered in the 2011 MAC analysis to the extent anticipated in the 'central' forecast would require investment, international political commitment, and potentially sacrifices from other sectors of the economy (in relation to sustainable biofuel, which is in short supply) well beyond what is currently realistic.

The other approach to controlling aviation emissions, not covered in the MAC analysis, is through pricing. This could take the form of increases to Air Passenger Duty or agreement on an EU or global market-based measure (MBM) for aviation such as a carbon trading system. While both DfT and Airports Commission modelling assumes that such a scheme is in place in fact the EU ETS for aviation now covers only around 25% of EU aviation emissions after full implementation of the original

[7] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/4208/ccc-response.pdf

legislation was put on hold, and the UN process for agreeing a global aviation MBM faces significant hurdles and is unlikely to be built on the same targets and ambitions as the UK Climate Change Act.

Perhaps the easiest way to illustrate the financial – let alone political – cost of achieving the climate target for aviation while building a new runway is to note that in the modelling conducted by the Airports Commission achieving the 'carbon capped' scenario required assuming a £600 charge per tonne of CO2 if capacity was unconstrained. This compares with a 2013 average carbon price of around £3.60 per tonne.

Summary

Capping capacity may not at first glance appear the ideal solution to the aviation emissions challenges. Indeed the fact that emissions are forecast to exceed the 2050 target even without increasing runway capacity demonstrates that other measures – such as MBMs, taxes, carbon efficiency incentives, or a moratorium on any new planning permissions or terminal expansions – would need to be implemented even if no new runways were built in order to bring emissions down to the required level. But as we argued in our 2011 analysis for WWF, we believe that while challenging, the 37.5 Mt tonne target is – with a committed focus on making best use of existing airport capacity – achievable. With a new runway, by contrast, it would be effectively impossible.

Our airport capacity scenarios illustrate how difficult it would be to constrain demand to a target-compatible level if a new runway were to be built. The fact that the 37.5 Mt target would be breached even if regional airports were prevented from increasing their passenger throughput from today's levels (for example using powers available to the Secretary of State under the Civil Aviation Act) suggests that achieving the climate target while building a new South East runway would require an overall reduction in activity at regional airports. Not only would this be politically very difficult to implement and have significant economic consequences, it would also run directly counter to the Government's support for regional airport growth set out in the 2013 Aviation Policy Framework.

Annex 1: Sensitivity analysis

Comparison with Heathrow's own emissions estimate

Estimates of future aviation emissions vary according to assumptions made about the proportion of long haul versus short haul traffic using the airport, the degree of runway utilisation, future fuel efficiency and biofuel take-up, typical aircraft size (affecting emissions per passenger), and emissions associated with surface access and construction.

There has been very little transparency in the materials published by the shortlisted airport promoters concerning the emissions that would be generated as a result of expansion. While all scheme promoters were asked to estimate emissions associated with their proposal, only Heathrow Airport has so far, to our knowledge, made public its forecast, namely that total emissions in 2050 from an expanded airport would reach 15.4 Mt. The figure appears once only on page 319 of Volume 1 of the full technical specification to the Airports Commission, and no working is included to show how it was derived. No figures are currently in the public domain in relation to a Thames Estuary, Heathrow Hub or Gatwick option.

The difference between Heathrow's estimate and our own appears to relate largely to the efficiency assumptions used. Heathrow indicates that its own analysis assumes technology take up in line with predictions by the industry coalition Sustainable Aviation (SA). In 2012 SA published an updated 'CO2 roadmap' reflecting its ambition for emissions from aviation to fall by 54% between 2010 and 2050 as a result of ATM and operational improvements, technology development, and biofuel take up.

Recalculating our forecast for Heathrow emissions in 2050 using this assumption from SA in place of the DfT efficiency improvement forecast generates an emissions forecast of 17.8 Mt. The remaining discrepancy is likely to be attributable to the additional emissions associated with the landing and take-off cycle (included in DfT forecasts but covered only in a separate section and only up to 2030 by Heathrow), though it is also possible that the airport has additionally made slightly different assumptions on future traffic mix.

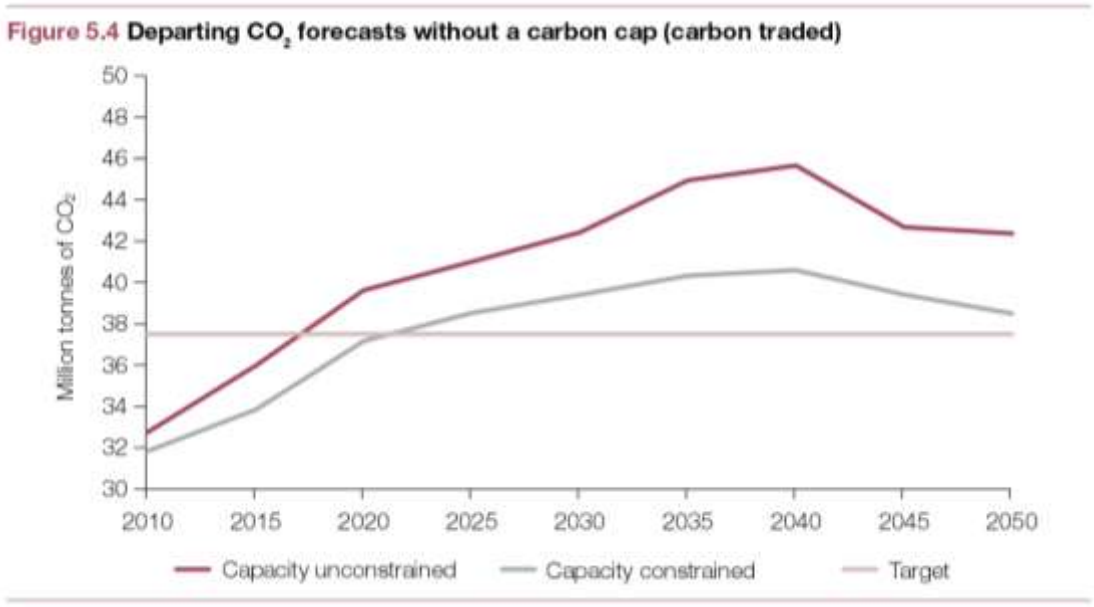
Given the consistency of the DfT's efficiency assumptions with those of independent bodies including the Committee on Climate Change UNEP our emissions forecast for a new runway uses the DfT assumption rather than Heathrow's much more optimistic figure.

Comparison with the Airports Commission's analysis of the emissions difference between constrained and unconstrained demand

The latest DfT forecasts indicate that with aviation emissions included in a global carbon trading scheme and APD retained at current levels, emissions would grow to 47 Mt CO2 by 2050 even with airport capacity constrained to current levels. DfT does not provide a CO2 forecast for unconstrained airport expansion, but our estimate using the per passenger emissions figures derived from constrained forecasts is that the national total would reach 56.4 Mt CO2 – an increase of 9.4 Mt compared with the constrained scenario.

The Airports Commission provides a forecast for total aviation CO2 both with and without runway constraints[8]. Although both its CO2 and demand estimates are lower than the official figures (lower growth at regional airports is predicted and the assumed annual efficiency improvement is higher) emissions are still forecast to overshoot 37.5 Mt by 2050 without any increase in runways and to overshoot it significantly if new runways are built. The graph below suggests an economy-wide emissions difference of around 5 Mt by 2050 if capacity is unconstrained.

Neither estimate for the emissions gap between constrained and unconstrained scenarios is suitable for use in our analysis since both figures concern overall emissions rather than those specifically from one new runway (and the consequences for other airports under a carbon cap). In addition, an unconstrained scenario could require more than one additional runway. But these findings do underline the important role of airport capacity in constraining emissions.



From Appendix 3 of the Airports Commission's interim report

[8] Appendix 3 of the Interim Report, page 71