

Metropolitan Transport Research Unit

The Cost-Benefit Analysis of a Third Runway at Heathrow – an Independent Assessment commissioned by WWF-UK

Part One Economic Benefits

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1 Introduction

MTRU has been engaged by WWF-UK to undertake the following tasks in relation to the Cost-Benefit Analysis (CBA) published as an annex to the Government consultation *Adding capacity at Heathrow airport*ⁱ. These relate to the impact on the Net Present Value (NPV) and Benefit to Cost Ratio (BCR) of the proposals which would arise from using different but reasonable assumptions about the inputs to the analysis. The changed inputs are summarised below.

NEW INPUTS

- Oil price to reflect current price of over \$100 a barrel (instead of the UK Government assumption of \$65 today falling to \$53 by 2012 and remaining at that price indefinitely)
- Taxation revenues, for example from Air Passenger Duty (or its replacement), treated as neutral in the appraisal
- Substitution of corporate air travel by improvements to electronic communications, in particular strong promotion of video conferencing
- Transfer of short distance flights to rail, both in UK and for nearby EU destinations such as Paris and Brussels
- The cost of carbon raised above the average figure used by Government, in particular the test used until 2007 of doubling the central estimate.

The different inputs would be tested individually and, where appropriate, incrementally. As far as possible all would be tested together for a final assessment.

It should be noted that some of these tests require information additional to that in the spreadsheets supplied by the Department for Transport . This data may require more detailed modelling, and where it is not available, a best estimate has been undertaken using what is available.

In fact, the elements can be divided between those which may affect the cost benefit appraisal, without any change in overall demand (Group 1), and those which slow down the predicted major growth in air travel (Group 2). The latter will effectively remove the benefits which are currently included in the cost benefit appraisal. This is because these benefits stem from increased capacity “releasing” future forecast demand which is suppressed by not expanding airports to cater for it. In the absence of suppressed demand, there is little or no benefit from adding capacity.

This Part 1 Report deals with the Group 1 sensitivities of the economic analysis and is based entirely on the DfT spreadsheets.

2 Approach for this study

The appraisal of Heathrow options has been undertaken by DfT using costs and benefits up to 2080. The benefits are derived from releasing demand to travel by air which would in future years be restrained by a lack of runway capacity. Future year money values are reduced (discounted) at a rate of 3.5% per year for the first 30 years and 3% thereafter.

Judging sensitivity using DfT spreadsheets

The available spreadsheets used by DfT to assess the NPV (entitled SCAB) do not contain a passenger demand model which allows easy calculation of the impact of different oil prices. This model has been run for other scenarios and some of the assumptions behind it have been published. It is run in conjunction with a model which allocates demand between airports. This is entitled NAPALM (or NAPAM) and has not been released for public use.

The normal aviation appraisal process can thus be described as: Aviation Demand Model, then NAPALM, then SCAB.

For this study, it is possible to divide the tests into two groups. The first can be undertaken using the SCAB spreadsheets alone (the final stage above). This includes carbon price and removing taxation effects. These recalculations should be consistent with Government figures.

Impact of the low estimate for surface access

It should be noted that they include the estimated cost of noise and the estimated benefit from reduced delays. However, they are for the low estimate for infrastructure costs for surface transport. The additional cost for this is uncertain, but the Government has used £800 million in its overall assessment. This would itself have a significant impact on both the NPV and BCR, reducing the NPV by 15%.

Importance of foreign user benefits

It should also be noted that when the benefits of Heathrow expansion are separately calculated for UK users and foreign users, the latter are very significant. They represent a third of generated user benefits, most of which go to people who would not otherwise have travelled. However, when the NPV is considered, which takes into account the costs of the scheme, the foreign user benefits represent just over half (52%) of the net value. These are extremely high figures.

Excluding such benefits would also mean that the Benefit to Cost Ratio (BCR), which is often quoted to justify the Heathrow expansion, would fall from 2.33 to 1.64. Further details of this are set out in Section 3. This is

clearly a very important consideration in terms of who benefits from UK public expenditure.

The Treasury Guidance on appraisal recommends the separate calculation of benefits to UK residents and non-residents and goes on to say that

“proposals should not proceed if, despite a net benefit overall, there is a net cost to the UK”ⁱⁱ.

Baseline with and without Stansted expansion

The second group involves making simplifying assumptions to adjust demand forecasts and their impact on the benefits. This also allows some comparisons with the sensitivity tests in the Government’s latest aviation forecasting report.ⁱⁱⁱ

The desired baseline for the study was no additional runway at either Stansted or Heathrow. The original spreadsheets supplied had analysed Heathrow with an additional runway at Stansted. It was clear that benefits would be higher for Heathrow if Stansted did not have an additional runway. Following our request, the DfT has supplied a version without the Stansted capacity and this has been used to produce a further set of figures which are set out in this report. The overall demand calculations are not dependent on assumptions about Stansted capacity.

The next section sets out the results for the Group 1 effects, based on the supplied DfT spreadsheets^{iv}.

3 Group 1: carbon cost and tax adjustments

Overview

The current spreadsheet cost and benefit values for the third Heathrow runway are set out below, together with the revised values when APD is removed from the calculation and when carbon cost is doubled.

The standard measure for value for money in transport investment is the Benefit to Cost Ratio (BCR). This takes all the benefits for the chosen period (in the case of Heathrow up to 2080), after discounting, and compares them to the costs of construction and maintenance, also discounted to the same base year. DfT give the following guidance on transport schemes^v:

- *“Poor value for money if its BCR is less than 1*
- *Low value for money if its BCR is between 1 and 1.5*
- *Medium value for money if its BCR is between 1.5 and 2*
- *High value for money if its BCR is over 2”*

It goes on to say that:

“Advice to Ministers should reflect the presumption that, purely on grounds of value for money, we should generally fund:

- *No projects with poor VfM*
- *Very few projects with low VfM*
- *Some, but by no means all, projects with medium VfM*
- *Most, if not all, projects with high VfM”*

The procedure used for this report is to adjust the SCAB worksheets, and include the noise costs (estimated as £0.3billion over the whole period) in the economic summary^{vi}. Reduced delays are not included since these arise from mixed mode working and this is not included in the base figures for this report. Figures are given separately for UK residents and others, in line with Treasury Guidance^{vii}.

Table 1

SCAB economic costs and benefits

Heathrow 3rd Runway: no mixed mode working, no Stansted 2nd runway

	NPV (all) £mn	NPV (UK) £mn	BCR (all)	BCR (UK users only)
DfT Base	£9,053.68	£4,469.43	2.29	1.61
APD removed	£5,901.31	£1,317.05	1.83	1.15
Carbon price doubled	£3,602.25	-£982.01	1.49	0.81
Both the above	£449.87	-£4,134.38	1.02	0.35

As noted above, these figures are based on the low estimate for Heathrow surface access costs. The high estimate would reduce the NPV by £800million. The spreadsheet summaries are attached at the end of the report.

Since the spreadsheet without an additional Stansted runway in the base arrived after the initial calculations had been completed, the equivalent figures for the benefits of a Heathrow third runway, if a second runway were added to Stansted, are given in Table 2 below.

Table 2

**SCAB economic costs and benefits
Heathrow 3rd Runway: no mixed mode working, assumes
Stansted additional runway**

	NPV (all) £mn	NPV (UK) £mn	BCR (all)	BCR (UK users only)
DfT Base	5449.54	2,632.85	1.80	1.39
APD removed	2,354.35	-462.34	1.30	0.89
Carbon price doubled	610.56	-2,206.13	1.05	0.63
Both above	-2,484.63	-5,301.32	0.59	0.17

In order to check that the spreadsheet values are compatible with the figures in the Consultation document, the values from the two sources were adjusted for delays and noise and put on a comparable basis. The results are shown in Annex 1. This shows that the figures are virtually identical, suggesting the spreadsheets can be used without further adjustment.

Treatment of tax revenues in other transport appraisals

The Government uses similar appraisal techniques for other transport schemes and these are covered by guidance, published on the web^{viii}. The consultation document states that these are generally followed, but there are significant differences in relation to tax revenues.

In webtag, revenues are usually deducted from or added to the public expenditure capital costs. The SCAB format includes them with the other costs and benefits. This is not particularly significant.

In addition, webtag advises that tax losses also need to be included in the appraisal. Thus, if people spend their income on a tax free activity, there is a tax loss, usually estimated at 20.39%. This is the tax loss adjustment applied to all public transport schemes, because fares are zero rated. Aviation fares are also zero rated, however some tax is collected through APD.

Thus, to be consistent with webtag, the tax loss should be calculated and included in the appraisal as a cost. This would be reduced by the amount collected in APD. Since it is clear that the tax loss far exceeds the APD income (by at least a factor of 2), the appraisal would be significantly affected.

If the current appraisal were to conform to current webtag guidance, the BCR should not just have the APD removed, as in the above Table, but have a large extra cost imposed.

At the time of writing, the treatment of tax revenues is undergoing review as part of the NATA Refresh process^{ix}. This is partly because of the perceived unfairness to public transport. This may well lead to the double entry of tax revenues in appraisal, or separately reporting them outside the cost benefit calculation. This would effectively eliminate their impact. The approach for this report has been to assume that this reform is carried out. If it were not, and the current practice were continued, the reduction in the Heathrow runway BCR would be even more dramatic.

Conclusions on Group 1 economic impacts

Schemes which have a BCR of 2 or more are generally considered to be worth pursuing, while those below 1.5 are not. A BCR of 1 is “break even” so below 1 effectively means that the expenditure creates a loss.

It is clear from the two tests above that the BCRs for Heathrow are mostly in the low value for money category and that such schemes would not normally proceed.

One of the calculations above is not really a sensitivity test. In view of the webtag position described above, the base figures in the consultation document should have at least removed APD from the economic calculations. This alone would have changed the overall conclusion that the Heathrow 3rd runway proposal was economically attractive. This should be considered as the base position. It is worth noting that this assumes the reform of the appraisal system. Without such reform, a balancing tax loss figure should be included. This would have a far stronger effect than the removal of APD, sufficient to reduce the BCR below 1.

In addition, there must be concern that the benefits for non-UK residents have been included in the appraisal, something which is not recommended by the Treasury Guidance. Adjusting for this factor would reduce the BCR for the DfT base case from 2.29 to 1.61. It would move all other tests into the poor to low value for money categories. Again this should indicate that the economic case for the Heathrow expansion is very weak if benefits to non-UK residents are excluded.

Part 2 of the study will consider changes to the overall level of demand for air travel.

Annex

Table A1

Comparison of Heathrow consultation document costs and benefits and SCAB spreadsheets

<i>Present Values</i>	<i>SCAB</i>	<i>Consultation Annex B</i>
	<i>Option PSDH2a</i>	<i>Option 1</i>
<i>Benefits</i>	17.1	17.1
<i>Costs</i>	11.6 + .3 (noise)	11.9
	<i>Option PSDH4a</i>	<i>Option 2</i>
<i>Benefits</i>	17.3 + 1.5 (delays)	18.6
<i>Costs</i>	12.3 + .3 (noise)	12.5
	<i>Option s05a</i>	<i>Scenario S05</i>
<i>Benefits</i>	21.0	21.0
<i>Costs</i>	12.2 + .3 (noise)	12.5

Please note: spreadsheet values have been set out in a comparable manner to the consultation. Thus the costs include construction, carbon and noise. On the other hand, benefits are gross - i.e. not with carbon and noise disbenefits deducted as in the spreadsheet.

References

- i *Adding capacity at Heathrow airport*, Consultation document, DfT, 2007
- ii *Treasury Green Book*, HM Treasury 2003, Section 5.25, & footnote 4
- iii *UK Air Passenger Demand and CO2 Forecasts*, November 2007, DfT
- iv SCAB spreadsheets as supplied by DfT, filenames “SCAB26_PSDH2a”, “SCAB26_PSDH4a” and “SCAB26_s05a”
- v See *Guidance on value for money*, DfT, on <http://www.dft.gov.uk/about/howthedftworks/vfm/guidanceonvalueformoney?page=1>
- vi Spreadsheets as supplied by DfT, filenames “071101 Heathrow Noise Version 2” and “Delay Spreadsheets”
- vii *Treasury Green Book*, HM Treasury 2003, Section 5.25, & footnote 4
- viii See www.webtag.org.uk
- ix For a more detailed discussion see: *Decision making for sustainable transport*, MTRU, February 2008