Flying into the Future:

Key issues for assessing Britain's Aviation infrastructure needs

April 2013

Submitted as a response to the Airports Commission as a response to the 'Aviation Connectivity and the Economy' paper.

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Report by the ITC

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Acknowledgements

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The report has been authored by David Gray in consultation with the ITC Steering Group. This was chaired by Dr Stephen Hickey, and included Simon Linnett, Professor Peter Jones, and Dr Matthew Niblett.

Executive Summary

Background

1. The future of our airports infrastructure, particularly in South East England, is one of the most important, but most contentious, challenges facing the UK. The ITC has therefore commissioned this review with the aim of identifying and exploring the major issues surrounding airport development in the UK over the longer term. It aims to illuminate the debate and identify key areas for further work, not to recommend a single solution. The research in this report is based on existing data as well as the wide range of evidence submitted to the ITC's Call for Evidence in Autumn 2012.
2. The ITC believes that it is vital for our future prosperity that the UK maintains an excellent level of global connectivity, particularly - but not exclusively - in the South-East. To secure such connectivity major decisions need to be taken on a long-term strategy for the UK's aviation infrastructure. We therefore welcome the establishment of the Airports Commission led by Sir Howard Davies, and offer our analysis and recommendations as a response to the Guidance Documents it has issued.

The Connectivity Challenge

3. Connectivity has always been essential for economic prosperity. Today connectivity by air is critical. Cities, regions and countries all benefit from good connectivity. If the UK is to flourish it requires good connectivity. And although the current debate is focussed on the South East, where the issues are most acute, it is important for all regions.

4. Good connectivity isn't simply a question of airport capacity. It is about the passenger's end-to-end experience of getting from start point to an end-destination. Good connectivity involves having a wide choice of destinations, the ability to fly direct (rather than via intermediate airports), good surface access to airports, a high frequency of services, flights at convenient times of day, reliability, and resilience in the face of adverse weather or operational problems. It's about freight as well as people. Different users give different weighting to issues including price, frequency, time, and comfort. The ITC recommends that all these factors are taken into account when developing a long-term aviation strategy.

5. People prefer to fly direct, from a local airport and to their end destinations. Having to travel far to/from the airport, and having to change, is second-best (though often unavoidable) for connectivity.

6. The UK has benefited from good connectivity: we have lots of airports able to serve Europe and beyond, including intermediate hubs through which you can get to anywhere else (if you change). One airport (Heathrow) has also been able to provide regular direct connectivity to a wide range of global destinations, by aggregating local, regional and transfer passengers, plus freight, and so making such flights commercially viable.

7. Looking ahead:

a) the importance of air connectivity in a globalised world is increasing rather than diminishing; long-haul connectivity is particularly important as economic focus diversifies;

b) demand is still expected to rise very strongly, despite downwards revisions to forecasts;

c) significant growth can be accommodated within the UK's CO_2 targets (following the advice of the Committee on Climate Change);

d) capacity constraints are biting strongly at Heathrow already, and are predicted to bite on all SE airports by around 2030 - and perhaps even wider by the mid-century. Details and the exact timing are open to debate: but available evidence suggests this is a real and growing problem, at least in the SE;

e) other major European (and global) airports are continuing to expand and compete for the role of aggregating enough traffic to support regular, long-haul, direct services to a broad range of global destinations. Heathrow is one of a handful in this competition and, if nothing happens, is likely to fall further behind.

8. So we see two distinct connectivity challenges:

- to long-haul connectivity, where the risk - already emerging - is that the UK ceases to host one of the top European hubs; and so loses the connectivity premium of direct communications (rather than via intermediate 3rd-country hubs) with the rest of the world;

- to short-haul connectivity, if the other SE airports in particular become unable to provide the services people want and need.

Strategic Options

9. We believe the long-term solutions to these challenges are also distinct (though overlapping).

10. There are larger local markets for short-haul than for long-haul flights; and smaller planes are more viable for them. The best connectivity is to/from your local airport. Putting these together, short-haul connectivity challenges, taken in isolation, could be met by developing regional airports. Since the South-East faces greatest pressure, this points to "distributed" strategy, developing (e.g.) Gatwick, Birmingham, Luton, Stansted etc. This indicates a relatively incremental developmental strategy, with more elements than just new capacity. Both Birmingham and Gatwick, for example, have put forward packages of improvements which might be implemented relatively soon.

11. However, long-haul direct connectivity generally needs larger, more expensive, aircraft. To run these profitably - on a regular, frequent, all-year basis to a wide range of destinations - requires aggregation of local, regional and international transfer passengers, plus freight. This requires a hub airport, with the scale and flexibility to

bring together and then distribute outwards these diverse streams. Hubs with a strong local market (like London) start with a natural advantage. But hubs with more limited local markets but with the necessary scale and capacity can compensate by aggregating more passengers from elsewhere: so Schiphol and even Dubai, with relatively weak local markets, can compete effectively through scale.

12. So excellent long-haul connectivity - regular, frequent, direct flights to the widest range of global destinations - means hosting one of the top-tier European hubs. This means an airport with significantly more capacity than Heathrow today - not just to enable more long-haul routes, and the feeder traffic to support them, but also for other key elements of connectivity: reliability and resilience (implying that capacity is not used routinely to the theoretical maximum); and the environmental benefits of reduced stacking in the air and queuing on the ground. We note that most major hubs have at least 4 runways, though not used to the maximum. More detailed work is needed on whether this is essential for foreseeable future UK connectivity needs or whether a 3-runway hub would suffice.

13. We conclude, therefore, that the optimal connectivity strategy for the UK will require both better local, short-haul, connectivity through regional airports; and also ensuring we continue to host one of Europe's top-tier hub airports. The latter is much more difficult and contentious than the former. But both are necessary if we are to maximise the benefits of good connectivity.[1]

14. If this conclusion is accepted, the difficult decision on where a single major hub airport should be located needs to be faced. We discount options such as 2 airports operating in unison as an "interconnected" hub, or developing 2 airports as separate, competing, hubs. We believe the first would not work in practice; and the latter would mean the UK had two second-division hubs, with the likelihood that more long-haul connectivity would actually be channelled through one of the top-tier European hubs instead. If the UK is to continue to get the connectivity premium of hosting a major hub, in our view there can only be one.

15. On the basis of the evidence we've received, we judge that there are 3 plausible options for this hub: Heathrow, Stansted or a new Thames airport. Any of these has great difficulties and will arouse huge opposition, particularly locally. The "easiest" option is not to bother and allow the UK to lose its central role in global connectivity.

Key Issues/Criteria for Assessment

16. If the Airports Commission agrees the challenge should be faced, it needs to agree criteria for selecting between the hub options. Several commentators have made suggestions and we propose 7 main categories of criteria: i) Surface transport, ii) Local and regional impacts, iii) Timescale for delivery, iv) Cost and financing,

[1] We recognise, of course, that the picture is more complex than briefly summarised here: "regional" airports can provide some direct long-haul services and could offer more in future with more capacity, more modern planes etc. And a better hub would also offer improved short-haul services. Nevertheless, we have seen no convincing evidence that the fundamentals of aviation economics, and particularly the need for aggregation to support regular, frequent, direct connections to a wide range of long-haul global destinations, is likely to change in the near future.

v) Noise, vi) Environmental issues, vii) Airspace, safety and regulation.

17. Detailed proposals have not yet been published, so it is too soon to reach a definitive view between the possible hub locations. Our preliminary view, which we invite the Airports Commission to test and challenge based on each of the options, is as follows:

18. On surface transport, Heathrow's strength is its existing connections, its accessibility not just to London but to other parts of the UK, the planned link to Crossrail, and the potential link with HS2. But it would also need to improve its road capacity and other links, for example, towards the south. Stansted is less accessible and would need to upgrade both its road and rail links, perhaps with a link to Crossrail. A new Thames airport would require more passengers to travel through London and would need major new road and rail infrastructure, including a link to HS1.

19. Local and regional impacts of any option would be significant and contentious. Heathrow's strength is in developing from an existing base, while a Stansted hub or a new Thames Estuary airport would involve building from scratch a wide range of new infrastructure, including new housing, schools, and local facilities. At Stansted, we estimate that this would involve building the equivalent of a town the size of Peterborough to serve a hub with three or more runways. All options could involve contentious losses to existing local homes.

20. If the UK hub was to be either Stansted or a new Thames airport, we believe that Heathrow would have to close as a major airport. This would have massive implications for local jobs and businesses depending on it. There would clearly be huge new economic opportunities near the new airport, and Heathrow itself would be attractive for business and residential development. But we believe the Airports Commission needs to consider very seriously the implications of the closure.

21. The timescale for any of the options could be long. The rest of the world will not stand still and wait for the UK to decide, plan and build. Developing an existing airport is likely to be quicker than an entirely new one with its essential supporting infrastructure (surface transport, housing, schools etc).

22. Cost and financing. Building a major new Thames airport, plus its supporting infrastructure, will be much more expensive than expanding an existing airport. The costs will include the airport itself, the new supporting infrastructure (roads, rail, housing etc), and any compensation which may be needed if - as we assume - Heathrow has to close (net of the residual value of the asset). Aviation investment in the UK is for the private sector. But the more new supporting infrastructure is needed - roads, rail links, housing - it is likely that more taxpayer investment would also be required.

23. From a connectivity perspective, the issue on costs is how far the eventual charges for passengers and airlines - who ultimately decide where to locate their operations - might need to rise. We are concerned that - on the basis of inevitably broad-brush initial estimates - to generate acceptable returns to reward investment, a large new Thames airport could need to charge substantially more not just than current charges

but than its European competitors. Although the same issues could arise with Stansted and, to a lesser extent, an expanded Heathrow, at this stage we believe the risks there would be more manageable. But Heathrow already charges more than its continental competitors and we believe the Airports Commission needs to consider very carefully not just the costs of each proposal but whether the likely fees which would - eventually - need to be charged would impact its economic viability in a competitive market.

24. Noise is a huge issue, particularly for Heathrow. The number of people exposed to aircraft noise is far higher there than anywhere else, and it was fundamental to the objections to previous proposals to expand the airport. Noise would be a far lesser issue at either Stansted or a new Thames airport. Noise is also far more intrusive in the early morning when the pressure of demand for arrivals from the emerging and growing markets of Asia dominate; a particular challenge for Heathrow. Noise levels have fallen significantly and are likely to continue downwards, so we do not consider it axiomatic that noise should necessarily decide the issue and in effect require Heathrow to close. But we believe that a credible Heathrow plan needs to show whether a package such as further moves to quieter aircraft, noise envelopes, local mitigation and compensation measures and a robust framework for enforcement and local engagement could enable the airport to expand capacity while containing the problem and even reducing it further over the longer term.

25. Environmental issues. For Heathrow the main concern is local pollution, largely from vehicles. For Stansted and a Thames airport the issues would include the loss of green environments and natural habitats. These are highly contentious issues and all proposals will be subject to serious challenge. It is essential, therefore, that the Airports Commission ensures an early and full assessment of these issues, and the potential scope for mitigation measures.

26. Airspace, safety and regulatory issues. The UK's aviation safety record in recent years has been good, but decisions are needed on the wisdom of continuing to fly across London (if Heathrow is not to be closed), or taking off over east London (depending on the flight path for a new Thames airport), and the recognised issues of bird strike, the sunken munitions ship etc. The Airports Commission will need to be satisfied that a major hub to the east of London would not raise unduly difficult issues in managing airspace, given the proximity to other international and local airports and the potential implications for them. Finally, we propose that, to ensure continuing challenge and innovation, a decision to develop a major UK hub - wherever located - should be accompanied by reconsideration by the CAA of whether the other airports could be deregulated.

Conclusions

27. Maintaining and improving the UK's global connectivity is, we believe, crucial for continued prosperity and jobs. We conclude that this will require both hosting a top-tier hub – since this is the key to enjoying frequent, regular, direct connections to the widest possible range of global destinations – and enabling local and regional airports to develop, to meet the growing need for short-haul connectivity and enabling them, where they wish, to compete in other markets.

28. All options for developing a single major hub are difficult and controversial. We propose a number of key criteria that should be used in evaluating the alternative options, and in particular we highlight the following:

    - the need to assess the impact on airport charges of each of the options;
    - the need to thoroughly assess the consequences of closing Heathrow if an alternative site for the UK's major hub is chosen;
    - the need for a credible plan to mitigate and reduce aircraft noise over London if expansion is recommended at Heathrow;
    - the importance of conducting key environmental assessments at an early stage.

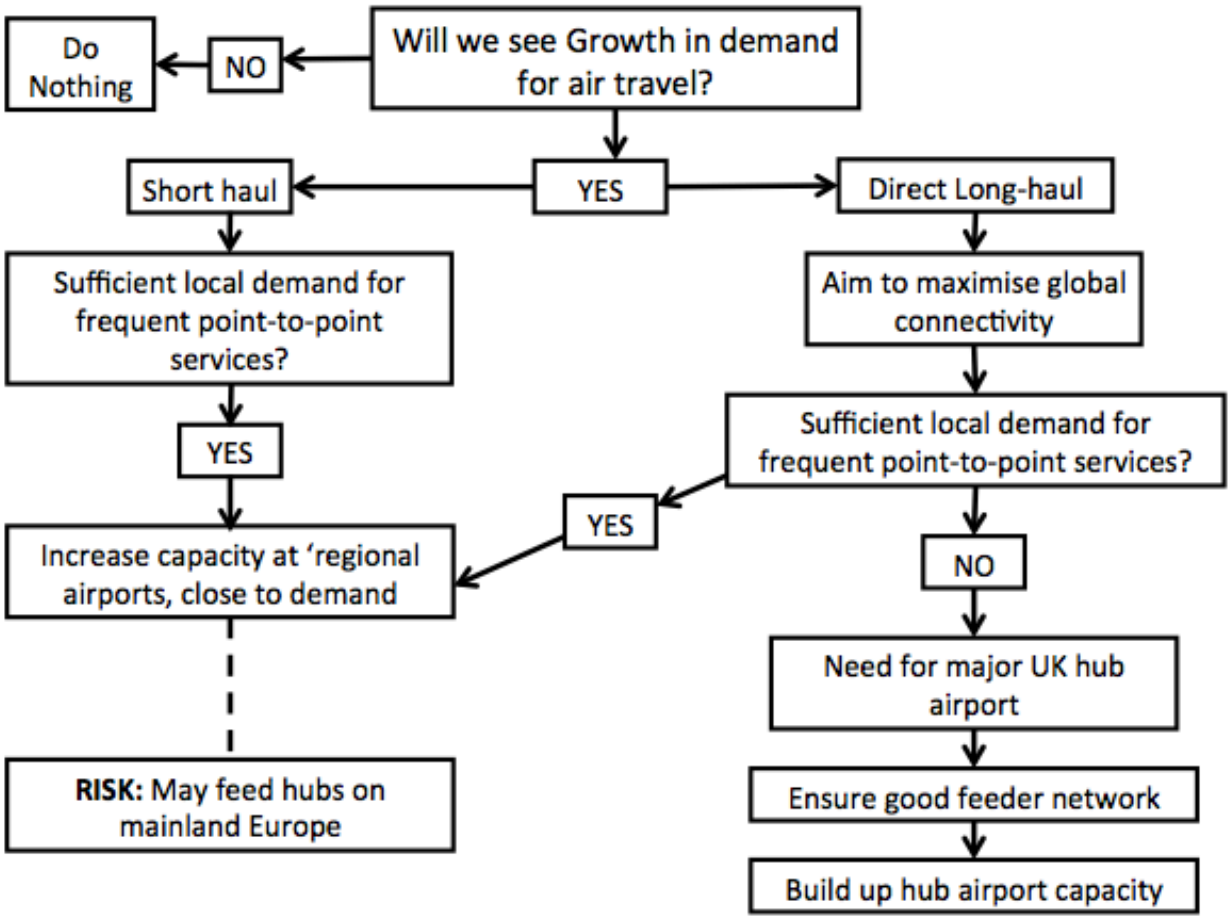
29. We also put forward the following **recommendations** to the Airports Commission to consider in its future work:

    - In considering how the UK should respond to future demand the Commission should focus on connectivity, not simply capacity.
    - It should consider whether there is a need to commission further work to clarify what "good connectivity" to/from the UK, and particularly the South East, means – what do we want/need in terms of connectivity to global markets; how far it can be met by point-to-point; and whether, as we fear on the basis of the evidence so far, connectivity is under threat from the trend for hub-dependent, long-haul routes to be focussed round non-UK airports.
    - The Commission should consider very seriously the options for enhancing capacity at regional and local airports as a (relatively) straightforward way of addressing an important element in the overall connectivity challenge - the need to ensure continuing short-haul capacity in the South East (near term) and elsewhere (by the mid-century).
    - The Commission should assess the necessary size of a future hub airport to ensure the UK maintains its position in the long-haul connectivity marketplace, including appropriate margins for resilience.
    - The Commission should ensure that the implications of closing Heathrow – both positive and negative - are comprehensively considered.
    - The Commission should consider the case for any public sector contribution, for example towards road and rail infrastructure, or any Government guarantees; and whether this has any implications for State aid.
    - Further work should be done on a range of noise-related issues, particularly those affecting Heathrow - including sensitivity to aircraft noise, scope for technology changes, the relationship between property prices and proximity to airport/aircraft noise, and the issues around night flights.
    - The Commission's final report should include preparing the ground for the necessary environmental assessments.
    - If the Commission agrees that a major hub should be developed, it should invite the CAA, in the interests of choice and competition, to consider the case for deregulating other airports.

30. In conclusion, we believe that an aviation strategy for the UK needs to address how we improve our connectivity with our nearer neighbours and globally. We can do the first largely by developing our regional airports in a relatively incremental fashion. But remaining amongst the best for global connectivity is more difficult, since it requires the UK to keep the connectivity premium we have enjoyed from hosting a top-tier European (and global) hub airport. There will only be a handful in Europe and can only be one in the UK, so the decision must be faced whether we really want to continue to host one; and, if so, where it should be. We summarise our thinking diagrammatically in the simplified flowchart at **Figure 1** below.

31. We recognise that any decision will be immensely controversial, especially with local residents and communities. Nevertheless, we believe excellent global connectivity is fundamentally important and would encourage the Airports Commission - and in due course the Government - to grasp this nettle.

Figure 1: Flowchart of Recommended Airports Strategy



1 Introduction

1.1 The Independent Transport Commission launched its Aviation Study in 2012. The context was the Coalition Government's moratorium on airport expansion in the South East and its subsequent recognition that a new policy framework was needed for aviation more generally. The first steps towards this had been taken with the publication of the Department for Transport's scoping document *'Developing a Sustainable Framework for UK Aviation'* in July 2012.[2]

1.2 But we remained concerned at the continued absence of strategic thinking about the UK's global connectivity and our future ability as a nation to meet that challenge. That is why, last summer, we issued a Call for Evidence[3] inviting views from a wide range of interests on the need for further aviation capacity in the UK and the key issues this raises for policy makers. These are issues of critical importance and, as an independent research charity, we felt we were well placed to make an informed and impartial contribution to this vital area of public policy.

1.3 Since then, the Government has established the Airports Commission to take the debate forward. We are pleased to offer this report as a contribution to the Commission's deliberations. We have based our report on the evidence that we have received from a wide range of organisations, plus our own assessment and review. We have not undertaken fundamental research at this stage but have included recommendations where we believe further work is needed.

1.4 We are grateful to all those who sent submissions following our Call for Evidence, some of whom also presented oral evidence to us last autumn. A list of respondents is at the ***Appendix***. The views expressed in this report and the conclusions reached, however, are those of the ITC.

Scope

1.5 This ITC report has the aim of identifying and exploring the major issues surrounding potential airport development in the UK over the longer term. As such, it is designed to illuminate important aspects of the debate, particularly connectivity and capacity; it does not seek to provide or recommend a single solution to the problem.

1.6 The focus of our work has been on the UK's longer term connectivity needs and the kinds of airport development issues and options which they raise, primarily in London and the South East. In this respect, our report concentrates on what the Airports Commission defines as 'long term' options, on which it has invited outline proposals in July 2013 and intends to identify by December the most plausible options for further assessment.

1.7 We recognise there are many other issues, e.g. shorter-term and regulatory options, which are important to the Commission in developing a comprehensive aviation strategy, but we do not address these here.

[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/2579/consultationdocument.pdf
[3] http://theitc.org.uk/docs/38.pdf

2 The Connectivity Challenge

2.1 Connectivity – its importance for the UK economy

2.1.1 Our position as an island on the north west tip of Europe with access to the Atlantic Ocean has shaped our history as a trading nation, affording connectivity by sea to the far reaches of the world. In the 19th century, the development of the canal and railway networks was transformative at home, allowing the benefits of the industrial revolution to be shared across the country. Aviation was no less transformative in the 20th century, bringing us connectivity to places and markets around the globe.

2.1.2 Connectivity, like travel itself, is a means to an end. It helps sustain economic growth, attract inward investment and support trade, tourism and broader social and family life. The evidence we have received has been virtually unanimous in stressing the vital importance of connectivity for the UK economy and jobs. For example:

- Connectivity has implications for growth and competitiveness. The World Economic Forum (WEF) has developed a Global Competitiveness Index for the travel and tourism sector which incorporates many of the factors necessary to develop connectivity and create wider economic benefits in terms of productivity and economic growth. There is a clear positive relationship between a country's connectivity and its performance in the WEF index[4].
- Around one third of all UK traded goods (by value) are transported by air[5], with Heathrow accounting for 65 per cent of all international air freight from UK airports (by volume) and serving as the UK's largest port in terms of exports (by value) to non-EU countries.
- Globalisation has brought inward investment to the UK, with an estimated 3.7 million people in the country working for foreign-owned firms[6].
- Air travel has revolutionised the tourism industry. Tourism is the UK's 6th largest industry. Some 72 per cent of inbound visitors to the UK arrive by air and they account for 83 per cent of all inbound visitors' spending[7]. Outbound tourism alone underpins more than 1.2 million jobs across the UK economy and brings in over £6 billion in tax revenue to HM Treasury.[8]
- The UK air transport sector itself is a significant contributor to the UK economy. It provides around 120,000 jobs in the UK directly and supports many more indirectly[9]. The sector as a whole generates around £10bn of economic output, with the average air transport services employee generating more than twice the productivity of the average UK job.

2.1.3 The Government's Aviation Policy Framework[10] notes that the UK has the third largest aviation network in the world, after the USA and China; and that the UK maintains its position as an attractive place to invest, with 75 per cent of Fortune 500 companies having offices in London.

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[4] http://www.iata.org/SiteCollectionDocuments/890700_Aviation_Economic_Benefits_Summary_Report.pdf
[5] CBI response to DfT Scoping Document 'Developing a sustainable framework for UK aviation', 2011
[6] Oxford Economics: 'The value of aviation connectivity to the UK', March 2012
[7] ONS International Passenger Survey, 2010
[8] Submission by ABTA to ITC Aviation Call for Evidence, 2012
[9] Aviation Policy Framework, Cm 8584, March 2013
[10] Ibid

" . . . the connections created between cities and markets represent an important infrastructure asset that generates benefits through enabling foreign direct investment, business clusters, specialization and other spill-over impacts on an economy's productive capacity."

(Economic Benefits of Air Transport in the UK, Oxford Economics 2011)

2.1.4 But several respondents also warned that what has been a major UK strength for many decades is now under challenge. The global economy is changing fast and the UK needs to ensure adequate connections to the emerging economies such as Brazil, Russia, India and China, which together are predicted to account for 40 per cent of world GDP by 2050.

2.1.5 Foreign firms often see Europe as a single market. Excellent connectivity, to their home and to other parts of Europe, can therefore be a major factor in determining where to locate their offices and operations (and hence jobs). The Thames Valley has benefited from this in the past. Research by the British Chambers of Commerce[11] suggests that business leaders in high growth or emerging economies (e.g. Brazil, India, China, Mexico and South Korea) see direct air links as vital to maintaining UK prospects in global markets. Ninety two per cent of these business leaders said that direct flights influence their inward investment decisions, while 80 per cent said they would trade more with the UK if flight connections to their home markets were improved. We find entirely plausible the claim that inward investors and companies seeking to establish offices in Europe will want to locate to places where they can easily fly direct, not via intermediate airports.

2.1.6 For over 20 years, London's connectivity has helped maintain its status as the No.1 European city for locating business[12] and as a centre for the global service industries - insurance, law and finance. Air services to and from the regions have similarly helped to ensure connectivity to places and markets around the world. The question is whether this can be sustained in the future. Our concern is that the assumption that the UK has one of the best direct air communications with the rest of the world appears to be coming under challenge. The evidence we have received suggests that if the UK is to 'succeed in the global race', the ability to secure connectivity to emerging cities – and to do so at an early stage when air services may not initially be economic - will be increasingly important.

2.1.7 Maintaining and improving connectivity applies to all parts of the UK. In calling for a fresh national strategy for wealth creation last October[13], Lord Heseltine spoke of the need to unleash the dynamic potential of English cities and encourage business communities to invest their energies into the growth of their local economies. If the regions are to share in the benefits of such a strategy, with devolution of funding and enhanced powers for Local Enterprise Partnerships to lead local economic development, access to and from regional airports will need to play a vital part.

2.1.8 The Government's stated aim in its Tourism Policy 2011[14] is to increase the number of inbound tourists to Britain by a further 4 million over 4 years. This requires both strengthening existing links and developing new ones, especially to countries with an emerging middle class who wish to travel and have the means to do so. The fact that

[11] Submission by the British Chambers of Commerce to ITC Aviation Call for Evidence, 2012
[12] European Cities Monitor, 2011
[13] Lord Heseltine report for the Chancellor of the Exchequer, 'No stone unturned in pursuit of growth', October 2012
[14] http://www.culture.gov.uk/images/publications/Government2_Tourism_Policy_2011.pdf

eight times as many Chinese visited France in 2010, rather than Britain[15], is thought to reflect, at least in part, the superiority of direct air connections to Paris, as opposed to London (though we also note that other factors may be influencing this e.g. visa controls).

2.1.9 Nor is this just about people coming to Britain. The international nature of the labour market and the diverse nature of the population underlines the increasing importance, for people living here, of being able to visit family and friends abroad. This is most notable in London where, for example, an estimated one third of the population were born overseas[16] (compared with the national average of 11 per cent). For many people, taking a plane to keep in touch with friends and family abroad is no longer seen as a luxury.

The Rise and Fall of Cities

Cities are not static in their development. Countless examples exist of cities that flourished in earlier ages, but declined as rivals adapted better to changing circumstances. One of the key factors determining the rise and fall of cities has been their ability to meet the connectivity needs of their population and maintain the flow of trade and commerce. London's success was largely based on its excellent connectivity to global maritime trade.

London's rivals, however, have not always been able to meet changing connectivity needs so well:

- Venice was one of the world's wealthiest medieval cities, supported by its position as a major maritime port for trade with Asia and the Mediterranean. As the focus of commerce shifted to the Americas and East Asia it lost trade to rival cities with better connections to the Atlantic.
- Amsterdam dominated European trade in the 17th century, but its inferior access for larger ships and problematic geography hampered expansion and helped to cause its relative decline. . Conversely, the recent development of Amsterdam's multi-runway Schiphol airport into a major world hub has boosted its economy and provided outstanding connectivity for a city of its size.
- Lisbon was a major international port in the early modern period, but its restrictive geography and limited hinterland made it a less attractive centre for trade than the densely populated and well-connected region of northwest Europe. More recently, the inability of Lisbon to expand its airport has coincided with declining inward cargo traffic.

London suffered in the later 20th century by failing to improve its maritime connectivity to accommodate containerisation. As a result it lost out to Rotterdam's capacity to handle huge container ships.

What will determine the rise and fall of cities and city-regions in the future? Excellent connectivity - local and global - is essential. Today this involves everything from broadband to roads, from cycle tracks to airports, from social hubs (coffee houses and arts centres?) where people come together to logistics centres. Some see modern airports as the key not just to travel but to far broader economic and social development in the 21st century, and hence determinants of which cities and city regions will succeed or fail in the next decades. Many other cities in Europe and around the world are now acting on this approach in the firm belief that hosting a major world airport is crucial to their future prosperity.

[15] ONS International Passenger Survey and INSEE national tourism statistics
[16] ONS Census data, 2011

2.2 What does good connectivity look like?

2.2.1 The evidence we have received, therefore, suggests that good connectivity is critically important for economic prosperity; and that aviation today is at the heart of international connectivity. But what does good aviation connectivity mean? The evidence suggests it is about more than simply being able to fly from A to B. It also involves:

- the choice of destinations available;
- the ability to fly direct, (where possible) without needing to change;
- the frequency and times of flights (e.g. some people need to travel at certain days or times, so that one flight a week, or even one a day, is poor connectivity compared with places offering more frequent flights);
- reliability (e.g. no routine delays, due to congestion on the ground or in air space);
- ease of access both to the departure airport and to the end destination;
- resilience – the ability to maintain schedules in the face of adverse weather or operational problems. It is widely acknowledged that heavy demand on Heathrow's two runways limit the airport's resilience capability, making it less able to cope with, and recover from, such events. (Work by the CAA[17] suggests that a modest 5 per cent increase in tactical headroom at Heathrow would reduce airborne holding by approximately 40 per cent).

What users want

Travellers by air want access to a wide range of flights at reasonable cost and sensible times of day (especially for business users), and to be able to travel direct to their destination wherever possible. They also expect reliable information, ease of booking, straightforward transfer to check-in, confidence in baggage handling and efficient processing of passport control and security.

Passenger surveys carried out by the CAA show that, overall, passengers cite airport proximity – the ability to fly from their local airport – as the single most important reason for their choice of airport, although other factors such as price also influence their decisions. Ease of access to the airport is a significant factor for all passengers, but especially for those outside London, whereas to users of Heathrow, for example, the major issue is the availability and frequency of routes.

The preference to 'fly local' will always be tempered by the extent to which the local airport is able to offer a comprehensive route network; and that is where a hub airport tends to have the advantage.

(*Source: Passengers' airport preferences – Results from the CAA Passenger Survey 2011*)

2.2.2 London and the South East have in the past enjoyed good connectivity by air. Heathrow was for many years one of the largest European airports and today serves 70 million passengers a year through some 475,000 flights ("air traffic movements" or ATMs). But Heathrow is only part of the picture: London and the south east are also served by Gatwick, Stansted, Luton, and London City airports and - depending on how you draw the line - by others such as Southend and even Birmingham. It is this aggregate connectivity which has supported the traditional claim that London is the best-connected city in Europe.

[17] Report of the South East Airports Taskforce Sub-Group on punctuality, delay and resilience, 2011

2.2.3 Nonetheless, the evidence we have received suggests that, whilst the UK still enjoys important aspects of good connectivity, there are growing signs of stress and strain, especially at our main hub airport. Capacity constraints at Heathrow mean that it operates at over 98 per cent capacity (measured in ATMs), leaving no margin to cope with disruption – whether caused by delays, operational problems, bad weather or low visibility – or to recover from such events; and it is a constant challenge to deliver reliability without incurring delays in the air (with aircraft held in stacks, prior to landing) or on the ground (before push-back, or queuing for take-off).

2.2.4 The lack of runway capacity also constrains the development of new routes. Airlines without an existing Heathrow presence find it difficult and expensive to get "slots" there. And incumbent airlines similarly find it difficult to expand or diversify. Indeed, from a very narrow commercial perspective, they may find it more profitable and less risky to utilise their slots for their existing and more successful routes, at the expense of serving more marginal or new and emerging destinations[18]. The number of destinations served by Heathrow has been falling in recent years - from 165 destinations in 2002 (and a high point of 175 in 2006) to 157 destinations in 2010[19].

2.2.5 In such a constrained, zero-sum, world passengers bear the cost – losing out in connectivity, a poorer passenger experience and potentially in higher fares. This is against a background where the long-term decline in average fares over the last two decades is already forecast to end as a result of a range of factors including higher oil prices, reduced scope for cost-cutting and the cost to the aviation sector of meeting its obligations with respect to CO_2 emissions[20].

2.3 The air transport market

2.3.1 Air connectivity is not a single thing. There are several different aviation needs and aviation 'markets', the obvious distinctions being between short-haul and long-haul; between freight and people; and between business and 'leisure' travellers, the latter often further divided between holiday makers and those visiting friends and relatives. Leisure travellers tend to be more price-sensitive but time-flexible, whereas business travellers are often less sensitive to price but more sensitive to frequency and time of day considerations, including scope for returning from a business meeting the same day, or in time to go into the office the same morning.

2.3.2 The aviation industry responds to these different types of connectivity needs in different, though often overlapping, ways, e.g. long-haul and short-haul services; regular scheduled services operating throughout the year and seasonal traffic, such as charter flights operated in conjunction with package holidays; dedicated air freight and freight carried in the "bellyhold" of passenger flights; and by offering different products and prices, even on the same flight.

2.3.3 Different airports have increasingly evolved to serve these different markets. Some focus on point-to-point leisure travel; some provide long-haul largely via European or other hubs. **Figure 2.1** below illustrates how the three main London airports differ in these respects.

[18] Submission by Hounslow Borough Council to the ITC Aviation Call for Evidence, 2012
[19] CAA statistics
[20] DfT UK Aviation Forecasts, 2013

2.3.4 Whilst Heathrow airport accounts for the majority of the UK's air freight, by volume, including the BA World Cargo Centre, an automated freight handling facility capable of handling unusual and premium cargo and fresh produce, its restrictions on night flying make it unsuitable for 24-hour operations which are essential to much of the dedicated freight and logistics sector. In practice, East Midlands airport has developed as the UK's major gateway for pure cargo (on dedicated freighter aircraft), mainly due to its central location and excellent road and rail links, as well as its ability to operate 24 hours a day.

Figure 2.1: illustrating different characteristics of London's three main airports

	Heathrow	Gatwick	Stansted
Long haul	51%	18%	1%
Short haul	42%	71%	90%
Domestic	7%	11%	8%
Scheduled services	99.9%	84%	97%
Charter services	0.1%	16%	3%
Business	31%	16%	16%
Leisure	33%	54%	39%
Visiting Friends and Relatives	36%	30%	45%
Proportion of connecting passengers	34%	9%	5%
of which, connecting Domestic to International	*24%*	*58%*	*31%*
of which, connecting International to International	*78%*	*40%*	*69%*

Sources: CAA Passenger Survey (2011) and Airport Statistics (2011)

Note: Figures are rounded and may not total 100%. Many of the connectors at Gatwick and Stansted will be 'self-connectors' (travelling on two separate tickets) rather than on a single-ticket 'interlining model.

2.3.5 Heathrow operates many more long-haul scheduled services than any of the UK's other airports – see **Figure 2.2** below, accounting for 78 per cent of all long-haul flights from the UK. To understand the dominance of Heathrow in the long-haul sector we need to consider the nature of the long-haul market and how it works.

Figure 2.2: Number of long-haul scheduled services from selected UK airports to destinations served non-stop with a frequency of more than 250 departures a year and more than 100 departures a year (year to March 2010)

Figure 25: Long-Haul Scheduled services operated from selected UK airports in 2010

	>250 Departures	>100 Departures
Heathrow	62	83
Gatwick	11	20
Manchester	10	12
Birmingham	2	5
Glasgow	2	4
Luton	1	1

Source: OAG, 2010

Source: CAA Insight Note 2012: Aviation Policy for the Consumer

2.4 Long-haul issues

2.4.1 The evidence we have received suggests the biggest concerns are about our connectivity to long-haul destinations. The ability to fly directly - not via an intermediate airport - between the UK and a very wide range of global destinations has been a historic strength. But, it is argued, this is now coming under serious competitive threat.

2.4.2 Flying long-haul direct is particularly important for certain groups of passengers - those for whom time is most important (who want to fly direct, not via a different hub); those for whom frequency is important (catching a daily or even hourly flight); and those for whom regular flights are important (all year round, rather than seasonal). For UK passengers, these will often be business people and other individuals who put these factors ahead of the cost savings they might otherwise make by flying via another hub, or on a different day or at another time.

2.4.3 Direct flights are also important to foreign business travellers, including firms investing in Europe, who want to avoid flying via an intermediary hub; and to inbound tourists, who don't want to make additional flights. In both cases, the choice of where they visit or locate their business may be significantly influenced by where their main flight lands.

2.4.4 Several of our respondents have argued that, although these categories are only part of the total aviation market, they are particularly important for the UK economy. For example, in a poll by the Institute of Directors, whilst one third of their members said that direct long-haul flights to emerging markets are important to their business today, two-thirds thought they would be important in the next decade.[21]

2.4.5 Long-haul flights are expensive to operate and, to be financially viable, typically depend on a mix of passengers: "local" passengers, starting or ending their flight at the airport and "transfer" passengers, who join it from a connecting flight; lower-price standard class passengers and higher-priced "premium" passengers (usually with various gradations of premium).

[21] Submission by the Institute of Directors to ITC Aviation Call for Evidence, 2012

2.4.6 The nature of the mix varies from route to route and from day to day. “Thick” routes such as the regular daily flights (or several times a day) between London and New York, rely heavily on strong local demand, while “thin” routes depend more on picking up transfer passengers to supplement lower levels of local demand. But even thick routes often rely to a significant extent on a proportion of transfer passengers to fill seats and make the route viable on a daily or more frequent basis throughout the year. And freight carried in the belly-hold of passenger planes is also important as another element that contributes to the commercial viability of these services.

2.4.7 Airlines seeking to provide regular long-haul flights have therefore naturally gravitated to ‘hub’ airports where they can be more confident of tapping ‘transfer’ passengers to fill as many as possible of their marginal seats. This behaviour is evidenced in the UK by the pressure on Heathrow ‘slots’, despite a high price premium – a peak-time daily pair can be worth in excess of £14m[22]; and internationally by the heavy focus of regular long-haul direct flights between a relatively limited number of hub airports.

2.5 Long-haul and Heathrow

2.5.1 This dimension of connectivity has traditionally been a major UK strength, delivered through Heathrow as the UK’s major ‘hub’. The hub concept is not unique to airports. It is common in many sectors, such as freight distribution, postal services, telecommunications and the retail supply chain. Its strength lies in the ability to handle and distribute volume between many different points in the most efficient manner, that is, via a central hub. In the ‘hub and spoke’ model, routing traffic from outlying points through a central hub and then on to its destination is much more efficient than trying to link every single destination directly to every other one. So, as **Figure 2.3** illustrates, multiple destinations can be served through a hub using far fewer routes than if they were all served individually point-to-point; the difference is exponential.

Figure 2.3: Number of routes needed to serve destinations via a hub as opposed to point-to-point

Number of points to be served	Number of routes needed with a hub	Number of routes needed with point-to-point
4	3	6
6	5	15
8	7	28
10	9	45

2.5.2 Although fairly obvious, this has enormous implications for connectivity by air. Channelling flights through intermediate hubs means that it is possible to get from any airport to any other - eventually. But we noted above that a key feature of good connectivity is the ability to fly direct, rather than by two or more flights with a change at a connecting hub. This highlights the enormous benefit, in terms of connectivity, for any country or city which actually hosts a major hub (as distinct from local or regional) airport. Given a combination of strong local demand plus sufficient capacity to top this up with

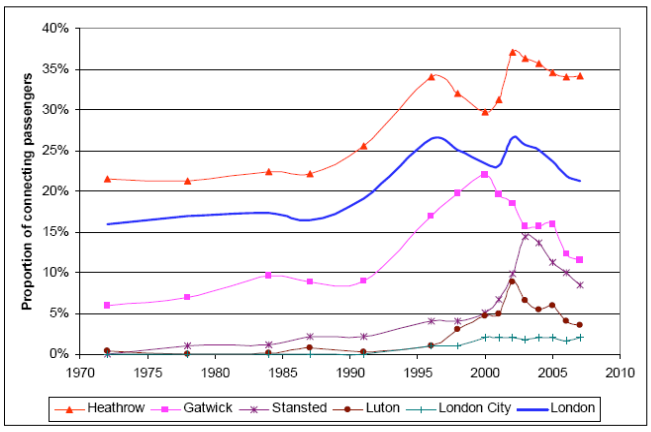
[22] Heathrow Airport: Introduction to Secondary Slot Trading, presentation by Sarah Whitman, Head of Network Development, September 2012

significant transfer traffic, a major hub airport can offer its local population direct flights, with no need to change, to virtually anywhere in the world.

2.5.3 The local or regional airport, by contrast, with fewer transfer passengers can usually only support direct long-haul flights where there is an extremely strong local market; it will tend, therefore, to channel long-distance passengers to most ultimate destinations through other hubs rather than provide direct connectivity. The UK has historically benefited from having both one of the world's most successful hub airports plus a number of regional and local airports: but the question now is whether and how that can be sustained in the future.

2.5.4 To sustain its network of routes Heathrow is helped by its strong local market - over 70 per cent of passengers arriving or departing the airport are from the London and South East area, and an estimated 25 per cent of its passengers arrive at the airport within 30 minutes of leaving home[23] - and by its ability to attract connecting passengers. The proportion of connecting passengers at Heathrow far exceeds that at any other UK airport – see **Figure 2.4.**

Figure 2.4: Proportion of connecting passengers at London airports since 1972



(Source: CAA, Connecting passengers at UK airports, 2008)

2.5.5 By contrast, regional airports with more limited local markets and relatively few transfer passengers often struggle to develop long-haul networks, except by diverting passengers through other hubs. Attempts over the past decade to introduce long-haul services from airports other than Heathrow have often not succeeded.[24]

2.5.6 Long-haul connectivity thus faces specific issues that distinguish it from short-haul. The need to supplement local with transfer passengers has meant an inexorable focus on "hub" airports where both flows come together. This has hitherto been a major strength, with the UK hosting one of the most successful hub airports anywhere in the world, and thereby benefiting people who want to start or end their journeys here. But this position is not set in stone, and there is evidence that other international hub airports are positioning themselves to displace the UK as the prime centre for long-haul

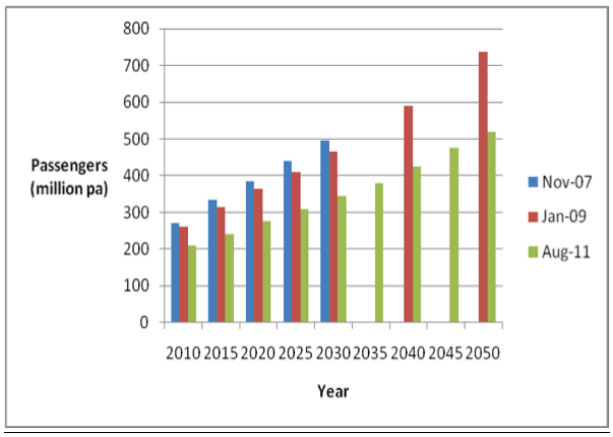
[23] 'Bigger and Quieter, The Right Answer for Aviation', Tim Leunig, Policy Exchange, 2012. See also CAA note from 1997 on Passenger domestic origin/destination: http://www.caa.co.uk/docs/81/1997CAAPaxSurveyReport.pdf.
[24] 'One hub or none', Heathrow, November 2012

connectivity to and from Europe. We discuss below the challenges and options if the UK is to maintain and strengthen its position.

2.6 Looking to the future

2.6.1 Most debate around aviation starts from a discussion about future demand. Growth in air traffic has been almost unrelenting since the 1950s until the shock of the financial crisis in 2007. Aviation forecasts have been consistently downgraded since then – see **Figure 2.5**.

Figure 2.5: Illustrating successive reductions in UK aviation demand forecasts since 2007



(Source: Chart from AEF submission to ITC Aviation Call for Evidence, 2012)

2.6.2 While the latest DfT forecasts (January 2013) show yet further reductions – down a further 7 per cent by 2030, compared with the 2011 forecasts - they continue to show an upward trend, albeit at a lower rate than in the past: in the range 1 – 3 per cent a year up to 2050, compared with historical growth rates of 5 per cent over the past 40 years - see **Figures 2.6** and **2.7.** The unconstrained forecasts represent underlying estimates of demand in the absence of airport capacity constraints; whereas constrained forecasts take into account the effect of the limitations to runway and terminal capacity at UK airports.

Figure 2.6: Latest projections for UK unconstrained aviation demand

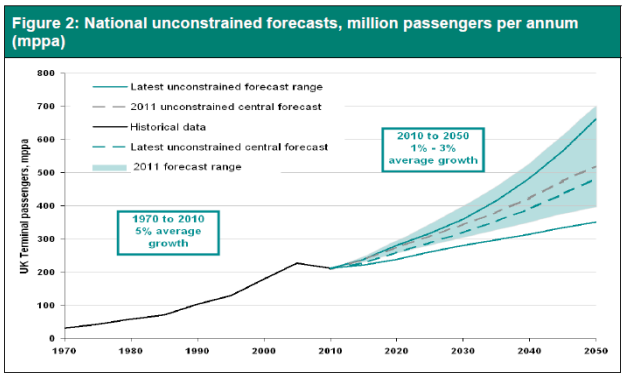
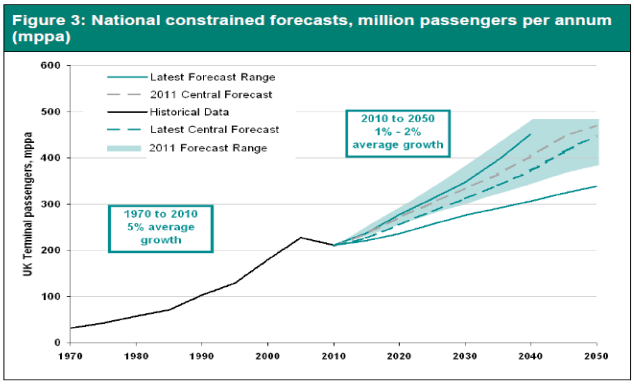


Figure 2.7: Latest projections for UK constrained aviation demand



(*Source: DfT UK Aviation Forecasts 2013)*

2.6.3 Forecasting demand well into the future is necessarily uncertain and open to debate. We note that the Airports Commission intend to use the DfT forecasts as a starting point for their own assessment, but they acknowledge that "the underlying trend of unconstrained growth in UK air passenger demand is forecast to continue, rising from 219 million passengers per annum (mppa) in 2011 to 320mppa in 2030 and to 480mppa by 2050" with the proportions of traffic travelling long-haul vs. short-haul and business vs. leisure remaining " broadly constant over the forecast period".[25]

2.6.4 It is sometimes suggested that the proposed High Speed 2 (HS2) rail line will reduce the need for air travel in the future. CAA analysis shows that 60 per cent of UK air passengers in 2010 were traveling either on routes which do not pass through any London airport or on which currently proposed high-speed rail routes would offer no significant journey time benefit.[26] Moreover, much of the domestic air traffic is connecting to overseas flights where HS2 would not help, particularly if it is not directly connected to Heathrow. While HS2 could play a valuable role in improving access to airports, including Birmingham and Heathrow, and reducing the need for some domestic air journeys, its impact on aggregate aviation growth is likely to be modest, and to depend significantly on the quality of the rail-to-air interface. We see High Speed Rail as a valuable contributor to improved connectivity, but not as a substitute for improved aviation connectivity.

25 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/73143/aviation-demand-forecasting.pdf

26 CAA Insight Note 3, 'Aviation Policy for the Future', 2012

Aviation and CO_2

Is further aviation growth compatible with the need to tackle climate change? The build-up of man-made greenhouse gasses is arguably the most pressing global issue this century. This debate focuses on the CO_2 but in aviation we also need to consider the impact of water vapour emitted in the upper atmosphere (known as "radiative forcing") which is estimated, on a consensus basis, to be 2.7 times as damaging as the attendant CO_2. These are significant issues because, unlike other forms of transport, there is no recognised quantum leap to improve aircraft design. Aircraft are becoming more efficient and producing less CO_2 but the impact is gradual.

The Committee on Climate Change has advised that air traffic can increase by up to 60 per cent within the target set by the previous administration to reduce aviation emissions to their pre-2005 levels by 2050. For the purposes of this study we have therefore assumed that a substantial long-term growth in aviation remains compatible with achieving the UK's overall climate change targets. In addition, most of the evidence we received suggests that the most effective way to manage and constrain CO_2 in aviation is through emissions trading, preferably on a global basis. Purely domestic measures will tend to displace, rather than reduce, the impact.

Nonetheless, within whatever aggregate carbon targets and policies are adopted, there may be ways in which specific proposals differ in their CO_2 impact. For example, flying direct between two destinations, as opposed to making a connecting flight through an intermediate hub, is good for passengers and avoids additional take-offs and landings. But if hub operations enable fewer flights in aggregate, and the use of larger aircraft which are more fuel-efficient per passenger, the overall result may be better in terms of CO_2. And more capacity can help reduce the most wasteful parts of the journey - avoidable waits on the runway and stacking in the sky. This was illustrated at an ITC Discussion Evening in April 2010 (for a report see the following link: http://www.theitc.org.uk/dyn.php?page=22).

The issues are complex and are likely to involve sophisticated trade-offs, including the extent to which particular options may have implications in terms of more/less fuel-burn through taxiing and stacking, and the carbon "cost" of airport construction. We therefore welcome the Airports Commission's proposal that these implications are included in the evaluation of specific options, and note that the Commission have published a paper on Aviation and Climate Change to open up discussion on these important issues.

2.7 What are the UK's aviation connectivity problems?

2.7.1 Across the UK as a whole we are fairly well served by the number of airports and their geographical spread. If the likely growth in aggregate, future demand – especially for short-haul point-to-point traffic - were to be spread out across the whole country, it could probably be accommodated within total airport capacity. But, as we have seen, demand is driven significantly by the strength of the local market, and so varies very significantly around the regions.

2.7.2 There is still significant capacity for growth away from the South East. But it is generally accepted that Heathrow's runways are at capacity now, Gatwick will be at capacity by around 2018 and Stansted by around 2030 (depending on precise economic and other assumptions). Indeed, by around 2030 - only 15 years after the Airport Commission is due to report - all London airports are projected to be operating at full capacity. So we believe there is a genuine, near-term, capacity issue in the South East, even for short-haul point-to-point services – see **Figure 2.8**. Looking further ahead, other key English regional airports - Birmingham, Bristol, Southampton, East Midlands and Manchester - are projected to be full by the middle of the century.

Figure 2.8: Capacity at UK airports to 2050 under 'max use'

Table 5.7: UK airports runway capacity used, 2010-2050, 'max use' capacity scenario (central forecast)

Airport	2010	2020	2030	2040	2050
Heathrow	99%	100%	100%	100%	100%
Gatwick	90%	100%	100%	100%	100%
Stansted	58%	69%	100%	100%	100%
Luton	59%	60%	100%	100%	100%
London City	56%	87%	100%	100%	100%
Southend		42%	100%	100%	100%
London	81%	86%	100%	100%	100%
Manchester	49%	57%	55%	58%	100%
Birmingham	45%	56%	79%	100%	100%
Bristol	35%	38%	37%	100%	100%
East Midlands	22%	17%	20%	43%	100%
Southampton	27%	36%	52%	100%	100%
Other modelled	22%	24%	28%	33%	43%
National	39%	43%	50%	54%	63%

100% = runway or terminal capacity exceeded, other %s refer to runway usage.
Mainland UK airports only.

(Source: DfT UK Aviation Forecasts 2013)

2.7.3 Against this background we conclude that the UK faces two distinct connectivity challenges, for which the potential solutions are quite distinct:

- short-haul connectivity in the South East in the near-term and potentially more widely by mid-century; and

- direct, long-haul connectivity.

The former is not yet a major problem but, given the forecasts, is a rapidly developing one. The latter is already a significant problem and is primarily about hub connectivity.

2.7.4 It is important not to confuse or conflate these two issues. Both need to be addressed, but solving the former will not solve the latter. Conversely, addressing the latter may help with the former.

2.7.5 There are a range of potential solutions for addressing short-haul connectivity in the South East, for example by additional runways at Gatwick and/or Stansted; or by taking advantage of Birmingham's longer runway plus a fast link to London via the West Coast Mainline (short-term) and HS2 (longer-term), which would make Birmingham as accessible for some SE passengers as other "London" airports. This is largely about capacity at local and regional level, and does not require major investment in new hub capacity.

2.7.6 Developing capacity at SE airports other than Heathrow could also contribute to improving long-haul connectivity, partly because more transfer passengers might then use these airports and partly because there could be more scope to use new-generation aircraft which might allow long-haul direct routes to be operated economically with smaller passenger numbers. We are aware that Gatwick and Birmingham are keen to attract airlines offering more long-haul routes. Such developments offer the prospect of additional innovation, choice, competition and connectivity options.

2.7.7 Nevertheless, we do not believe that simply improving regional and local capacity will resolve the long-haul connectivity challenge. There is no real doubt that most long-

haul routes will continue to focus on hubs, and that hosting a major European hub will continue to offer enormous added direct connectivity benefits to any city or country, compared with those who need to route their long-haul journeys primarily through 3rd-country hubs. For long-haul connectivity, the central issue for the UK is not the relative position of Heathrow viz-a-viz Gatwick, Stansted, Birmingham etc. but the UK hub viz-a-viz other prime European hubs at Paris, Amsterdam, Frankfurt and (increasingly) Madrid, Istanbul (which has recently announced plans for a 6-runway hub) and the middle east.

2.7.8 In some respects, Heathrow today compares reasonably well with its European competitors. It is true that it now serves fewer international destinations than its mainland European rival hubs but it has a higher level of daily international departures - see **Figure 2.9** – and handles more international passengers – 64.7 million in 2011[27], nine million more than its closest rival, Paris CDG.

Figure 2.9: Range and frequency of direct destinations - selected European airports

Figure 20: Range and Frequency of Direct Destinations – selected European airports

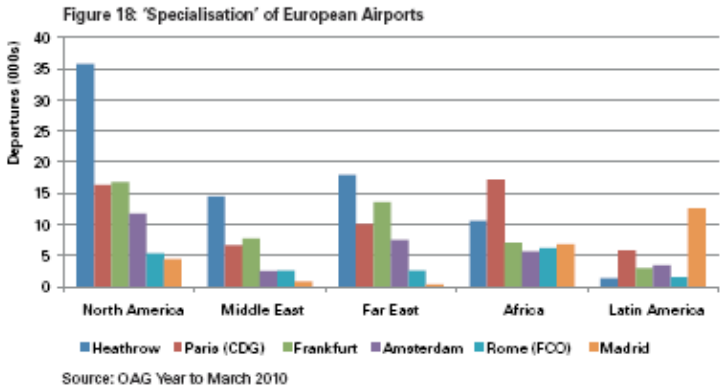
Airport	International Routes	Daily International Departures/Route	Non-European Routes	Daily Non-European Departures/ Route
Heathrow	144	3.9	84	2.6
Paris (CDG)	193	3.0	98	1.6
Frankfurt	196	2.6	92	1.4
Amsterdam	187	2.6	70	1.2
Madrid	117	2.7	46	1.4
Rome (FCO)	107	2.2	38	1.3

Source: OAG
Note: A route is defined as an airport served non-stop by more than 100 scheduled departures in the year to March 2010

(Source: CAA Insight Note 2012: Aviation Policy for the Consumer)

2.7.9 As we have noted, frequency is particularly important to business users. Airlines at Heathrow – in part because it is capacity constrained – have tended to concentrate on providing services to fewer destinations but at higher frequencies. Of particular note is the high level of connectivity to North America – more than twice the volume of its rivals – and to the Far East, see **Figure 2.10**.

Figure 2.10: Specialisation' of European airports

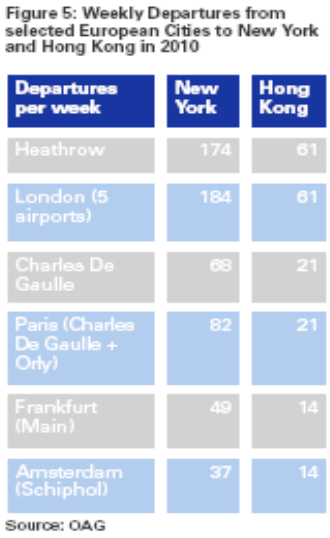


(*Source: CAA Insight Note 2012: Aviation Policy for the Consumer)*

[27] Data from Heathrow airport

2.7.10 Taken together, the London airports have more than twice the number of weekly departures to New York than the Paris airports, and around 3 times as many weekly flights to Hong Kong than any of the mainland European hubs - see **Figure 2.11** below.

Figure 2.11: Comparison of weekly departures to New York and Hong Kong from selected European cities



(Source: CAA Insight Note 2012: Aviation Policy for the Consumer)

2.7.11 But this is to focus narrowly on services to New York and Hong Kong which have been traditional UK strengths. It remains the case that, in terms of total international routes, Heathrow is already well behind Paris, Frankfurt and Amsterdam.

2.7.12 Those airports have also generally been growing much faster, especially in terms of passengers and freight – see **Figure 2.12**.

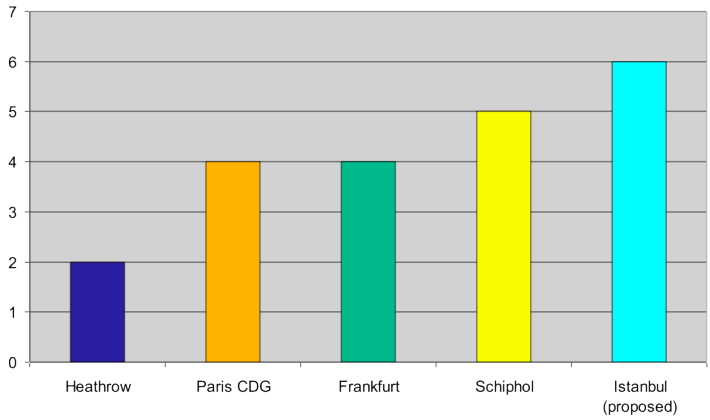
Figure 2.12: Comparison of major European hubs, 2000 and 2012

	ATMs (thousands)		***Change***	**Passengers (millions)**		***Change***	**Freight (metric tonnes)**		***Change***
	2000	*2012*		*2000*	*2012*		*2000*	*2012*	
Heathrow	467	475	*2%*	65	70	*8%*	1.4m	1.6m	*14%*
Paris	518	498	*-4%*	48	62	*29%*	1.5m	2.2m	*47%*
Frankfurt	459	482	*5%*	49	58	*18%*	1.7m	2.1m	*24%*
Amsterdam	432	438	*1%*	40	51	*27%*	1.3m	1.5m	*15%*

(Source: ACI. Note: 2012 figures are provisional estimates)

2.7.13 And while Heathrow capacity is currently capped at 480,000 ATMs, mainland European hub airports are planning for further growth over the next 10 years; all of them capacity for around 700,000 ATMs. The available forecasts suggest that by 2020 all three will have significantly more flights than Heathrow, with both Frankfurt and Paris providing over a third more.[28] Frankfurt has recently addeda 4th runway; and Turkey has announced ambitious plans to replace Ataturk airport by 2017 with a six-runway hub airport – see **Figure 2.13**. Heathrow's passenger terminals could handle higher numbers – perhaps 25 per cent or more than today's 70 million passengers a year – but its two runways are effectively full.

Figure 2.13: Number of runways at selected European hubs



2.7.14 Because long-haul routes require larger aircraft (more fuel) and therefore more seats to fill, they depend on feeder traffic to increase passenger numbers and make a route commercially viable. This is especially true for airlines aiming to develop routes to new destinations, for which the existing local market is still weak. All of this points to the importance of being able to operate from a hub.

2.7.15 Airline alliances are also key to the successful operation of a hub airport. An alliance grouping of network airlines needs to develop interconnected schedules, anchored by a home network airline which does most of the flying (e.g. KLM in Amsterdam which is part of the Sky Team Alliance, BA in London which is part of OneWorld, or Lufthansa in Frankfurt which is part of Star Alliance). This may be enhanced by other friendly or regional airlines where capacity allows. Heathrow's constraints mean that the largest flag carrier has a smaller proportion of slots/ATMs than its counterparts at Amsterdam, Paris and Frankfurt.

2.7.16 Long-haul airlines (and particularly the alliances) have a growing choice around where they locate their hub operations. Competing network-model airlines and their alliances are unlikely to choose to hub through London – they want to feed and grow their own hubs and will give priority to these. So Heathrow now faces a growing challenge, especially from Schiphol, CDG, Frankfurt, Madrid, Istanbul and Dubai, all of which are growing their capacity. Meanwhile, the fall in the number of domestic flights to

[28] For these figures on growth in ATMs at European hubs, see 2012 Facts & Figures on Frankfurt Airport, (Fraport's Airport Expansion Programme), p.28 http://www.fraport.com/content/fraport/en/misc/binaer/press-center/facts-and-figures/jcr:content.file/zadafa-2012_e_lowres.pdf; also *From Airfield to Airport City*, Schiphol Airport, (March 2013), p.6 http://www.schiphol.nl/web/file?uuid=8f8593b4-95e5-4f8a-99bd-f4f14df2f4cc&owner=7ccedf61-a8f4-4180-b5b0-849e8def7d3e, and http://www.aeroportsdeparis.fr/adp/en-gb/group/home/ .

Heathrow – from 21 cities in 1995 to only 7 today – is impacting on the feeder traffic needed at Heathrow for potential new routes.

Competition for hubs

How many major hub airports can Europe sustain? Much global aviation is now channelled through 3 main international airline "Alliances". If they were starting today with a blank sheet, it is a reasonable guess that to maximize their efficiency they would each concentrate their European business around a single super-hub. This suggests that the "optimal" number of major European hubs may be closer to 3 than the present/planned 6 (London, Paris, Amsterdam, Frankfurt, Madrid, Istanbul) and that there may well be continuing commercial pressure to move traffic to the ones most attractive to the airlines. For the rest, long-haul connectivity would increasingly be indirect, involving at least one connecting flight to a 3rd-country airport.

If there is a natural limit on the maximum number of top-tier hubs needed to achieve adequate levels of international connectivity, this only serves to underline the intense competition there is likely to be in future between countries to make sure they are among the successful host nations. It also has a bearing on the merits or otherwise of seeking to introduce multiple hubs in the UK – a point we return to in Section 3.

2.7.17 The fundamental issue is, we believe, whether and how the UK can continue to be a central source and destination for the long-haul routes traditionally starting/ending at Heathrow and whether it can increase such routes in future; or whether we will see a growing concentration of long-haul routes at non-UK airports, with UK airports essentially feeding their long-haul passengers to and through them. That would lead to reduced connectivity, with the UK becoming an aviation 'spoke' and long-haul passengers to and from the UK increasingly having to travel via other hubs in Europe and beyond.

2.7.18 The signs are already there:

- Paris and Frankfurt offer 2,200 more flights a year to mainland Chinese cities than Heathrow, and more flights to Brazil and Russia – see **Figure 2.14**; and evidence received indicates that Heathrow compares less favourably with other hubs in mainland Europe in terms of its 'anchor' airline's connectivity

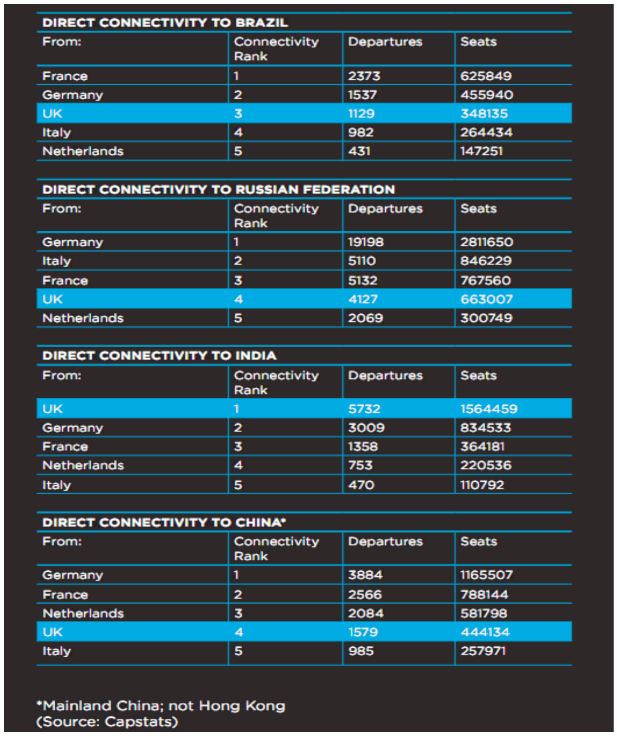
- The inability of foreign airlines to introduce new routes to Heathrow due to capacity constraints which in turn restricts reciprocal access to their growing global markets[29]

- Claims that there are 26 emerging market destinations with daily flights from other European hubs but not currently served daily by Heathrow[30]

- A poll by BAR-UK which suggests 86 per cent of airlines would put on more flights from Heathrow if additional slots were available; and that 53 per cent of airlines had decided, or were planning, to base flights in other countries than the UK because of a lack of capacity at Heathrow.[31]

[29] Submission by BA to ITC Aviation Call for Evidence, 2012
[30] Submission by Heathrow to ITC Aviation Call for Evidence, 2012
[31] Heathrow – 'One hub or none', November 2012

Figure 2.14: Direct UK connectivity to BRIC economies in 2011



DIRECT CONNECTIVITY TO BRAZIL

From:	Connectivity Rank	Departures	Seats
France	1	2373	625849
Germany	2	1537	455940
UK	3	1129	348135
Italy	4	982	264434
Netherlands	5	431	147251

DIRECT CONNECTIVITY TO RUSSIAN FEDERATION

From:	Connectivity Rank	Departures	Seats
Germany	1	19198	2811650
Italy	2	5110	846229
France	3	5132	767560
UK	4	4127	663007
Netherlands	5	2069	300749

DIRECT CONNECTIVITY TO INDIA

From:	Connectivity Rank	Departures	Seats
UK	1	5732	1564459
Germany	2	3009	834533
France	3	1358	364181
Netherlands	4	753	220536
Italy	5	470	110792

DIRECT CONNECTIVITY TO CHINA*

From:	Connectivity Rank	Departures	Seats
Germany	1	3884	1165507
France	2	2566	788144
Netherlands	3	2084	581798
UK	4	1579	444134
Italy	5	985	257971

*Mainland China; not Hong Kong
(Source: Capstats)

(Source: AoA submission to ITC Aviation Call for Evidence, 2012)

2.7.19 We could in principle live with these capacity constraints by (for example) allowing prices to rise to choke off demand, or channelling more long-distance passengers through European hubs instead of the UK one. But the result would be reduced connectivity. As the Airports Commission notes in its own guidance on forecasting, the DfT forecasts include an assessment suggesting the outcome would be a significant loss of routes (with daily flights), with all the London airports projected to have significantly fewer routes under the constrained forecast – see **Figure 2.15** – while all other UK airports are predicted to gain routes.

Figure 2.15: Implied route losses due to capacity constraints by 2050 (routes served daily)

	Unconstrained	Constrained	Difference
Heathrow	193	121	-72
Gatwick	106	83	-23
Stansted	79	68	-11
Luton	40	31	-9
London City	25	14	-11

(*Source: DfT UK Aviation Forecasts 2013)*

2.7.20 Putting a price on this lost connectivity is more difficult. Various estimates have been suggested:

- up to £14bn a year in lost trade as a result of poor connections without growth at Heathrow[32];
- £100bn over the next 20 years[33];
- lack of good air links is costing UK business as much as £1.2 billion a year[34];
- a 10 per cent increase in international connectivity would add £890m to UK GDP; conversely, failure to do so could see loss of around 141,000 jobs[35];
- Analysis by the CBI suggests adding one daily flight to each of the eight largest high-growth markets would increase UK trade by as much as £1billion a year[36].

2.7.21 Whilst there may be argument about the precise figures and the timescales, the consensus is that there will be direct and substantial economic damage if the UK is unable to maintain and enhance its international connectivity. As the CAA have noted,[37] *"capacity constraints at airports in London/SE may already limit the scope to adjust as global economic activity shifts to emerging markets such as China, India and South America".*

2.7.21 Could long-haul connectivity be improved *without* requiring additional hub capacity? It has been suggested to us that new generations of aircraft like the *Dreamliner* may offer scope for long-haul flights with smaller loads, so less reliant on feeder traffic; and if so, some extra capacity at airports like Gatwick, Stansted and Birmingham could provide improved direct connectivity by means of point-to-point services. We welcome the growth of this potential long-haul model, but remain doubtful whether it represents a viable alternative (rather than complement) to the hub model. Indeed, the bulk of orders for the *Dreamliner* appear to be from airlines operating a hub business model. We also question whether such developments alone would ensure that London retains the degree of connectivity which the hub model has traditionally provided.

2.7.22 Others have suggested that long-haul throughput at Heathrow could be improved by cutting back on short-haul services and increasing load factors on its long-haul services. Our response to this is summarised in the Box below.

[32] Heathrow Airport submission to ITC Aviation Call for Evidence, 2012
[33] TfL submission to ITC Aviation Call for Evidence, 2012
[34] Evidence given by CBI business environment director Rhian Kelly to the TSC committee, 14 January 2013
[35] Value of aviation connectivity to UK, Oxford Economics, March 2012
[36] 'Trading Places', report by the CBI, March 2013
[37] CAA Insight Note 1, Aviation Policy for the Consumer, 2012

Bigger planes, higher load factors?

Some have argued in evidence to us that the way to address capacity constraint is to use larger aircraft and encourage higher load factors (the ratio of seat occupancy). No airline wants to fly empty seats if they can fill them, and sophisticated yield management techniques are used to help ensure maximum efficiency. Load factors at Heathrow have risen in recent years and average around 76 per cent (peaking at 85 per cent in July 2011) – much the same as at Frankfurt and Paris. But load factors are a function of demand at any given time and airlines need to construct their schedules in a way that also responds to passengers' needs in terms of frequency, time of day and seasonal variations in demand.

In practice, capacity constraints at Heathrow have seen a move towards the use of larger aircraft where there is adequate demand on a particular route to make this commercially sensible. That is why, along with passenger terminal capacity, the airport is assumed to be still capable of handling a further 20-25 million passengers a year. But the viability of many inter-continental flights relies on feeder traffic, and feeder routes to Heathrow have fallen in recent years. By their nature, feeder flights will use smaller aircraft and any move to squeeze out the use of smaller planes at Heathrow will only exacerbate this problem. Hence the capacity on the existing two runways is acting as a key constraint in the airport's ability to extend the benefits of connectivity by serving new destinations.

2.7.23 In summary, we **recommend** that, in looking at how the UK should respond to forecast demand the Airports Commission should

a) focus its work on connectivity, rather than capacity; and

b) commission further work to clarify what "good connectivity" to/from the UK, and particularly the South East, means – what do we want/need in terms of connectivity to global markets; how far it can be met by point-to-point; and whether, as we fear on the basis of the evidence so far, the UK's long-haul connectivity is under threat if it becomes increasingly necessary to access global destinations through 3rd country hubs rather than direct from the UK itself.

3 Strategic Options

3.1 Overview

3.1.1 Some of our respondents took the view that the situation is neither serious nor urgent; that the aviation market may be maturing to the point where demand will level out; and that, even if new capacity is needed, it is difficult for the Government to come to a view on its location, given the competitive market in which airports now operate. This suggests that the easiest strategy would be for the Government to do nothing – in effect, to sit back and leave the outcome entirely to the market.

3.1.2 The overwhelming balance of evidence we have received, however, appears to agree with the Government about the importance of maintaining the UK as a major aviation hub, and having a strategy to achieve that. In the preceding paragraphs we have sought to identify the likely consequences if no action is taken: a loss of connectivity, particularly long-haul, and to emerging markets; erosion of the UK's comparative position vis-à-vis other European hubs, which are planning for growth; and likely adverse impacts on the UK in terms of trade and global competitiveness.

3.1.3 If it is accepted that there is a genuine and growing connectivity challenge, particularly in relation to direct long-haul connectivity, and that it needs to be addressed, what are the strategic options? We have received many suggestions. We categorise them in the following terms:

a) a distributed strategy i.e. maintaining the status quo at Heathrow but allowing other airports in the SE or further afield to grow in response to demand;

b) multiple discrete hubs i.e. seeking to develop competing hubs at more than one UK airport;

c) an inter-connected hub i.e. linking up 2 (or more) airports with a view to sharing capacity in a single 'virtual' hub;

d) a single major hub.

3.2 A distributed strategy

3.2.1 A number of respondents have argued in favour of this, including Birmingham Airport who claim that such an approach would be *"better for customers, better for business and better for the UK's future prosperity"*[38]. In effect it represents a policy of continued incremental growth, with airport expansion as and when market conditions allow. It assumes no further development at Heathrow.

3.2.2 We believe that this approach would enable continued growth in point-to-point services where the level of demand can sustain them. It would therefore address the likely capacity problem in the SE for both short-haul and point-to-point connectivity. As discussed earlier, it could also contribute to improved long-haul connectivity if it meant (for example) that more foreign airlines who cannot use Heathrow could access alternative UK airports, or that new routes could be developed using smaller but more economic new-generation planes. This approach therefore has strong attractions in addressing at least one element of the future connectivity challenge.

[38] Letter to ITC from Paul Kehoe, Chief Executive, Birmingham Airport, 11 June 2012

3.2.3 However, we do not believe that expanding regional airports alone would address the bigger challenge of maintaining the UK's position for long-haul connectivity, since it would not enable our major hub to respond to the growing competitive pressure from other European hubs. Without more capacity at our major hub, London/SE long-haul connectivity would increasingly be channelled through hubs in mainland Europe and/or the Middle East and UK passengers would find themselves having to travel via an intermediate hub rather than direct. It is not clear to us, therefore, how such an approach could secure the Government's objective to *"maintain the UK's position as Europe's most important aviation hub".*

3.2.4 We **recommend** that the Airport Commission consider very seriously the options for enhancing capacity at regional and local airports as a (relatively) straightforward way of addressing an important element in the overall connectivity challenge - the need to ensure continuing short-haul capacity in the South East (near term) and elsewhere (by the mid-century). Enhancing this capacity may well form an important element in an overall, holistic, strategy. But we do not believe it resolves the more challenging issue of direct long-haul connectivity.

3.3 Multiple discrete hubs

3.3.1 It has been suggested by some that increasing runway capacity at Gatwick and perhaps other airports would not only address the coming constraints on short-haul capacity in the South East but also avoid the need to expand (or replace) Heathrow to meet the long-haul connectivity challenge. Instead of one major hub serving intercontinental routes there would be at least two, albeit both of smaller size and capacity than their continental rivals. They point, for example, to New York which, like London, has several large airports – JFK, Newark and La Guardia – and claim that this illustrates the practical possibility of dual or multiple hubs.

3.3.2 We are not convinced, however, that the comparisons with NY are strong. Traffic at La Guardia airport is mainly domestic and Newark and JFK are each home to a (different) large US network airline, whereas Heathrow has only one major network airline, BA. Newark and JFK are also very different in the proportion of transfer traffic they handle – around 17 per cent in the case of the former, and over 40 per cent in the case of the latter. As we have seen earlier, an effective hub airport requires a high level of transfer traffic to help balance local demand. The volume of transfer traffic at Newark is not much higher than that at Gatwick today.

3.3.3 Previous attempts to introduce hub operations at Gatwick in the late 1970s and 1980s – albeit under different circumstances - were unsuccessful[39]. For Gatwick, or any other UK airport, to emerge as a genuine second UK hub providing global connectivity comparable to Heathrow, Paris, Amsterdam or Frankfurt would require, we believe, not just additional capacity but also one of the major airlines or alliances to base some or all of their global services (not just feeder traffic) there. (Manchester, for example, has two runways but does not operate as a global hub comparable to Heathrow etc). This seems improbable, given the commercial pressures for airlines and alliances to consolidate around a small number of large hubs rather than a larger number of small hubs. The absence of a dominant airline or alliance with a sufficient network and volume of long-haul traffic makes it questionable, we believe, that further attempts would be much more likely to succeed.

[39] Heathrow – 'One hub or none', 2012

3.3.4 Indeed, we have been unable to identify any instances in Europe where dual or multiple hubs have been successfully introduced, other than by Lufthansa at Frankfurt and Munich under somewhat different circumstances. Japan's experience over its airports in Haneda and Narita is further evidence of the dangers of seeking to split hub operations. [40]

Lufthansa at Frankfurt and Munich

The Lufthansa model is sometimes cited as an example of a dual hub. However, this is a rather different model, since it involves a single national airline carrying out hub-type operations from two locations, as distinct from competing airlines or alliances. The decision by Lufthansa to make Munich its 2nd (or secondary) hub is understood to have been prompted by the ban on night flights at Frankfurt some years back, and the lack of available slots. In addition, Frankfurt and Munich serve rather different markets – the latter concentrating primarily on the intra-EU market and travel between the EU and Eastern Europe whilst Frankfurt is Lufthansa's primary intercontinental hub. Moreover, the geography of Germany differs markedly from that of the UK in terms of its population distribution and, significantly, the absence of a hugely dominant city region like London and the wider south east.

Tokyo's Haneda and Narita

Tokyo slipped from 1st to 7th in the Asian city connectivity ranking in the decades following an unsuccessful attempt in 1978 to operate a 'split' hub. Domestic and international services were split between Haneda and Narita airports, which were connected by express rail and bus links. In practice, many passengers opted instead to fly from South Korea's Incheon airport, or from Hong Kong or another foreign hub.

Japan has since agreed to expand international traffic at Haneda, which has encouraged global network airlines (including BA) to switch services from Narita to Haneda.

3.3.5 We recognise, of course, that increased capacity at Gatwick, Birmingham and other airports could contribute to improved long-haul as well as short-haul connectivity. New aircraft such as the Boeing 787 could make it commercially more feasible to operate long distance routes with smaller passenger numbers. And greater capacity, plus changes such as "fifth freedoms" could make these airports more attractive to airlines which can't get access to the main hub or are put off by its charges. Such developments would improve connectivity and are therefore to be welcomed. Nevertheless, we do not see them changing the fundamentals of long-haul connectivity: running frequent, regular, direct flights to a very broad range of global destinations will almost certainly continue to need passengers (and freight) to be aggregated from a wide base, including non-local transfer passengers; and the wider the pool of customers who can be aggregated – i.e. the bigger the hub - the more connections will prove commercially viable.

3.3.6 So although we see genuine benefit in expanding the capacity of other airports in or near the SE we are not convinced that this alone would resolve the long-haul connectivity challenge. The major problem is that trying to operate two medium-sized hubs in the South East would not succeed: they would either require substantial duplication of feeder routes, which would be uneconomic; or involve splitting feeder routes between the two hubs, which would reduce the pool of transfer passengers. Neither would have the capacity or the commercial appeal of the larger mainland alternatives. As a consequence, airlines could still find it simpler and more economic to

[40] Heathrow – 'One hub or none', 2012

channel their UK passengers, and feeder travellers from outside the UK, via a much larger hub in mainland Europe or the Middle East.

3.3.7 In summary, on the evidence we have seen, we are not persuaded that the dual-hub or multiple-hub option would succeed. We fear that the result would be to strengthen the position of the major alternative European hubs as the focal points for long-haul, intercontinental flights, reducing rather than strengthening the UK's direct global connectivity.

3.4 An inter-connected hub

3.4.1 The concept of an interconnected or 'virtual' hub would be to allow (typically) two airports to be connected in such a way as to enable them to operate seamlessly as a single hub. One such idea – 'Heathwick' – envisages joining Heathrow and Gatwick airports by a 35-mile high-speed rail link, with integrated check-in and security arrangements. Similar ideas have been suggested for linking Heathrow with other airports in the South East.

3.4.2 In the evidence we have received, there has been very little support for this approach. Without additional capacity, simply linking two airports together will have very limited benefit in addressing the connectivity problem. And there are real practical difficulties: most respondents believe that the transfer times between airports would be unacceptably long, however good the transport links, and that it would be difficult to guarantee quick and seamless flight connections. Hub airports aim to be able to get passengers and their baggage from one flight to another within about 60 minutes or less and it is extraordinarily difficult to see how this could be achieved between distant sites, especially if passengers needed to go through immigration as well as security. From the point of view of both passengers and airlines, the far more straightforward arrangements offered by a single, major, integrated hub - in another European country if necessary - would almost certainly be more attractive, undermining the commercial viability of such a scheme.

3.4.3 Nor is it clear how such a scheme would work where, as is now the case with all the London airports, each has separate owners and are in competition with each other.

3.4.4 In addition, there must be questions about the feasibility and financeability of the rail links that would be needed. Rough estimates for 'Heathwick' put the costs of the inter-airport link at around £5bn. It is not clear how this would be paid for, even in the event of possible expansion with a second runway at Gatwick. If the costs fall to be recovered through higher airport charges, ultimately passed on to passengers, that would be another incentive for connecting passengers to choose to transfer elsewhere.

3.4.5 In short, whilst we support the case for strengthening transport links to and between airports as a desirable end in itself, we do not believe that an inter-connected "virtual" hub, operating across two airports, would resolve the UK's connectivity challenge.

3.5 A single major hub

3.5.1 If it is accepted that a distributed strategy does not guarantee to preserve the UK's status as a major aviation hub, and that inter-connected and multiple hubs do not work, the logical conclusion is that the solution is to develop a single hub airport. The balance of the evidence we have received has been to support this as the most appropriate solution to deliver the global connectivity the nation needs, and the only solution that delivers the depth, reliability and density of routes needed to attract the transfer traffic which makes such routes viable.

3.5.2 We have not reached a firm view on the likely size of such a hub. The most recent proposal for Heathrow was to develop a (short) third runway, and one of the grounds on which this has been challenged is whether it would actually prove sufficient in the longer term. We note other major European hubs have four or five runways and that Istanbul is planning for six (see Figure 2.13 above). Proponents of a new Thames airport and at least one proposal for a radically reshaped Heathrow have proposed 4 runways as providing not simply capacity but, almost as important, the operational flexibility and resilience which a major hub requires.

3.5.3 It is not clear to us whether a hub has a natural maximum size; in other words, once we have achieved a certain level of interconnection to major cities across the globe, supported by a certain level of transfer traffic, does the hub-centric model start to break down? At some point, airlines might then choose to add capacity by means of direct point-to-point services: this could be done from other airports. We **recommend** that further research is undertaken to understand better whether there is an optimum size for a hub from both operational and user perspectives.

3.5.4 We believe that the question of the optimum size of a hub needs further analysis and research. Amongst the factors to consider are:

- the need for redundancy. As noted above, one of the key requirements for good connectivity is reliability and resilience. Heathrow currently struggles with both, since its runways are operating at maximum capacity virtually all the time. This also worsens its CO_2 impact, due to the additional taxi-time and stacking. Capacity planning needs to build in "redundancy" as part of improving the overall connectivity benefits;
- efficiency of operations and whether this points towards (for example) twin pairs rather than odd numbers of runways;
- how much capacity is actually needed to deliver the desired additional capacity, in particular "sufficient" additional flights to "sufficient" additional destinations? We recommend further work to model alternative assumptions on this and to assess how much additional capacity this implies; and on whether additional capacity alone is likely to unlock the additional connectivity goals (more direct flights to more destinations) or whether other policy levers might be needed as well;
- longer-term uncertainties about the future shape of aviation, e.g. whether the balance between the hub model and point-to-point is likely to change at some future point in the light of technology, costs and market or other factors. For example, although filling marginal seats with transfer passengers makes good financial sense, from another perspective it adds costs compared to a direct flight, through the need for an extra flight and associated costs - see later box on hub charges: might this balance plausibly change in future? For the reasons discussed above, we think hubs will continue to be the main vehicles for long-haul

connectivity as far ahead as we can currently usefully plan: but that does not mean the balance might not change at some future date.

3.5.5 We discuss below what we believe to be the three most plausible candidates for the location of the UK hub: expanding Heathrow, developing Stansted or building a new airport from scratch – the most frequently proposed location being in the Thames Estuary. We focus on these on the grounds that developing the UK's existing hub, and still one of Europe's top airports, is clearly an option which should be considered. But if that were to be rejected, and an alternative major hub had to be built elsewhere, we consider it sensible to focus on sites with the clear potential for a major development of four runways. This is the attraction of a completely new airport, such as the various Thames proposals. And, amongst the other existing SE airports we understand that expanding on this scale is likely to be more feasible at Stansted than at (say) Luton or Gatwick. We understand the Commission proposes to analyse preliminary options and narrow them down to a manageable number by the end of the year, and suggest that Heathrow, Stansted and a new Thames airport should be part of that analysis, unless any are ruled out definitively on the basis of the criteria discussed in the next section.

3.5.6 We preface this with three important points. First, if it is accepted that maintaining the UK's connectivity requires a single hub able to compete with the best elsewhere in Europe, and if this were not to be at Heathrow, we believe it follows that Heathrow airport would have to close. Investors in any major new hub would need to have confidence that airlines would migrate their business to it. It would therefore be necessary to plan from the outset on the assumption that Heathrow would close; and to identify a mechanism to give assurance that this would actually happen.

Closing Heathrow

Heathrow airport employs over 76,000 people directly, with another 38,000 indirectly employed in hotel, catering, transport and other businesses that rely on, or serve, the airport. In addition, much of the economy of west London has developed around the airport, while many global high tech companies have chosen to locate in the wider Thames Valley Region.

We believe that decisions on the location of our major hub airport imply a stark choice. Either it continues at Heathrow, or it finds an alternative new home elsewhere – in our view, Stansted and the Thames Estuary look like the prime candidates. In the event of a decision to develop a major hub airport at either of those two locations, we do not see how the current Heathrow could continue to operate. The majority of our respondents share this view.

This raises significant issues for west London and the wider region, including employees at the airport and businesses which have located there because of the airport's proximity; the compensation that may be payable to the airport owners (and others?) on closing down operations; the mechanisms needed to effect closure; and the potential alternative uses for the Heathrow site. We touch on these later in our report. But little detailed attention appears to have been given to these issues and we **recommend** that the Airports Commission should ensure that they are comprehensively considered.

3.5.7 Second, we stress again that although ensuring the UK continues to host a top-tier European hub is crucial, it is not the sole answer to the country's connectivity challenge. The hub should be complemented by appropriate development of other airports, partly to meet the short-haul needs discussed above and partly to promote competition, innovation and convenience for passengers by enabling different models of service too. Even in long-haul connectivity, it is important for hub services to be complemented by local services operating either via the UK (or foreign) hubs or through direct flights where and when these are commercially viable. It will also be necessary to

consider the operational impacts on other airports, e.g. on their flight paths, of any major new hub development

3.5.8 Third, we do not think that, if there is a 'preferred' hub, it should be allowed to gain a monopoly right because other airports are unnecessarily constrained. In the event that the UK creates a 'super-hub', we would argue that the case for other airports to be deregulated and allowed to develop their own strategies alongside would be greatly strengthened. Gatwick Airport told us that deregulation would improve its ability to anticipate and respond to changes in a dynamic and competitive industry, and enhance its commercial proposition for new carriers[41]. Those of our respondents who commented on other issues relating to regulation tended to welcome developments such as the proposal in the draft Aviation Policy Framework (now confirmed) to extend "fifth freedoms" which would allow incoming airlines at airports like Gatwick, Stansted and Luton to land, take on passengers and then fly elsewhere. This would help give passengers access to a broader network of destinations, improving choice and frequency. Current EU proposals for slot reform were similarly supported.

3.5.9 We discuss the three suggested hub options in greater detail below and, in Section 4, the criteria and considerations against which the options might usefully be evaluated.

Heathrow

3.5.10 Heathrow is operating at capacity now, in terms of aircraft movements (capped at 480,000 ATMs a year), but is understood to be capable of handling an increase in passenger numbers from today's 70mppa to around 85mppa with no more terminal capacity but assuming the use of larger aircraft and perhaps some increase in apron capacity. In common with other world hubs, Heathrow also has a substantial freight operation – nearly 1.6 million tonnes a year - much of it in the belly-hold of passenger aircraft.

3.5.11 There is no firm proposal currently on the table for adding new runways at Heathrow but under the previous proposal for a (short) third runway and new passenger terminal facilities, runway capacity was forecast to rise nearly half to around 700,000 ATMs, and passenger capacity to around 120mppa. It is possible that future technology changes, for example in the control of airspace, could see that rise even further.

3.5.12 Recently support has grown for more radical options at Heathrow in order that it can be expanded to four runways, such as by replacing the existing two runways with twin pairs of parallel runways on an extended airport to the west, over a filled-in Wraysbury reservoir, with the motorway (M25) put in a tunnel (as happens at Paris). There would be a new passenger terminal at the western end, connected to the rail/Tube lines and all existing terminals (other than T4) would be retained. This concept has been costed indicatively at around £10bn.[42] Key benefits include utilising much of the existing airport infrastructure, and reducing aircraft noise over London by moving the runways further west, meaning flights over residential areas would be higher and quieter.

[41] Submission by Gatwick Airport to the ITC Aviation Call for Evidence, 2012
[42] 'Bigger and Quieter, The Right Answer for Aviation', Tim Leunig, Policy Exchange, 2012. See also support from *The Economist,* 30 March 2013, http://www.economist.com/news/leaders/21574486-expanding-heathrow-westwards-could-give-london-airport-capacity-it-needs-reasonable

3.5.13 We deal later with some of the key issues – notably noise and surface transport – that would need to be considered. But a key question is also whether an expanded Heathrow, particularly if limited to three runways, would be sufficient to provide the global connectivity we need for the foreseeable future.

Stansted

3.5.14 Stansted's current traffic is around 145,000 ATMs and 19mppa. There is room for growth to around 260,000 ATMs and 34mppa with the existing runway and passenger terminal capacity.

3.5.15 Stansted has very recently been acquired by new owners and, as with Heathrow, there are no proposals currently on the table for expanding the airport. But previous work assumed that adding a second runway would allow for more than doubling passenger numbers, to around 80mppa. Options for adding two and three new runways were also considered. A third (close parallel) runway was thought feasible, allowing the airport to handle around 100mppa. As this is less capacity than Heathrow with a third runway, if it were decided to make Stansted the UK's hub airport, it might be sensible to consider 4-runway options from the outset.

3.5.16 Developing Stansted as a major alternative to Heathrow has certain attractions – the location allows for expansion with relatively low impacts on land-use; flights approach from the east over open country, which avoids intensifying aircraft noise over London; and the airport's position allows for access to London as well as the growth areas/economies of east Herts, west Essex and Cambridge. Disadvantages include its distance from many of those who make most use of Heathrow today and its relatively poor surface transport links which would need to be significantly strengthened.

3.5.17 Developing Stansted airport as a major hub airport would also be a good deal less costly than building a brand new airport in the Thames Estuary.

Thames Estuary

3.5.18 There are a number of proposals in the public domain, including notably 'Shivering Sands' ('Boris Island') on a man-made island north-east of Whitstable; the Foster & Partners scheme on the Isle of Grain (Hoo Peninsula), combined with proposals for new flood defences, renewable energy and other infrastructure; floating runways in the Estuary, as proposed by London Britannia Airport; and more recently a plan for an off-shore airport at Goodwin Sands off the Deal coast.

3.5.19 The key attraction of these various proposals is seen to be the potential for removing the noise problem from central and west London, along with the space for building a substantial 4-runway airport and allowing for 24-hour operations. The Foster & Partners scheme assumes capacity of up to 150mppa, more than double Heathrow's present level of traffic.

3.5.20 Construction of a new off-shore airport in any of these locations is likely to present significant challenges, as would also the provision of the necessary infrastructure to link it satisfactorily into the national road and rail networks. The predicted order of costs is therefore substantially higher than options for expanding an existing airport.

4 Key issues and criteria for assessment

4.1 In this section we discuss what seem to us to be the key issues which would need to be considered in relation to any proposal for a single major hub, and the criteria that might be employed in assessing the relative merits of different options,:

i) Surface transport

ii) Other local/regional impacts

iii) Timescale for delivery

iv) Cost and financing

v) Noise

vi) Environmental issues

vii) Airspace, safety and regulation.

4.2 We are aware that the Airports Commission has suggested its own set of factors that scheme promoters are being encouraged to consider in developing their proposals[43]. These include economic and social factors, climate change impacts, local environmental factors, accessibility and feasibility. Although our criteria do not entirely coincide with these, we believe they cover essentially the same ground. Our comments on CO_2 and climate change impacts are found in Section 2 above.

4.3 We have also attempted, on the basis of the evidence we have received, to give some sense of the scale of challenge presented by the different options. This is necessarily tentative, since much will depend on the details of any specific scheme. Our assessment is summarised in a Table at the end of this Section. We conclude that the challenge of delivering a working hub airport in the Thames estuary (in whatever form) would appear to be an order of magnitude greater than at Heathrow or Stansted.

4.4 Surface transport

4.4.1 Ease of access to airports and specifically journey times are important elements of 'connectivity' - ones that passengers rate high on their list of priorities and which influence their decisions about their choice of airport. Business users in particular, who may be time-poor, want fast and reliable access; it is interesting to note that Emirates undertake to collect their business class passengers by car. **Figures 4.1** and **4.2** illustrate some typical journey times at present by train and car to selected airports, highlighting those where the journey time is less than or close to 60 minutes.

4.4.2 Heathrow is reasonably well connected now, and around 25 per cent of passengers are believed to start their journeys within 30 minutes of the airport. Further improvements are planned with the advent of Crossrail (planned for 2018), the recently confirmed plans for western rail access, which will see the introduction from 2021 of direct rail services to the airport from Reading, via Maidenhead and Slough; and a possible link to HS2 (currently deferred, pending development of the Aviation Strategy). But the M25/M4 is heavily congested at peak periods and more surface transport capacity – road and rail - is likely to be needed to cope with any significant airport expansion, if this is not to have unacceptable impacts on other traffic in the area. This

[43] 'Submitting evidence and proposals to the Airports Commission', February 2013

might include a Southern Rail link to Heathrow, probably via Staines, to provide direct rail access to the airport from South West London.

Figure 4.1: 2013 estimated journey times on public transport from the Greater London region to selected major airports

Station of Origin	Airport				
	Birmingham	Gatwick	Heathrow (T3)	Luton	Stansted
Wimbledon (SW London)	1 hr 48 mins (change at Euston)	1 hour 10 mins (Tube & Train) 1 change	1 hour 1 min (Tube & Train) 1 change	1 hour 26 mins (Train & Bus) 2 changes	1 hour 36 mins (Tube & Train) 2 changes
Lewisham (SE London)	1 hr 50 mins (change at Euston)	55 mins (Train) 1 change	1 hour 17 mins (Tube & Train) 3 changes	1 hour 28 mins (Train and Bus) 2 changes	1 hour 17 mins (DLR and Bus) 3 changes
Walthamstow (NE London)	1 hr 36 mins (change at Euston)	1 hour 6 mins (Tube & Train) 1 change	1 hour 11 mins (Tube & Train) 2 changes	1 hour 16 mins (Tube, Train, Bus) 2 changes	46 mins (Tube & Train) 1 change
Wembley Central (NW London)	1 hr 42 mins (change at Euston)	1 hour 12 mins (Train) 2 changes	1 hour 1 min (Tube & Train) 1 change	1 hour 21 min (Bus, Train) 2 changes	1 hour 36 mins (Tube & Train) 2 changes

(*Source: National Rail Enquiries/Transport for London journey planner)*
Note that these are fastest connections and not all timetabled journey times will be the same

Figure 4.2: 2013 estimated journey times by car from the Greater London region to selected major airports.

Origin	Airport				
	Birmingham	Gatwick	Heathrow (T3)	Luton	Stansted
Wimbledon Rail Station (SW London)	2 hr 29 mins (118 miles	53 mins (26 miles)	51 mins (18 miles)	1 hour 21 mins (42 miles)	1 hour 30 mins (45 miles)
Lewisham Rail Station(SE London)	2 hr 40 mins (117 miles)	1 hr 0 mins (41 miles via M25)	1 hour 5 mins (25 miles)	1 hour 23 mins (40 miles)	1 hour 5 mins (38 miles)
Walthamstow Central (NE London)	2 hrs 20 mins (116 miles)	1 hour 30 mins (50 miles via M25)	1 hour 12 mins (29 miles)	1 hour 3 mins (39 miles)	49 mins (29 miles)
Wembley Central (NW London)	2 hrs 7 mins (108 miles)	1 hour 19 mins (54 miles via M25)	42 mins (14 miles)	50 mins (31 miles)	1 hour 7 mins (43 miles)

(Source: AA Route Planner http://www.theaa.com/route-planner/index.jsp)

4.4.3 In evaluating any proposals for Heathrow, we suggest the Airports Commission should consider what a "well-connected Heathrow" should look like and the necessary additional investment needed in surface transport, including for a 4-runway 'Heathrow West' option. Good links to HS2 and Crossrail seem to us essential if any expansion occurs.

4.4.4 Stansted is well connected to the motorway network via the M11, although the capacity of the motorway to handle the traffic from a substantially expanded airport would need substantial upgrading, along with improvements to the M25 and local road network. Major enhancements to rail access, both to London and the Midlands/north, would also be needed. A possible extension of Crossrail, at a cost perhaps in the order of £3bn, could deliver journey times of 25 minutes to the City/Canary Wharf and 35 minutes to the

West End, 'bringing 30 million people within two hours travel time from Stansted with one change of train'.[44]

4.4.5 Surface access would be most challenging for any Thames Estuary option, given the distance from central London (around 55km) and the hinterland of west and north London, where a significant proportion of Heathrow passengers originate. As the promoters of such schemes have recognised, major new road and rail links would need to be created, and whether these are by means of a new orbital rail line to the north of London, an extension to Crossrail or a High Speed rail link, they will have very major implications in terms of planning approvals, costs and delivery.

4.4.6 The scale of the ambition here has attractions, not just to provide surface access to the proposed new airport but to transform the economy of the whole region. However, the Airports Commission will need to reach a careful judgement on the deliverability of so much major new surface transport infrastructure, whether it will be on the timescale necessary for the airport itself, the likely costs and the potential impact on fares for passengers. The cost of providing such links has been estimated at around £20bn: equivalent to over five years of expenditure on the strategic road network in the UK.[45]

4.4.7 Access is also an important issue for freight and express services, and its associated warehousing and distribution activities which a major hub will need to support. We noted earlier in this report that Heathrow as our current major hub does not provide dedicated air freight to any significant degree, not least due to its restrictions on night-time operations. Clearly, a decision to develop a major hub airport elsewhere could offer opportunities for an integrated transport hub with rail-freight access, serving the logistics and distribution industry sectors and fully integrated with the High Speed Rail network. The Airports Commission should ensure that these considerations are taken into account in their assessment of options.

4.5 Other local and regional impacts

4.5.1 Airports are more than simply places from which to fly; they act as major hubs for transport, employment generators and centres of economic activity. Whilst Heathrow employs over 76,000 people directly, another 38,000 are indirectly employed in hotel, catering, transport and other businesses that rely on, or serve, the airport.

4.5.2 New airport capacity therefore has implications, not just for physical airport and access infrastructure but also for housing and other supporting social infrastructure – schools, hospitals, local roads etc. The Airports Commission will need to consider what implications the different options have in these areas, including the extent to which existing social infrastructure can absorb the increased demands and, if not, what would be needed to provide for them.

4.5.3 A major increase in the size of Heathrow would have implications for housing and would raise the question whether the housing market in west London can meet the need. At Stansted, without the equivalent hinterland, it has been suggested that at least an additional 50,000 workers would need to be catered for, requiring in effect a new 'Eco' town[46]. This may be a conservative estimate, given that Heathrow provides 114,000 jobs directly and indirectly. We estimate that, in order to service such a population, a

[44] Submission by Michael Schabas to the ITC Aviation Call for Evidence, 2012
[45] Estimate from OXERA report to the Transport Select Committee, January 2013, DfT Business Plan, 2011-12
[46] Submission by Michael Schabas to the ITC Aviation Call for Evidence, 2012.

settlement the size of Peterborough would need to be developed. A Thames Estuary airport would raise similar challenges for the neighbouring towns to house and support a workforce expansion on such a scale.

4.5.4 Negative impacts on existing settlements also need to be considered. The earlier proposal for a third runway at Heathrow would have necessitated the loss of around 700 homes in Sipson. It has been suggested that up to nine villages might be lost in the event of an airport on the Hoo Peninsula under the Foster proposals. Impacts on heritage and listed buildings also need taking into account.

4.5.5 Perhaps the biggest single impact of a decision to base the main UK hub at anywhere other than Heathrow would be closing Heathrow itself and, in effect, shifting a major part of the west London economy to a completely new location. There are clearly very major implications here - positive and negative - for jobs, for companies and for individuals in both west London and around any new site. On the one hand, closing Heathrow would have major impacts on the 114,000 people who are directly or indirectly employed by the airport, as well as their families and the communities where they live. On the other hand, the release of some 1,200 hectares of land - the size of Kensington and Chelsea – could offer an unparalleled opportunity for redevelopment for housing and other uses in a prime west London location, with good rail and road access.

4.5.6 There are also issues of timing: Heathrow would need to keep operating right up until the new hub was open, but then the transfer of airlines would need to be reasonably quick, both for operational reasons (connections etc) and to start to pay back the investment. Managing such a transition while ensuring seamless service would be a highly complex challenge in its own right.

4.6 Timescale and Delivery

4.6.1 In the absence of detailed proposals, it is difficult at present to do more than state that the scale of challenge in delivering any of these options, and the timescales involved, will be of critical importance. Timing will also depend on the planning and legislative procedures prevailing at the time and the logistical and supply chain implications e.g. for the construction industry while other major infrastructure projects like HS2 are under way. We deal later with the planning and appraisal requirements that have to be met. These suggest an overall timetable of around 2027 at the earliest, and probably significantly longer, particularly for the more far-reaching Estuary options.

4.6.2 Previous estimates for a short third runway at Heathrow assumed around 10 years from detailed plans to operational readiness. An Estuary airport would be likely to take longer; realistic estimates will be needed not just for constructing the airport itself but also for the necessary connecting roads, railways, housing etc to enable the new hub to operate. These will have their own planning, financing and delivery challenges and estimating the overall critical path and its realistic duration will need to take them all into account.

4.6.3 The likely timescale for delivery is important not just for its own sake (i.e. how long before the desired outcome is delivered?), but also for judging the relative merits of the proposed solutions themselves. The rest of Europe will not stand still while the UK solution is decided, planned and delivered, so there could be a trade-off between delivering the “best” solution, if that were to take significantly longer, and delivering a “good enough” solution if that seemed more likely to protect the UK’s position in relatively good time. In assessing options, the Airports Commission will also need to consider the

implications of these timeframes for our connectivity in the intervening period, and how any short to medium term actions might impact on, or assist, the path to a longer term solution.

Planning, construction and delivery

Delivery of the eventual solution will take many years. Once the Government has reached its decisions in the light of the recommendations of the Airports Commission it will be necessary to develop a National Policy Statement(NPS). To support the NPS it will be necessary to carry out:

- an Appraisal of Sustainability (required under the Planning Act)
- a Strategic Environmental Assessment (under the EU SEA Directive)
- an Appropriate Assessment (to maintain the integrity of the Natura 2000 network and its features)

This is likely to require an approach that first characterises the economic, social and environmental fabric of the area/region; appraises the 'do nothing' alternatives; sets out policy and appraisal objectives; and then appraises the options on an evidence-based approach.

Early screening for Appropriate Assessment and the Habitats Directive, and establishing policy and appraisal objectives in advance, along with collecting baseline data could help pave the way towards an NPS as soon as decisions are taken in the light of the Airports Commission's final report.

In addition, taking forward any option to the planning stages will require feasibility and outline design, a clear business case, an Environmental Impact Assessment, an Equalities Impact Assessment, public consultation and engagement, drafting of the necessary consent and applications, NPS hearings and a Development Consent Order.

Assuming the Airports Commission reports in 2015, we suggest an ambitious indicative timetable for a relatively straightforward option might be as follows:

- 2015-2017 Preparation of an NPS
- 2015-2018 Project Development
- 2018-2020 Authorisation
- 2021-2026 Construction
- 2026-2027 Opening

In practice there are many reasons why delivery might take longer, particularly if the solution requires major new surface transport or other major infrastructure projects as well as the airport itself. Any proceedings for Judicial Review could be expected to add a year or more to the timetable.

4.7 Cost and financing

4.7.1 Since the mid-1980s, airports in the UK have been funded by the private sector and infrastructure costs are recovered through airport charges. The economics of an airport with the market power of a national hub is governed by an economic regulator, the CAA, charged with setting a cap on aviation charges sufficient to allow the airport to sustain its capital requirements (i.e. give a fair return for its investment as measured by the Regulated Asset Base - RAB) taking into account also revenues from retail activities (the "single till"). We assume such a regime would continue to apply in future.

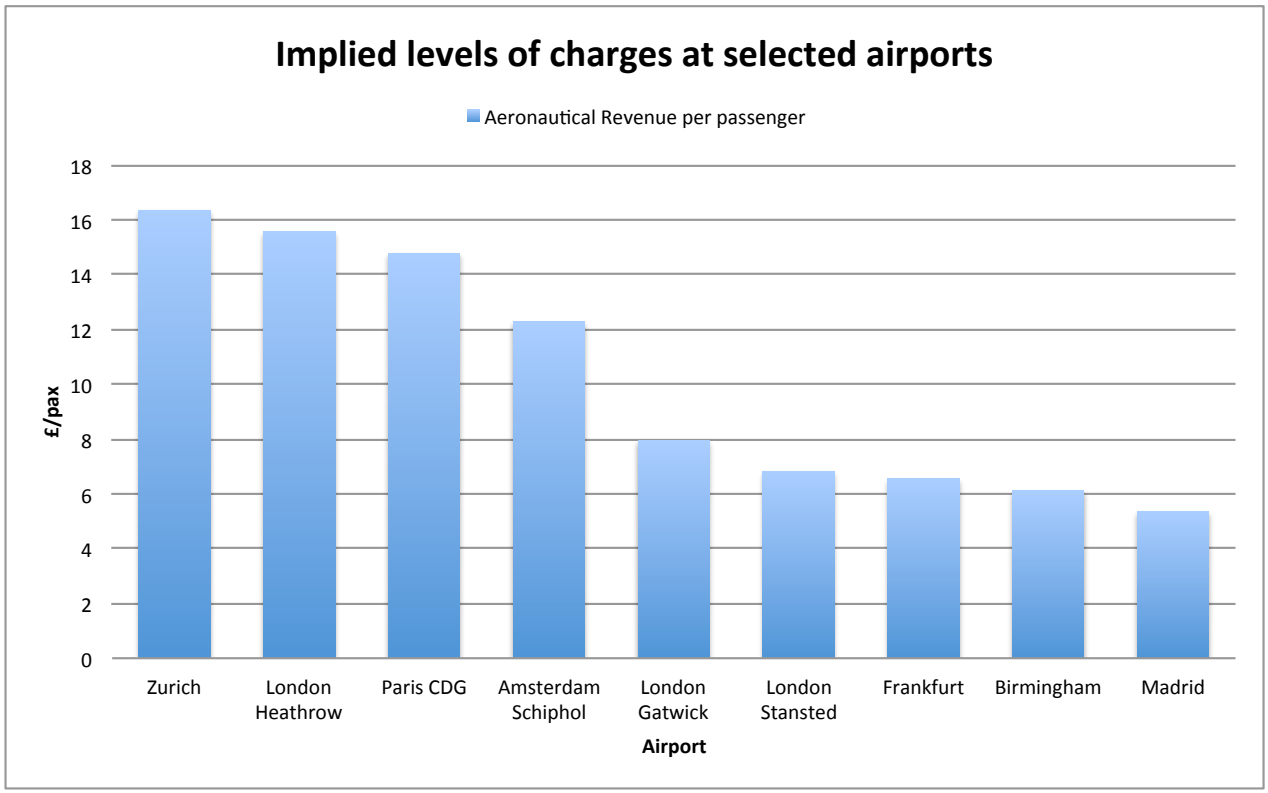
4.7.2 Indicative costs of the various strategic options have been broadly summarised by Oxera in a report for the House of Commons Transport Select Committee on the commercial viability of a new hub airport: for a 3rd runway at Heathrow, £8-9bn; for a 2nd runway at Stansted, £4bn; for a 4-runway Thames hub, £50bn (less for on-shore variants) – within a range of £40bn to £86bn including surface transport links and

allowing for optimism bias and compensation packages.[47] If Heathrow or Stansted were also to develop four runways, their costs would clearly increase further.

4.7.3 The application of regulation is likely to be relevant to most scenarios: Heathrow, Gatwick and Stansted are all regulated airports and any new estuary hub would undoubtedly be so. For the purposes of this section, we analyse the impact of such a regulatory regime for the forced closure of Heathrow; the implied charges for any new estuary airport; the impact of a future runway at Stansted; and the extension of runway capacity at Heathrow. The detailed assumptions and calculations are covered in *Appendix 1*.

4.7.4 It is important to remember that the regulator only specifies the maximum charges that an airport operator may charge for its airport. These charges may not be what the owner can charge in practice (as evidenced by Stansted - only just able now to charge up to its regulated charges several decades after it opened). The calculations are therefore a surrogate for what investors will need to charge to recoup this investment: an assessment of the charge investors might reasonably expect to charge before they commit investment. A table of implied charges currently at selected major airports in Britain and Europe is given at **Figure 4.3** below.

Figure 4.3. Implied charges at selected major airports



(Source: Oxera report to the Transport Select Committee, January 2013, and Leigh Fisher (2012) 'Airport Performance Indicators')

Note:These are based on the latest figures available to us, but are not the current charges and will have changed in the meantime. Heathrow's charges, for example, have been rising at RPI + 7.5%.

[47] OXERA report to the Transport Select Committee, January 2013

Charges for a Thames Estuary airport

4.7.5 Let us take broad figures derived from Oxera: £30bn for the construction of the airport and, say, £20bn for the transport links of which half is paid by the developer. Let us also assume that capitalisation of these costs (the need to reward investors for tying up their money before the project opens) take the developers' costs to £50bn. Then, the airport charges might be expected to be as high as £50 per passenger. Clearly, if the airport was subsequently expanded further to (say) 150mppa, this should reduce (though there would also be offsetting additional investment required).

Charges for Stansted

4.7.6 While Oxera has speculated on the cost per runway of £4bn we would presume a figure with terminals and infrastructure support costs that would approach the £8-9bn quoted for Heathrow. So taking Stansted up to four runways might cost £25bn which, capitalising construction charges and including the existing RAB, we round up to £30bn. Applying the same crude mathematics suggest that Stansted in this configuration would require charges of £30/PAX. Significantly cheaper than the Estuary for the same capacity.

Charges to close Heathrow

4.7.7 Elsewhere we have suggested that if a new hub is to be built and attract the traffic away from the very attractively located (for current users) Heathrow, then Heathrow would have to close. This would have financial as well as wider economic and operational implications. We assume that the regulator would allow the current Heathrow owners to be rewarded for sunk investment, less the residual value of the site (say, £1bn net of clearance costs?). One way might be for charges to be increased for the final 10 years of so before closure. This could add around £700m pa and therefore raise aviation charges from the current level of around £18 per passenger (see Appendix 1) to approaching £30. Alternatively, the owners of the new hub might need to buy out the remaining Heathrow value: but this would simply increase further the costs, and ultimately the charges, for the new hub on top of the estimates above. Whatever the regulatory and commercial approach, closing Heathrow adds a significant additional cost which would need to be factored into the pricing of the new airport.

Extending Heathrow

4.7.8 If, instead, one were to build a new runway at Heathrow costing, say, £10bn with associated infrastructure and terminals, then broadly one might presume that the charges would edge up marginally (about £5/pax), from £18/pax to something over £20/pax. A 4-runway option would presumably increase the charges further, if it incurred higher capital costs.

4.7.9 So the effects of applying regulatory discipline to the aviation costs which might derive from each of these options could suggest that the charges for the hub might fit into the following profile by reference to other airports **(Figure 4.4)**

Figure 4.4 Estimated hub airport charges

	Airport Hub option				
	Heathrow now	Heathrow expanded	Heathrow facing closure	Stansted expanded	Thames Estuary 4 runway hub
£/pax	18	23	30	30	50

(Source: see Appendix 1)

In essence a new “estuary airport” could cost airlines nearly three times as much to land and make airborne each passenger; and even an upgraded Heathrow is getting close to double its core competitors on present day pricing.

4.7.10 These represent in broad outline the static picture; however, nothing stands still and the opportunity for any overseas hubs (some of which may have spare capacity and/or sunk cost) to compete against the new UK hub on price should be assessed. Nor should it, necessarily, be presumed that the aviation charges would be equally spread across all passengers – the airlines might be able to pass on a greater proportion of the cost to the Origin and Destination traffic using Heathrow to keep down the cost to the more flexible transfer traffic (see box). But to do this does not help the UK economy or the connectivity of the South East.

4.7.11 In reality, it is possible that some of these bigger options may need the Government to support the proposition (beyond contributing some of the transport upgrades). Government has a number of ways to help – clearly by contributing more to associated infrastructure, or by direct grant to the airport itself or by guaranteeing the debt of any undertaking. But, equally Government might find that a difficult proposition – partly politically and partly in State Aid terms with its European neighbours. Alternatively it could build the airport itself and, like HS1, sell it to the private sector once built. In any event, we **recommend** that the Commission should consider the case for any public sector contribution or any Government guarantees; and whether this has any implications for State Aid.

4.7.12 The Oxera report discussed different delivery mechanisms for the infrastructure – including a regulated utility, PPP and concession. We have not sought to “drill down” into these details save to say that all those in the private sector should be governed by broadly the same economics which this section very crudely attempts to draw out based on some very simple figures and analysis. We believe it is essential that the Airports Commission uses the same affordability tests against each of the options it chooses to examine in detail.

4.7.13 Finally, proposals should, we suggest, include estimates for the costs of mitigating local impacts, such as noise insulation measures, any costs for relocating homeowners etc and compensation for community dislocation; these are discussed later.

Summary

4.7.14 In conclusion: we have assessed the broad-brush costs of the various alternatives – perhaps it is hardly surprising that the cost of extending Heathrow appears the cheapest option followed by Stansted and the Estuary, based on core assumptions, potentially being significantly the most expensive. Even more to the point is to understand the likely pricing of equivalent, potentially much cheaper, overseas hubs. Hubs have to be capable of being appropriately priced; and investors have to have confidence of this.

The effect of hub charges on transfer traffic

Hubs are commercially attractive to airlines since they enable "marginal" seats to be filled by transfer passengers. But they can also carry higher costs, compared to a point-to-point business model, since:

- a transfer flight has four movements (an extra take off and landing at the hub) compared with just two for a direct (take off at the origin; landing at the destination). When you take such "double movement" effects into account the charges for using an expensive hub become particularly critical;

- all these costs are made more acute by the fact that airlines tend to charge less for transfer services than they do for direct flights. Therefore, their ability to pass on these high charges to the transfer traffic may be constrained; the O&D traffic may take a disproportionate share.

There is therefore a risk that if hub charges become too high, the commercial model on which they rely is undermined and thereby their commercial viability.

4.8 Noise

4.8.1 Noise is the main concern of local people near airports. It is not just about 'annoyance' – the potential issues include well-being, stress, sleep disturbance and cognitive development in children, although the effects in terms of e.g. cardiovascular impacts and long term stress are not conclusive[48].

4.8.2 The number of people affected by noise at Gatwick and Stansted airports is much smaller than at Heathrow, by a factor of 50 or more, reflecting the much less densely populated areas around those airports – see **Figure 4.5**.

Figure 4.5: Population and area affected by noise at London's three main airports, 2011

	Heathrow	Gatwick	Stansted
Population within 55Lden* contour	725,500	11,900	9,400
Population within 57Leq dBA* contour	237,750	2,750	1,250
Area of 57Leq dBA contour (km^2)	107.1	40.4	21.2

(Source: CAA Noise Exposure Contours for London Airports 2011)

**Note: Lden = unit used for EU noise mapping. dBA = decibels*

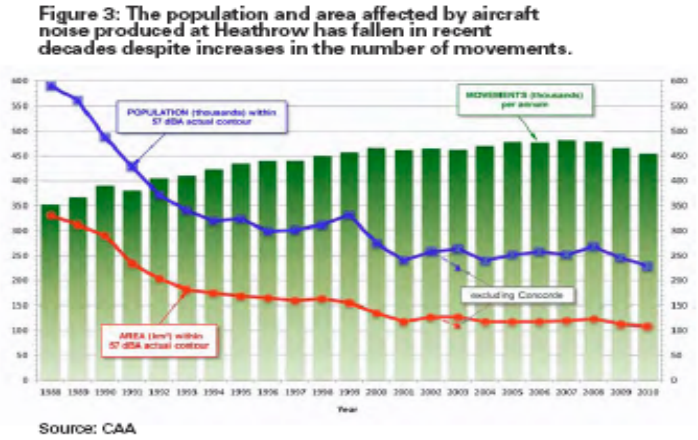
4.8.3 Noise is a particularly important challenge at Heathrow, given its proximity to densely populated areas of London; in terms of L_{den} Heathrow accounts for 29 per cent of all airport-related noise in Europe.

4.8.4 Nor can noise concerns be summarised in a single concept: the perceived level of noise, the time of day (especially early in the morning or late at night) and the frequency of 'events' are all legitimate concerns.

[48] CAA ERCD Report 1201: Aircraft Noise, Sleep Disturbance and Health Effects: A Review, January 2013

4.8.5 The evidence shows that noise levels (however measured) have been falling over time – noise contours around Heathrow reduced by over half between 1991 and 2009. **Figure 4.6** illustrates the changes since 1988.

Figure 4.6 – Population and area affected by aircraft noise at Heathrow since 1998



(Source: CAA Insight Note – Aviation Policy for the Environment, 2012)

4.8.6 Successive generations of aircraft have become progressively quieter and this downward trend is expected to continue with the gradual replacement of older aircraft - for example, the new generation Boeing 787 *Dreamliner* generates 60 per cent less noise than standard planes on take-off and landing and the Airbus A380 is significantly quieter than the Boeing 747 series, despite being larger. And under ICAO rules, from 2017 new types of large civil aircraft will be required to be at least 7dB quieter on average in total, across the three test points, than the current standard. Improved operating procedures have also played a part in reducing noise impacts and there is potential to do more, such as steeper descents for some aircraft, which could further reduce the size of the noise envelope. But there are limits to what further progress can be made to reduce noise at source without impacting on other factors. For example, it is reported that the Airbus A380 could be 1 per cent more fuel-efficient were it not for the need to comply with noise restrictions at Heathrow.

4.8.7 There are many sensitive debates about noise which we do not address here but which could merit further research. For example, what is the relative noise impact of aircraft, at different times of day, vis-à-vis the "normal" background noise from traffic etc which anyone living in a major city can expect? How do people respond in practice, and why, to the trade-offs which have always been made between the benefits and disbenefits of living in the areas most affected? Research carried out last year[49] suggests that house prices in areas close to Heathrow have moved in line with overall London-wide trends since 1995, with properties changing hands at comparable levels to the rest of London: some 70 per cent of residents in areas affected by aircraft noise have lived in their homes for less than 10 years. And more homes have been added within the 57 decibel noise contour since 1991, an increase of 16%, which suggests a continuing demand - and market - for buying or renting homes in the area. We recommend that these issues are the subject of further investigation, along with any evidence as to whether people today have become appreciably more sensitive to noise than in the past, particularly those who moved into the relevant areas in the knowledge that they are affected; and whether local objections to noise are sufficiently well-founded to warrant

[49] Study by property consultant CBRE into house prices and sales data, for Heathrow Airport, 2012

closing Heathrow and losing large numbers of jobs, as well as convenient access to the airport itself, from that part of London.

4.8.8 Noise late at night or in the early morning is a particularly sensitive issue – one of our respondents describing night flights as "probably the most disruptive of all the aircraft noise impacts".[50] Under the strict 'night noise' regime at Heathrow, the noisiest aircraft may not be scheduled to land or take off during the 'night period' (11pm to 7am); and during the 'night quota period' (11.30pm to 6am) aircraft movements are limited both by number and by a noise quota (based on the noise classification of specific aircraft), thereby providing an incentive on operators to use quieter planes.

4.8.9 At present night flights at Heathrow average around 15 flights a night[51] – mostly scheduled services arriving after 4.30am (the majority after 5am) and comprising long-haul passenger services from the Far East. The noise from these early morning long-haul arrivals has long been a matter of contention for households around Heathrow. For the airlines, however - and also for passengers and cargo/freight handlers - the ability to fly these long-haul services into Heathrow at the start of the day is highly valued. Around half are operated by BA with Boeing 747-400s (which is the noisiest aircraft currently used for scheduled operations at Heathrow, though many are expected to be retired in the next decade and replaced with the new generation of quieter aircraft).

4.8.10 Night flying restrictions of some kind also apply at most mainland European hubs, typically limiting the number and/or type of late evening and early morning flights. Use of certain runways at Amsterdam Schiphol is prohibited between 21.00 hours and 04.30 hours, and Frankfurt operates a total ban on night flights between 23.00 hours and 05.00 hours, a decision that has attracted criticism from Lufthansa and industry groups, on grounds of its impacts on lost earnings.

4.8.11 The night flights regime – which also operates at Gatwick and Stansted, with variations - is currently the subject of a 'Stage 1' consultation[52] by DfT to gather evidence which will inform the successor regime to the current one, due to end in October 2014. The current consultation invites views on, among other things, the economic benefits of night flights and the implications of any changes for freight service users. Specific proposals, such as the number of permitted flights, will be for consultation in Stage 2.

4.8.12 Although any long term proposals that emerge from the Airports Commission will not be realised before successive further rounds of the night noise regime, our recommendations below include inviting the Commission to consider the implications of night-time operations at any future hub airport.

4.8.13 The Thames and Stansted options are bound to score much better on noise than Heathrow since, although a major hub at either location would inevitably introduce additional noise there, it would remove the noise issue for very much larger numbers of people in west London. Indeed, this is often seen as one of the main benefits of relocating the hub. It would nevertheless be important for the Airports Commission to understand the potential noise implications of any major new housing development in the

[50] Submission by Richmond Borough Council to the ITC Aviation Call for Evidence, 2012
[51] The regime also allows for dispensations and disregards e.g. in the event of emergencies, severe delays, low visibility etc
[52] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/66837/consultation-document.pdf

vicinity of an expanded Stansted or Thames airport, especially in the light of concerns expressed to us that the planning system has not prevented additional housing in areas affected by noise at existing airports.[53]

4.8.14 If the acid test is to end aircraft noise over West London, the logical solution is to close and replace Heathrow. But we propose a more balanced test: to see whether it is possible, over the longer term, to avoid worsening overall noise impact, and if possible continue the long term downward trend.

4.8.15 We are not yet clear whether this can be achieved, although a number of radical ideas have been proposed to mitigate the noise issue at Heathrow. Policy Exchange, for instance, have proposed shifting the Heathrow runways westwards so as to increase the height - and reduce the noise - of aircraft on the approaches, banning very early-morning arrivals (by putting back take-off times at the airports of departure), and entirely banning older and noisier planes, including the 747, with effect from the opening of the proposed new capacity. Taken together, these measures could significantly reduce the noise envelope and see relatively fewer people suffering from noise compared to the present.[54]

4.8.16 In the light of this, we **recommend** that further work is commissioned on:

a) the net noise implications of (i) continued reductions, due to technology, flight patterns, more operational flexibility through additional capacity, etc, and (ii) increased noise from more flights if Heathrow expands, projected if possible out to 2050;

b) the scope for improved noise incentives (e.g. more variable charging to incentivise the use of quieter planes, and/or daytime slots compared with late/early slots);

c) the scope for tighter regulatory controls (noise envelopes, absolute bans on noisier aircraft, setting a limit on the noise affected area (by size or reference to population), perhaps alongside a movements limit; and tighter restrictions on new residential developments in the worst affected areas;

d) the potential for further reducing noise by shifting the Heathrow runways west;

e) the scope for improved local mitigation and compensation measures, especially for communities newly affected by noise; and the opportunities to establish a more robust system of independent mediation/adjudication over these matters, and more generally over the handling of complaints, which currently rests with the airport operator;

f) the scope for further reducing, or even ending, night flights at Heathrow. This also raises a wider question which the Commission will need to address, namely how far night-time operations are deemed an essential feature for a future major hub.

4.8.17 The aim should be to test whether, using a realistic package of measures, Heathrow expansion could be delivered without a significant overall worsening of noise for Londoners.

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[53] Submission by Gatwick Airport to ITC Aviation Call for Evidence, 2012

[54] 'Bigger and Quieter, The Right Answer for Aviation', Tim Leunig, Policy Exchange, 2012. See also *The Economist*, 30 March 2013, http://www.economist.com/news/briefing/21574489-britain-has-many-options-providing-extra-airport-capacity-its-capital-going-need

4.9 Environmental Issues

4.9.1 Local emissions are a key issue, both from on-airport operations (aircraft, other vehicles and equipment) and emissions from road vehicles travelling to and from the airports and servicing them. NO_2 concentrations from a combination of aircraft movements and heavy local traffic are of particular concern at Heathrow. But away from the immediate runway areas, evidence suggests that the main contributors are road traffic, domestic and industrial sources. Local air quality is likely to be a less significant problem at other sites where there is a lower concentration of airport-related and non-airport related activity.

4.9.2 EU limit values for NO_2 are currently exceeded in the Heathrow area and any proposals for expanding Heathrow operations would need to show how this could be done while meeting the obligations for local air quality. This may not be a show-stopper, if vehicle and aircraft emissions continue to fall. Previous analysis suggested that Heathrow was likely to be compliant with air quality requirements by the time a third runway could be constructed.[55]

4.9.3 The situation at Heathrow would be eased if airports were encouraged to adopt best practice ground procedures to limit local air pollution e.g. more reliance on low emission vehicles and low emission solutions for ground power, towing etc.

4.9.4 Scheme promoters will need to be able to demonstrate, in the light of the latest data and trends on emissions, that compliance with EU limits will be achieved.

4.9.5 The UK also has national and international obligations with respect to open space, green belt, ancient woodland, Sites of Special Scientific Interest habitats and biodiversity which will need to be taken into account, along with impacts on landscape. In the case of any development in the Thames Estuary, the Ramsar Convention on wetlands will be particularly pertinent, since disturbance to the Ramsar site could only be sanctioned where there is no reasonable alternative. In considering strategic options, it will be important to show what can be done to mitigate and/or replace potential loss and damage and manage impacts on ecosystems and water resources.

4.9.6 We note that the Airports Commission's objective is that its final report should support the preparation of *"a National Policy Statement to accelerate the resolution of any future planning applications for major airports infrastructure".*[56] We **recommend** that this should include preparing the ground for the necessary environmental assessments – see box above on Planning, construction and delivery.

4.10 Airspace, Safety and Regulation

4.10.1 All options for new capacity (whether or not at existing airports) will need to meet the CAA's requirements for a safety case and require comprehensive modelling of arrival/departure routes before agreement with NATS for air traffic control purposes. The latter will need to be consistent with the Future Airspace Strategy which aims to provide the safest and most efficient airspace possible, aligned with European developments and

[55] 'Britain's Transport Infrastructure – Adding capacity at Heathrow: Decisions following consultation', DfT, January 2009
[56] DfT Press Notice, 2 November 2012

technological changes, reducing aviation's impact on the environment and balancing the needs of all airspace users.

4.10.2 The evidence we have received suggests that the Thames Estuary options raise a number of issues such as a potentially increased risk of bird-strike, proximity to the sunken munitions ship *SS Richard Montgomery* and to industrial processes in the area (e.g. LNG plant). NATS have drawn attention to the potential conflict with Dutch/Belgian airspace[57], with flights from airports such as Schiphol and Brussels meaning that climb and descent profiles would be affected, and the need for international cooperation on airspace redesign; and they note there would be implications for Stansted, Biggin Hill, London City and Southend airports. Some have suggested the latter two might need to close[58]. There are also potential impacts on shipping into the Thames Gateway and Thamesport.[59]

4.10.3 The Airports Commission would need to be satisfied that these issues are capable of resolution if any such option is to be supported.

4.10.4 In the case of Heathrow, despite a long safety record, concerns are likely to focus in particular on the risks associated with continued and intensified over-flight of central London, including arrivals (and in certain wind conditions, departures) over the heavily populated areas of west London. Even an airport in the Estuary could still have flights over London, with departing aircraft towards the Capital fully laden with fuel.

4.10.5 Safe operations must be a priority and we recommend that the Airports Commission should ensure that a full risk assessment is undertaken at all potential sites to ensure that the degree of risk is properly understood and can be maintained at an acceptable level.

4.10.6 We also recommend that due consideration is given to regulatory issues that might arise from each proposal, as noted at 3.5.8 above. If a decision is taken to invest in developing a major hub airport we would **recommend** that the Airports Commission should invite the CAA, in the interests of choice and competition, to consider the case for deregulation at other airports.

4.11 Impacts of criteria on main single hub options

4.11.1 We summarise in **Figure 4.7** our provisional thoughts on the relative scale of challenge and complexity presented by these three main options. It is not possible, however, in such a simplified assessment to properly reflect the very substantial impacts that closing down Heathrow would have in the event of favouring a Stansted or Thames Estuary hub option.

[57] Submission from NATS to ITC Aviation Call for Evidence, 2012
[58] Submission from UNITE to ITC Aviation Call for Evidence, 2012
[59] Ibid

Figure 4.7: Provisional scoring of options in terms of challenge and feasibility
(in ascending order of difficulty, i.e. 1 = most feasible, 3 = most difficult)

	Heathrow	Stansted	Thames Estuary
Surface transport	1	2	3
Other local impacts	1	2	3
Delivery and timescale	1 (3 runways) 2 (4 runways)	2	3
Cost and financing	1	2	3
Noise	3	1	1
Local environment	2	2	3
Airspace and safety	2	2	3

5 Conclusions and Recommendations

Conclusions

5.1 The starting point for debate should be the UK's connectivity requirements, not simply airport capacity. Connectivity is crucial for economic growth, jobs and prosperity. Capacity is important for connectivity but is not the whole story;

5.2 We see two main connectivity challenges: the most difficult is direct connectivity to a wider range of long-haul destinations, a traditional UK strength. This type of connectivity seems of growing importance, given the changing global economy; but the UK's position is under threat because long-haul depends heavily on hub airports for commercial viability and the UK hub is facing competition from the growth of better hubs elsewhere. The danger is that long-haul connectivity increasingly depends on 3rd country hubs. This could displace the UK as a primary focus in Europe for business and leisure travelers, diverting economic activity, investment, jobs and prosperity elsewhere;

5.3 There is also a growing challenge for short-haul connectivity in the south east (by around 2030) and in other parts of England by mid-century;

5.4 The potential solutions to these connectivity challenges are different: short-haul connectivity can be addressed by developing local and regional airports as necessary. Sustaining the UK's position in direct long-haul connectivity depends on hosting one of the very few top-tier European hubs. Heathrow's current capacity constraints make that extremely hard.

5.5 We therefore conclude the UK should seek to host a top-tier European hub airport, complemented by appropriate improvements to local and regional airports. The simplified flowchart at **Figure 5** below provides a summary of our thinking.

5.6 Selecting a site is extremely difficult and contentious. At this stage we do not reach any firm recommendation on the final answer but note some of the most significant challenges facing each of what we see as the initially most plausible alternatives - an expanded Heathrow, an expanded Stansted or a completely new Thames airport.

5.7 We have proposed a number of key criteria that should be used in evaluating the alternative options. These include adequacy of surface connectivity, local/regional impacts, delivery and timescale, cost and financing, noise, local environment and airspace and safety. From an evaluation of these we draw the attention of the Airports Commission in particular to the following:

- The need to assess the impact on airport charges of each of the options for a single major hub.
- The need to thoroughly assess the consequences of having to close Heathrow if an alternative site for the UK’s major hub is chosen.
- The essential need to investigate and address noise mitigation measures if expansion is recommended at Heathrow.
- The importance of conducting necessary environmental assessments at an early stage.

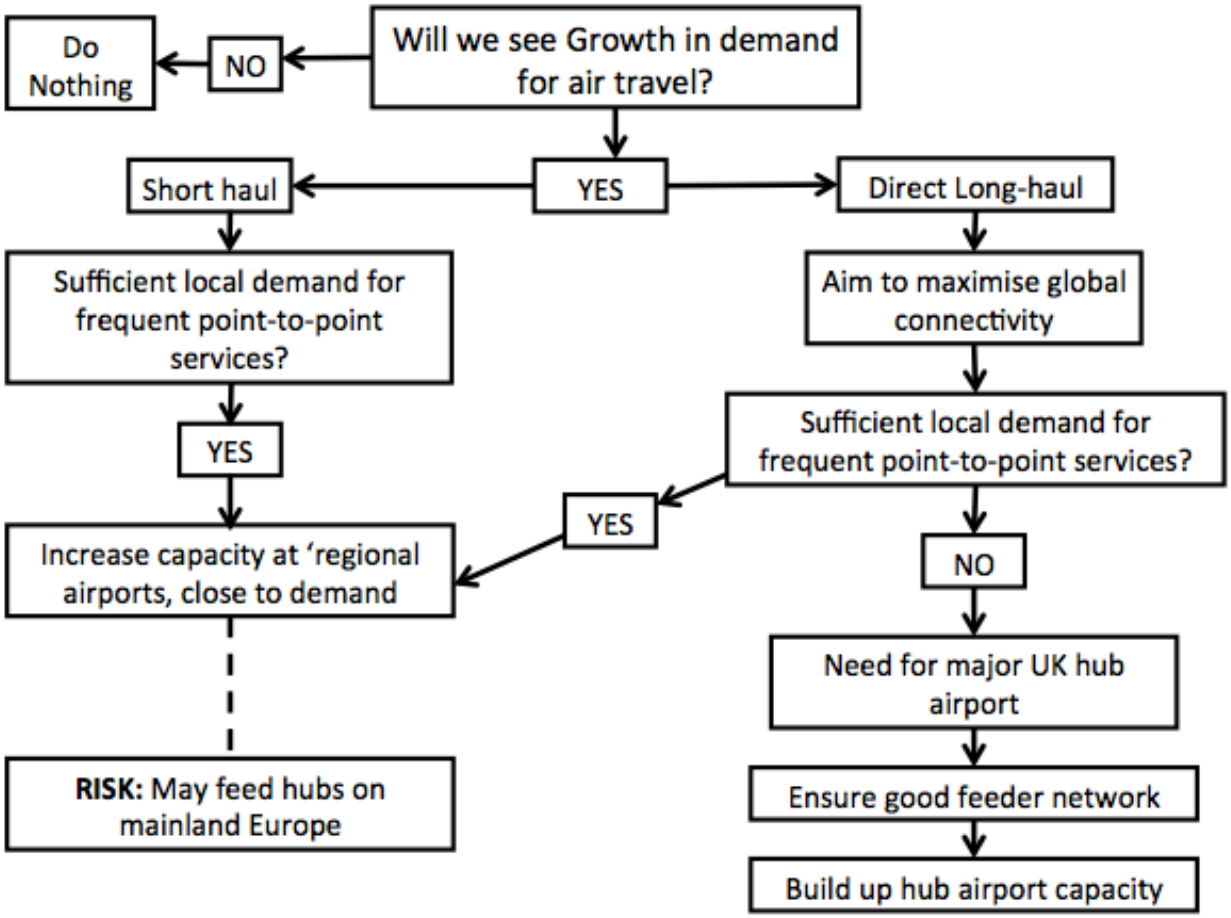
Recommendations

5.8 We also put forward the following **recommendations** to the Airports Commission to consider in its future work:

- In considering how the UK should respond to future demand the Commission should focus on connectivity, not simply capacity. (2.7.23)
- It should consider whether there is a need to commission further work to clarify what "good connectivity" to/from the UK, and particularly the South East, means – what do we want/need in terms of connectivity to global markets; how far it can be met by point-to-point; and whether, as we fear on the basis of the evidence so far, connectivity is under threat from the trend for hub-dependent, long-haul routes to be focussed round non-UK airports. (2.7.23)
- The Commission should consider very seriously the options for enhancing capacity at regional and local airports as a (relatively) straightforward way of addressing an important element in the overall connectivity challenge - the need to ensure continuing short-haul capacity in the South East (near term) and elsewhere (by the mid-century). (3.2.4)
- The Commission should assess the necessary size of a future hub airport to ensure the UK maintains its position in the long-haul connectivity marketplace, including appropriate margins for resilience. (3.5.3)
- The Commission should ensure that the implications of closing Heathrow – both positive and negative - are comprehensively considered. (3.5.6)
- The Commission should consider the case for any public sector contribution, for example towards road and rail infrastructure, or any Government guarantees; and whether this has any implications for State aid. (4.7.11)
- Further work should be done on a range of noise-related issues, particularly those affecting Heathrow - including sensitivity to aircraft noise, scope for technology changes, the relationship between property prices and proximity to airport/aircraft noise, and the issues around night flights. (4.8.16)
- The Commission's final report should include preparing the ground for the necessary environmental assessments. (4.9.6)
- If the Commission agrees that a major hub should be developed, it should invite the CAA, in the interests of choice and competition, to consider the case for deregulating other airports. (4.10.6)

5.9 In conclusion, we recommend that the UK should seek to host a top-tier European hub airport, complemented by improvements to local and regional airports. We recognise that selecting a site is extremely difficult and contentious and the above key criteria should be used when evaluating the alternative options.

Figure 5: Flowchart of Recommended Airport Strategy



Appendix 1

Assumptions for Assessing future Hub Charges (see Section 4.7)

1. Our general assumptions are as follows:

- where appropriate the costs are as summarised in the Oxera report for the Transport Select Committee;
- the regime is applied as currently; in particular that a single till regime aggregates the revenue from retail and aviation services
- the single till "retail/other" revenue broadly equates to the operating costs of an airport
- capital is rewarded, as currently, at around 6.2 per cent pa real pre-tax on its inherited RAB
- a crude estimate of the capital charge for a continuing airport of roughly £400m/£10bn RAB
- in the case of transport-related support infrastructure (additional access) the airport contributes half and the government contributes the other half
- the new hub's steady state rises to 100m passengers a year (on current growth estimates, by the middle of the next decade)
- this compares with current usage of 70m passengers.

2. It should be emphasised that the figures represented are broad brush, honestly assessed as relatively consistent and representative, but do not represent forecasts or detailed calculations. In general they have been calculated on a conservative estimate of the costs. In particular: for the big expansion/new airport options there is no assessment of the presumption that the return required by investors (and allowed by the regulator) might be set at a level above that which would apply to Heathrow on a business as usual (less risky) pattern; we probably underestimate the additional capitalisation costs of new development (in other words the cost which the private sector would require for loss of income over construction period). Likewise we assume 100m passengers at completion for all options (we presume that Stansted's existing low-cost airlines would, at the prices required to raise the investment, go elsewhere) notwithstanding the challenge that this might impose for a new airport (or considerably enhanced facility at Stansted) especially if Gatwick seeks out premium business traffic on Heathrow's closure.

3. None of these calculations attempts to assess the compensation cost an owner of any "new" airport might need to pay to the airlines to move and discard their ancillary investment in and around Heathrow. And we have assumed no compensation would be payable to other businesses currently located for convenient access to Heathrow.

4. We invite comments on these assumptions and start with the calculation that acts as the "control" on the expansion/new build calculations that follow based on the 70m passengers currently using the airport.

Airport Charges - Calculations

Heathrow now

£13bn[1] x 6.2%	=	£0.8bn pa		
£13bn x 0.4/10	=	£0.5bn pa		
	=	£1.3bn pa/70m	=	£18/PAX

Thames option

£50bn[2] x 6.2%	=	£3bn pa		
£50bn x 0.4/10	=	£2bn pa		
	=	£5bn pa/100m	=	£50/PAX

Note 1 : £13bn is taken as the Regulated Asset Base (RAB) of Heathrow.

Note 2: Oxera's report to the Transport Select Committee had a broad estimate of £30bn for the airport, £20bn for connections of which we presume the airport has to find half. We have added to this £40bn, £10bn representing the capitalisation cost (see general assumptions)

Closing Heathrow

£12bn[3]/10[4] years	=	£1.2bn pa		
£13bn x 6.2%/2[5]	=	£0.4bn pa		
[£13bn x 0.4/10[6]	=	£0.5bn pa]		
	=	[£2.1bn pa/70m passengers	=	£30/PAX]

Note 3: £12bn represents £13bn RAB of Heathrow less the value of the site of £1bn

Note 4: We assume that Heathrow closes 10 years after the decision and, therefore, the capital needs to be "repaid" over that period; if it were longer this charge could diminish.

Note 5: ADI (owners of Heathrow) have to be rewarded for the loss of their capital invested so as this is rewarded in higher charges the need to reward their capital reduces. Crudely, we assume that half the capital is "outstanding" in any typical year underwriting the time generative programme.

Note 6: An evaluation of the annual capital maintenance budget for Heathrow (excluding depreciation).

Stansted expansion

£30bn[7] x 6.2%	=	£1.8bn pa		
£30bn x 0.4/10	=	£1.2bn pa		
	=	£3.0bn pa/100	=	£30/PAX

Note 7: There are no accurate statistics for the expansion of Stansted with its attendant infrastructure; the existing RAB is modest at only around £1bn. Oxera suggested £4bn for a runway, i.e. half of that for Heathrow. Given that Stansted, to be a hub, would

require very significant upgrades of both road and rail links we have assumed a very crude £10bn per runway (+ tunnels + terminals + construction to transport links + capitalisation costs and to include the existing RAB): roughly £30bn. This triangulates with £23bn for three runways at Heathrow whose RAB is based on historic investment (see below) and £50bn for a new estuary airport (delivering 4 runways from scratch). It does not seem unreasonable.

Heathrow expansion

£23bn[8] x 6.2%	=	£1.4bn pa		
£30bn x 0.4/10	=	£0.9bn pa		
	=	£2.3 pa/100m	=	£23/PAX

Note 8: Oxera assumed a new runway at Heathrow as costing £8-9bn to which we have added an initial £1-2bn for attendant transport improvements. It should be noted we have added nothing for capitalisation costs on the basis that, as for T5, Heathrow would probably be allowed (and able) to charge at a higher level while the new runway is being constructed – these approximate charges are no greater than the closing Heathrow option so if that were affordable by airlines "paying upfront" should also be so.

Appendix 2

List of ITC Call for Evidence respondents

NAME	ORGANISATION
Neal Weston	ABTA
Christopher Choa	AECOM
n/a	Aviation Environment Federation (AEF)
Alan Baxter	Alan Baxter Associates
Darren Caplan	Airport Operators Association (AOA)
Bailey, James W	(Individual)
Nigel Milton	BAA (now known as Heathrow Airport)
n/a	BATA
John Morris	Birmingham Airport
Adam Marshall	British Chambers of Commerce (BCC)
Martin Picken	British Airways
James Wiltshire	CAA
Huw Thomas	Foster & Partners
Kyran Hanks	Gatwick Airport
Jim Steer	Greengauge21
John Stewart	HACAN
Dr Patrick Hogan	(Individual)
n/a	London Borough of Hounslow
n/a	Institute of Directors (IoD)
Dr Tim Leunig	Policy Exchange
Professors David Metz and Anne Graham	(UCL)
n/a	National Air Traffic Services (NATS)
David Cumming	Norfolk County Council
John Coates	Richmond Borough Council
Peter Willan	Richmond Heathrow Campaign
Michael Schabas	First Class Partnerships
Dr Michele Dix	Transport for London
Cllr Daniel Moylan	Mayor's Aviation Advisor, Transport for London
n/a	Unite the Union
Victoria Banks	The Woodland Trust
John Wright	(Individual)

Independent Transport Commission
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