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A new airport for London

Part 1 – The Case for New Capacity



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Contents

Contents	3
Mayoral foreword	5
Executive summary	6
Chapter one - Introduction	14
1.1 Policy context	15
1.2 Approach	16
Chapter two – Aviation and the economy	18
2.1 Introduction	18
2.2 Direct economic benefits	18
2.3 Indirect economic benefits	19
2.4 Threats and challenges to London’s position	20
Chapter three – Demand for Aviation	21
3.1 Introduction	21
3.2 Trends in worldwide demand	21
3.3 UK demand forecasts	21
3.4 London and the South East demand	22
3.5 UK demand growth by category	23
Chapter four - Compatibility of growth and climate change	25
4.1 Introduction	25
4.2 Emissions targets	25
4.3 Sustainable growth	26
4.4 Air traffic movements (ATMs)	27
4.5 Are CCC targets reasonable?	27
Chapter five – Compatibility of growth with localised environmental impacts	28
5.1 Introduction	28
5.2 Localised impacts at London’s airports	28
5.3 Growth within Greater London is unacceptable	28

Chapter six – Capacity at London’s primary airports	31
6.1 Introduction	31
6.2 History of airport growth in London	32
6.3 Heathrow	33
6.4 Gatwick	34
6.5 Stansted	34
6.6 Luton	34
6.7 London City Airport	35
6.8 Scope for increasing runway and terminal capacity within current planning permissions	35
6.9 Capacity shortfall	36
6.10 Potential impacts of constrained capacity	36
Chapter seven – London’s aviation market	38
7.1 Functions of London’s airports	38
7.2 Passenger demand and air traffic movements	39
7.3 Trip purpose	40
7.4 Trip Origins and Destinations	42
7.5 London’s airports are poorly connected with each other	43
Chapter eight – The importance of hub airports	44
8.1 Introduction	44
8.2 Hub airport characteristics and benefits	44
8.3 Hub operations	46
8.4 Why a hub airport is important to London	47
8.5 Can London retain a hub airport?	48
8.6 Airlines – insiders and outsiders	50
Chapter nine – Key findings and next steps	52
9.1 Introduction	52
9.2 Does London have sufficient capacity for its future needs?	52
9.3 Does it matter how and where new capacity is provided?	56
9.4 Next steps	57
Appendices	
Appendix A	59
Appendix B	61
Appendix C	62
Appendix D	70
References and footnotes	72

Mayoral foreword



London should rightfully be regarded as the best big city on earth. Historically, it has enjoyed excellent international air links. Without these London would not have retained its place at the heart of global business nor would it have developed the distinctive cosmopolitan culture which attracts people of energy and talent from around the world. Even today, no other city even approaches London in terms of the volume of passengers handled at its airports every year. However our table topping position is not secure.

Passenger demand for London's airports is forecast to increase from 140 million passengers a year in 2010 to 400 million passengers a year by 2050. Yet the UK lacks a clear long term vision for how to respond. What is clear is that aviation is mobile and so are its benefits. If London's airports no longer offer what the airlines and their passengers require then other European airports, with greater capacities, will move quickly to gain from the UK's slow response on this issue. Heathrow has already fallen from second in 1990, in terms of destinations served, to seventh in 2010. London is the motor of the UK economy and our international links are crucial in supporting the businesses based here. Ninety per cent of respondents to a recent London First survey stated that international air links were critical to their businesses, and that these links would need to grow in the long term for London to remain globally competitive. We must act now if we are to maintain those links. Doing nothing will effectively mean that tens of thousands of good jobs will be exported to Amsterdam, Frankfurt, Madrid and elsewhere - jobs that belong to London.

I welcome the review of national aviation policy announced by the Government but it is essential that it captures the significance of aviation growth to London and the UK's economic future. The new Government must act swiftly to address the difficult questions that previous governments have failed to grasp; and the correct decisions must be made now in order to stimulate the continued growth of London and the UK. The capital's airports are already full and runway space is at a premium. That is why I believe there would be considerable benefit from providing capacity at a new airport which can act as a hub, particularly to the rest of the UK.

Heathrow is not the answer. Its confined and unsuitable location means it cannot grow to a size comparable to the expanded airports at Frankfurt, Madrid, Amsterdam and Dubai. We will publish a further report later this year that will assess a range of locations for new airport capacity, including a new airport in the Thames Estuary. For too long Britain has failed to act, paralysed by the difficulties rather than recognising the opportunities. With jobs, prosperity and investment at risk from inertia, we must act now. I hope this report will help to reopen a national debate about the role of aviation in the country's economic future and how we should provide for it.

A handwritten signature in black ink, appearing to read 'Boris Johnson', written in a cursive style.

Boris Johnson
Mayor of London

Executive summary

Chapter 1: Introduction

- E1 London is the economic dynamo of the United Kingdom. It is a fulcrum of the global economy, hosting a range of specialised international financial and business activities. In spite of its current strength, there are a number of potential threats to London's global economic position. At the same time the reduction of both public sector and personal debt levels has become a national priority. There is a need to rebalance the economy away from government expenditure and consumption and towards investment and export earnings. This calls for a clear focus on developing those sectors in which the UK has and will retain a strong comparative advantage. The country will need to concentrate on building upon highly productive, knowledge-based specialities, and these are outward-looking and aviation-intensive.
- E2 The Mayor of London has a clear responsibility for promoting and protecting London's economic interests and this gives him a legitimate voice in trying to ensure that the UK develops a vision and strategy for providing future aviation capacity. The Mayor seeks that London has the best international links of any city in the world, and that the UK has the best possible access to these links.
- E3 The Government is opposed to the construction of new runways at any of the three main London airports. It has established a 'South East Airports Task Force', to provide recommendations for reforming civil aviation regulation, and improving the passenger experience at these airports. The Government is also developing a Bill to reform the economic regulation of UK airports in order to promote a more competitive aviation industry which supports UK economic growth while staying within the constraints of existing runway infrastructure.
- E4 While the Mayor welcomes the invaluable work which is being done to plan short and medium term interventions to ameliorate the problems which currently exist at London's airports, there is no remit for considering the amount of additional capacity needed at London's airports in the longer term, even though this issue lies at the heart of the debate about service quality. Furthermore this is the fundamental issue which will ultimately determine whether London and the UK can fully capitalise on the benefits which first class international aviation links can offer.
- E5 This report sets out the results of a work programme undertaken during 2010 on behalf of the Mayor of London to inform his understanding of the long term needs for aviation for London and the range of options for providing it. The work programme aims to capture the strategic priorities facing London and the UK within the global context and to take a balanced view of the competing economic, social and environmental arguments. Conclusions about the appropriate level of growth in aviation capacity serving London are drawn.

- E6 All possible options, from doing nothing to building a brand new hub airport are contentious. The Mayor strongly supports the Government's position opposing expansion at Heathrow. There are many and varied interests at stake. However this difficulty reinforces the importance of identifying the options, at least at a high level, which could meet long-term needs.
- E7 The Mayor is keen for a new airport in the Thames Estuary to be considered among the options. He acknowledges that it will require sustained political determination to deliver such an airport. The intention at this stage is to stimulate further debate with the aim of building a consensus around a long term vision which will complement the work of others. The Mayor also sees the publication of this report at this stage as a contribution to the formulation of the DfT's scoping study for a sustainable aviation framework which is due in March 2011.
- E8 The work programme is in two parts which define the remit of the work:

Part 1 – The need for additional capacity for London

(a) Does London have sufficient capacity for its future needs?

(b) If not, does it matter how and where new capacity is provided?

Part 2 - Options and the vision for new capacity

(c) What are the options which exist for addressing London's future airport capacity needs and what are the main advantages of each?

- E9 This report provides key findings of the work programme undertaken during 2010, comprising both desk research and discussion with a range of stakeholders and it addresses the questions in Part 1 of the work programme. The exploration of options is continuing, and will be reported as Part 2 in due course.

Chapter 2: Aviation and the economy

- E10 Aviation has become of central importance to the economy of London and the UK. It helps attract inward investment to the UK, sustains jobs and offers UK residents a chance of a well-earned holiday or an opportunity to visit family and friends in other parts of the world. Above all, it is an essential service that supports London's status as a global city. Indeed one of the principal features that distinguishes 'world cities' from others is their aviation connectivity. Alongside New York, London is consistently ranked as the most integrated city in the world city network¹.
- E11 The London economy is highly productive and acts as a dynamo for the rest of the UK, which is therefore dependent to a

strong degree on its continuing success. The UK is facing a challenging period of transition as its economy needs rebalancing and global economic power is shifting towards Asia. A return to traditional basic manufacturing or other sectors in which it has an uncompetitive cost base is not a viable option. Rather the country will need to concentrate on building upon the highly productive, knowledge-based specialities in which it can compete with the best. These sectors are outward-looking and aviation-intensive and therefore benefit from London's excellent international links and world city status. It is worth noting that advances in non face-to-face forms of communication through information and communications technology do not appear to have diminished the demand for travel in these sectors, many of which involve the development of personal business relations. These industries also tend to depend on the support of a wide range of specialist financial and business services which are currently predominantly available in London. It is therefore vital that the UK's role as a fulcrum of global business is maintained since it is fundamental to the UK's capacity for wealth creation.

- E12 Global connectivity is recurrently cited by international businesses as a reason for choosing a location. London's airports must continue to provide a world-leading range of destinations and frequency of service, with market-leading journey times and service quality. As the global economy develops and new markets emerge, airlines need the flexibility to serve new destinations. Aviation itself is an important component

of the UK economy and provides jobs which are considerably more productive than the average. If capacity is constrained in the longer run, there is a substantial risk that the aviation benefits, investment, business transactions and productive firms will be lost to alternative locations. The relative connectivity of London will deteriorate, and fares could increase.

Chapter 3: Demand for aviation

- E13 Demand for travel by air is growing around the world. Its location is closely correlated with wealth creation, and the degree to which emerging economies are becoming integrated into the global economy.
- E14 Demand for aviation is increasing in the UK, and Government forecasts indicate that this will continue in the medium and long run. Forecasts by EUROCONTROL and the United States Federal Aviation Administration (FAA) support this view from broader perspectives. In a 'central-case', without capacity constraints, the DfT forecast that UK-wide demand will nearly double between 2007 and 2030, rising from 240mppa in 2007 to around 465mppa in 2030². Beyond 2030, if demand were to continue to grow at a similar rate, it could reach around 700mppa by 2050. This is a figure endorsed by findings of the Government's Committee on Climate Change (CCC) who report a figure of 695mppa.

Chapter 4: Compatibility of growth and climate change

- E15 While unconstrained demand cannot be accommodated within the constraints of Government environmental policy, substantial growth is compatible with environmental commitments.
- E16 There are a number of harmful impacts of aviation. It may not be legitimate to meet demand fully where it causes harm to others. The industry faces a number of competing challenges. While many accept that aviation's contribution to global emissions associated with climate change will increase from the current share of 2.5%, it is important that aviation's total contribution is kept to a minimum. Aviation's growth and operations will therefore need to be governed within policy frameworks and commitments to minimise mankind's environmental footprint.
- E17 Demands for new capacity must be tempered by the rate of technological and regulatory progress. The aviation industry is following a number of avenues to minimise emissions. Aircraft engines continue to become quieter and increase their efficiency of fuel burn. Most European airlines have offered their support in principle to emissions trading. A widely adopted scheme would ensure that individual airlines/alliances or nations are not unduly disadvantaged.
- E18 An additional 85mppa, or 564,000 annual Air Traffic Movements (ATMs) could be accommodated at London's airports

within the environmental targets for 2050. This is equivalent to a brand new airport even larger than Heathrow.

Chapter 5: Compatibility of growth with localised environmental impacts

- E19 Aviation growth therefore supports the Mayor's Transport Strategy (MTS) challenges of promoting economic development and population growth and is also consistent with the overall challenge of reducing transport's contribution to climate change. However, there are a number of localised environmental impacts which need to be considered if decisions about future capacity are to be properly informed, including aircraft noise, local air quality, and impacts on transport networks used for surface access.
- E20 These issues are key concerns to the Mayor. The scale of these impacts, the number of people affected and the intensity of the impacts will vary according to the location of new aviation capacity. It is therefore clear that the amount of demand which can be reasonably accommodated depends on the location under consideration. Heathrow's location places significant constraints on the extent to which it can reasonably expand. Even with optimistic assumptions about changes in aircraft technology, the quality of life impacts of the scale of growth associated with a third runway on large populations in West London and beyond are unacceptable.

Chapter 6: Capacity at London's primary airports

- E21** While the commercial aviation opportunities available at a number of smaller regional airports such as Southend, Oxford and Southampton are growing, this report has focused on London's busiest five airports: Heathrow, Gatwick, Stansted, Luton and City. Heathrow, the UK's only hub airport, and Gatwick are operating at capacity. Delays and poor reliability are a persistent problem.
- E22** The Government is currently conducting a review into maximising the efficiency of existing airport capacity (the South East Airports Task Force). This is just the first step in dealing with the expected increase in demand predicted by the Department for Transport's own studies. Even coupled with a potential High Speed Rail strategy, maximising the use of existing capacity will not be able fully to meet the long-term capacity shortfall.
- E23** London does not have sufficient capacity for its future needs. Under current planning conditions, the additional number of passengers which could be handled over current volumes is 50mppa, while an estimated 85mppa could in principle be permitted within environmental limits. However the 50mppa estimate is based on a set of assumptions regarding the extra capacity generated by the use of larger planes and the alteration of services which may in practice be neither commercially viable nor desirable.
- E24** If this additional 50mppa were utilised, which would involve using all spare capacity at Gatwick and Stansted, and if a third runway at Heathrow were provided, the sustainable growth level of 85mppa could in theory be accommodated. However, this would fail to address a further set of problems associated with the capacity shortfall. In particular Heathrow would still not be able to meet the performance requirements of a modern hub airport since this requires spare runway capacity of about 25% to provide timetabling flexibility and resilience.
- E25** There may be severe economic consequences if London's offer is bettered by that of rival airports. If capacity constraints are not addressed adequately in response to demand growth, future economic prosperity will be threatened.

Chapter 7: London's aviation market

- E26** The size and structure of London's aviation market is unique. London has five principal airports, with a total of six runways. Each airport has a distinctive role that has developed over time. At Heathrow, 35% of trips are transfer trips: they neither start nor finish at Heathrow. Business trips comprise nearly 40% of all terminating trips. A mixture of long and short-haul leisure demand drives London Gatwick. Stansted and Luton airports are almost exclusively driven by short-haul leisure demand. London City airport has a niche, business-

focused role, with limited routes. Together, London's five airports accommodate more aviation demand than any other city. 45% of demand at Heathrow, Gatwick and Stansted comes from trips with an immediate origin or destination within Greater London.

Chapter 8: The importance of hub airports

- E27** A hub airport is a location at which flights are organised in waves of arrivals and departures in order to allow large volumes of passengers to make a wide range of connections. London is by far the biggest aviation market in Europe. Economically London is highly integrated with the rest of the World, its airports have a large, prosperous catchment area, and since the UK is an island, it remains particularly reliant on air for international connections. In many ways London is therefore a natural location for airlines to base their hub operations, particularly given its strategic geographical location for serving North American – Continental European markets.
- E28** While Heathrow remains a major international hub, with British Airways as the hub operator, there are some senses in which it does not meet the basic requirements for efficient hub operations. Furthermore, these shortcomings may thwart the opportunities which London's position and status offer as a potential hub for other airline alliances.
- E29** Hub airports generate the same kinds of benefit as other airports but in different ways. A hub airport multiplies the number of effective routes available at all the airports they link. Since transit and connecting passengers add to demand, a greater number of destinations can be offered with the frequency of service needed by international business. This extra connectivity is a great benefit in attracting business and investment. Such operations benefit the regions they are in because the additional passengers they handle beyond those of their home market allow them to sustain a network of exceptional connectivity in terms of the range of destinations served and flight frequencies. There are also direct economic benefits arising from providing the additional aviation services which a hub generates.
- E30** However, the operational requirements of hub airports are more demanding than non-hub airports, since passengers are interconnecting between flights. There is greater interdependency between flights in terms of their timing. This means that hub airports tend to require greater spare runway capacity than other airports in order to allow the efficient 'banking' of arrivals and departures. Heathrow's performance as a hub has been deteriorating while continental hubs have grown.
- E31** The 'grey' market for slots at Heathrow, in which 'grandfather rights' are traded for up to £30m per pair, provides important context for airlines' arguments about new capacity at Heathrow and in London and the South East generally. It is evidence of

an ‘insider’ – ‘outsider’ market by which incumbent airlines may have an interest in protecting their position at Heathrow. This suggests airlines may have strong interests at stake that are potentially at odds with the wider public interest.

- E32 There may be better ways of increasing capacity other than the well rehearsed, extreme alternative that Heathrow is either expanded or closed. It may be possible to maintain Heathrow as a hub and have a second major airport capable of supporting hub operations. Indeed, such an airport could help Heathrow perform its function as a hub more effectively by allowing the main hub operator to control a higher proportion of the slots there, and also by reducing capacity utilisation to levels more consistent with efficient hub operations. Examples in the United States demonstrate that two hubs can work in the same city. The similarities between New York and London are manifold and so their comparison is particularly relevant.

Chapter 9: Key findings, conclusions and next steps

- E33 The key findings and conclusions of Part 1 of the work programme are as follows:

Key finding 1: London’s economic success is critically dependent on the quality of its international air links and the economic rebalancing which is now needed makes the success of the UK as a whole increasingly dependent on them.

Key finding 2: There is evidence that London’s airports have been performing their vital economic function less than optimally for the last fifteen years.

Key finding 3: To maintain the system of world-class air links which London needs will become increasingly difficult as the volume of flights needed to maintain a sufficiently comprehensive and attractive network increases.

Key finding 4: The required level of growth cannot be accommodated within the constraints of the government’s aviation policy and a failure to act is likely to cause London to lose out to its competitors.

Key finding 5: Heathrow’s location places constraints on the extent to which it can reasonably expand. Even with optimistic assumptions about changes in aircraft technology the quality of life impacts on large populations in West London and beyond are unacceptable. At other locations, significant growth in aviation is compatible with

environmental commitments. There would be substantial economic benefits of accommodating this growth.

Conclusion (a): London does not have sufficient capacity for its future needs, and there is a strong case for accommodating the growth in aviation demand that is permissible within environmental limits at locations other than Heathrow.

Key finding 6: The size and structure of London's air market is unique and London is one of the few cities which may be able to successfully support two hub airports.

Key finding 7: Building capacity at an airport capable of supporting hub operations will generate a range of significant additional benefits.

Conclusion (b): Hub airports provide larger benefits and they spread the benefits of aviation to regions away from their 'home' market. Heathrow is the only hub airport in the UK but its capacity constraints reduce its ability to operate as a hub efficiently. The size and structure of London's air market is unique and there is no independent evidence to suggest that London is unable to support two hubs.

E34 These conclusions endorse proceeding with Part 2 of the work programme. The exploration of options is underway. A proposed set of criteria against which the options should be assessed has been identified. They comprise two core objectives and several other groups of objectives. They are based on the vision, objectives and goals set out in the Mayor's London Plan and Transport Strategy together with a number of basic requirements for realistic options to be likely to succeed. The background to the development of these criteria is presented in Appendix D.

Chapter one - Introduction

- 1 London is the economic dynamo of the United Kingdom. It is a fulcrum of the global economy, hosting a range of specialised international financial and business activities. These activities are predicated on excellent international, national and inter-regional transport links. Aviation is central in this. London is one of the world's two leading city destinations for visitors (the other is New York), attracting around 15 million international and 11 million UK overnight visitors every year³. As a result of its global status, London is by far the wealthiest and most productive region in Europe⁴. Amongst worldwide major cities, London trails only New York, Tokyo, Los Angeles, and Chicago in GDP per capita⁵.
- 2 In spite of its current strength, there are a number of potential threats to London's global economic position. Some of these are external and beyond UK control, for example the emergence of competing financial and business centres in Asia. However others, such as those which stem from national infrastructure inadequacies, are within the control of government and it would be folly for London to lose out because these are not properly addressed. Within this context, it is vital that aviation's central importance to London's success is recognised and that decision-makers understand that it will be more difficult in the future to maintain international air links of the highest quality, to established and new destinations (as the number of countries which are integrated into the global economy increases) if new infrastructure is not planned and delivered. Against this backdrop it is unfortunate that London and the UK do not currently have a clear long-term vision for how to respond.
- 3 The recent economic turmoil makes the need to engage with these issues even more pressing. The UK now faces unprecedented economic challenges and a period of painful adjustment to new conditions. The reduction of both public sector and personal debt levels has become a national priority. There is a need to rebalance the economy away from government expenditure and consumption and towards investment and export earnings. Economists agree that the UK will need to become more competitive as a whole if it is to remain a prosperous leading nation in the decades to come. UK regions outside London and the South East will need to generate more economic output from within the private sector, and become less dependent on public sector employment. This will involve a change in the UK's regions' relationship with London, from one of dependence to one of interdependence.
- 4 This calls for a clear focus on developing those sectors in which the UK has and will retain a strong comparative advantage. A return to traditional basic manufacturing or other sectors in which the UK has an uncompetitive cost base is not a viable option. Rather the country will need to concentrate on building upon the highly productive, knowledge-based specialities in which it can compete with the best. These sectors are outward-looking and aviation-intensive and therefore benefit from London's excellent international links and world city status. They also tend to depend on the support of a wide range of specialist

financial and business services which are currently predominantly available in London.

- 5 For the UK to become more competitive as a whole, London needs to be given every possible opportunity to succeed in its role as a leading world city. The rest of the UK needs to benefit from this far more than it has done until now. At present only London and the South East host large volumes of activity in these highly productive sectors. In the future more regions will need to do so. The UK regions need to be able to harness the benefits which London's global status as a transport gateway and business centre provides. This will generate more income and wealth for the UK regions and provincial cities. In other words, London's airports need to both support London's world city activities and to also provide better connections to the regions so that they can partake in this global activity better and host more international economic activities themselves. London's airports should be seen therefore as national infrastructure and judged therefore in terms of how they perform their national role.
- 6 The Mayor of London has a clear responsibility for promoting and protecting London's economic interests and this gives him a legitimate voice in trying to ensure that the UK develops a vision and strategy for providing future aviation capacity. The Mayor seeks that London has the best international links of any city in the world, and that the UK has the best possible access to these links.

1.1 Policy context

- 7 The Government is opposed to the construction of new runways at any of the three main London airports (Heathrow, Gatwick and Stansted) and reversed the previous Government's approval of a third runway at Heathrow, which the Mayor welcomed. It has established a 'South East Airports Task Force' (SEATF), to provide recommendations for reforming civil aviation regulation, and improving the passenger experience at these three airports⁶. Currently, three primary work streams are being advanced: reliability and resilience; border controls; and security⁷. The recommendations are due to be published in July 2011. However, whilst this task force will provide useful indications of how passenger experience can be improved in the short-term, it is not considering the wider need for additional capacity.
- 8 The Government is also developing a Bill to reform the economic regulation of UK airports in order to promote a more competitive aviation industry which supports UK economic growth while staying within the constraints of existing runway infrastructure. The Bill will complement the SEATF, encouraging investment in existing airport facilities and improving performance to benefit passengers.
- 9 The Government has said that its strategy review will take into account guidance from their Committee on Climate Change (CCC) on the extent to which aviation growth can be sustainable. This report

acknowledges both DfT demand forecasts from 2009, and the work of the CCC.

- 10 The Government intends to publish a scoping document for a sustainable framework for UK aviation in March 2011. It then aims to consult on this sustainable aviation framework for the UK in the spring of 2012. The framework is proposed for adoption in March 2013.
- 11 While the Mayor welcomes the invaluable work which is being done to plan short- and medium-term interventions to ameliorate the problems which currently exist at London's airports, there is no remit for considering the amount of additional capacity needed at London's airports in the longer term, even though this issue lies at the heart of the debate about service quality. Furthermore this is the fundamental issue which will ultimately determine whether London and the UK can fully capitalise on the benefits which first class international aviation links can offer.

1.2 Approach

- 12 This report sets out the results of a work programme undertaken during 2010 on behalf of the Mayor of London to inform his understanding of the long-term needs for aviation for London and the range of options for providing it. It is intended to complement the development of short- and medium-term interventions which the Government's existing initiatives may offer. The work programme aims to capture the strategic priorities facing London and the UK within the global context and to take a balanced view of the competing economic, social and environmental arguments. Conclusions about the appropriate level of growth in aviation capacity serving London are drawn and the consequences of failing to plan are considered.
- 13 All possible options, from doing nothing to building a brand new hub airport are contentious. The Mayor strongly supports the Government's position opposing expansion at Heathrow. There are many and varied interests at stake. However this difficulty reinforces the importance of identifying the options, at least in broad terms, which could meet long-term needs. The time needed between this and actual implementation of a solution is likely to be many years. A failure to progress options for providing additional capacity risks a prolonged period of inertia in which decision-makers shy away from taking action which inevitably some people will not like. The courage to start a difficult debate should be rewarded with the benefits which proper planning can yield

over time, namely the best overall outcome for all, including future generations.

- 14 It is for these reasons that the Mayor is keen for a new airport in the Thames Estuary to be considered among the options. He acknowledges that it will require sustained political determination to deliver such an airport. The intention at this stage is to stimulate further debate with the aim of building a consensus around a long-term vision which will complement the work of others. The Mayor also sees the publication of this report at this stage as a contribution to the formulation of the DfT's scoping study.
- 15 The work programme has two parts which correspond to the following three questions. This defines the remit of the work:

Part 1 – The need for additional aviation capacity for London

(a) Does London have sufficient capacity for its future needs?

(b) If not, does it matter how and where new capacity is provided?

Part 2 - Options and the vision for new capacity

(c) What are the options which exist for addressing London's future airport capacity needs and what are the main advantages and disadvantages of each?

- 17 This report provides key findings of the work programme undertaken during 2010, comprising both desk research and discussion with a range of stakeholders. This report addresses the questions in Part 1 of the work programme. The exploration of options (Part 2) is continuing, and will be reported later in 2011.

Chapter two – Aviation and the economy

2.1 Introduction

- 18 Of all the cities in the world, only a handful are the economic, cultural and financial power-houses that we call world cities. Most of the world's wealth and prosperity is located in cities. World cities are global gateways for innovation and growth since they provide a range of high-value, specialised financial and business services not available in other cities.
- 19 A distinguishing feature of world cities is that they are part of a super-network of connectivity. This factor is essential to attracting large-scale foreign and domestic investment, and accessing the appropriate pools of skills. As a result there are many aspirant world cities which compete to displace the incumbents.
- 20 London retains all the hallmarks of a world city; for example, many international businesses maintain major offices with a global function. However, in a fast-changing global economy, with vast new economic powers emerging in Asia, there is no guarantee that London will continue to enjoy the benefits of its current position in the longer term. London would certainly lose its world city status if, by choice or neglect, it failed to offer the connectivity of its peers and rivals.

2.2 Direct economic benefits

- 21 Providing additional capacity for aviation has a number of direct economic benefits. Some of these benefits accrue to the consumer, while others benefit employers and producers.
- 22 These benefits are time-related. They arise from a greater number of flights (increased frequency), improved service quality and reliability (including reduced waits for take-off and landing), and a wider range of direct destinations. The British Chambers of Commerce estimates that these time savings would be worth between £300m and £500m a year if Heathrow were expanded or new hub capacity was made available at a different location serving London⁸.
- 23 Additional available capacity means that it is likely that flying becomes accessible to a larger number of people. It is less likely that capacity constraints generated by a finite number of available seats drive up ticket prices.

2.3 Indirect economic benefits

- 24 In addition to the time related benefits accrued by individuals travelling, an increase in service frequencies and the number of destinations accessible from London will widen the pool of talent that businesses are able to recruit from. This will increase the capital's productivity by allowing it to attract more highly skilled workers. These wider economic benefits (based on the most conservative of the assumptions used in previous studies) have been estimated to produce annual productivity benefits of £595m⁹. This equates to a present value of £20 billion in 2009 prices (discounted over 60 years).
- 25 Providing additional capacity and associated connections to more destinations exposes London and the UK's business sectors to increased competition. This encourages industry to become more efficient. The DfT estimates that such efficiency benefits could constitute the equivalent of 10% of the time-saving benefits of aviation¹⁰.
- 26 Airports can provide a strong regional economic anchor. Clusters of prosperous and intensive industry have emerged in close proximity to UK airports. West London, the Thames Valley and parts of Surrey are powerhouses of the regional economy which have developed to a significant extent in response to air connectivity at Heathrow¹¹. On the other hand, parts of London and the South East which are relatively inaccessible through poor infrastructure have failed to attract equivalent economic development.
- 27 International examples demonstrate the ability of airports to attract clusters of development. A £15bn development housing 65,000 residents and 300,000 office workers is proposed upon reclaimed land near Seoul's Incheon Airport in South Korea. Major development is also planned near Atlanta and Memphis Airports, respectively the largest air passenger and cargo hubs in the United States.
- 28 The regional benefits are emphasised by the fact that airports are large employers in their own right. A general rule of thumb in the UK is that there is one directly employed member of staff per thousand passengers per year. Therefore additional aviation jobs generate additional wealth in proportion to the number of passengers that they handle. Indirect employment, including a range of activities supplying the airport, supports additional jobs, some 30% of those directly employed. Furthermore research carried out by Oxera¹² suggests that aviation sector workers are more productive than the average worker by approximately £16,000 per annum.

2.4 Threats and challenges to London's position

- 29 It has become clear in recent years that the UK's economic base needs to diversify. The economic crisis has revealed an excessive dependence on the financial services sector. Although this sector will continue to be a vital source of overseas revenues, a new policy priority is to develop a more diversified, more export-orientated economy. This diversification will need to be in highly productive sectors and it will be knowledge-intensive.
- 30 Such activities generate intensive communications needs. Business trends such as outsourcing generate additional demand for air travel since there is still a significant need for face-to-face contact. Empirical evidence from the United States shows that international business travel is positively related to exports of manufactured goods¹³ and that export growth is generated by increased frequency of contact with the same foreign buyers¹⁴. Increasing airport capacity in an area that has substantial potential for new growth, or gives excellent access to such areas, could facilitate and fortify the economic transition of London and the UK.

Key Messages

i) Aviation is a key driver of London's economy

ii) Aviation generates significant economic benefits for London and the UK. To diversify the economic base of London and the South East and respond to the need for better export performance at the national level, new high-productivity sectors need to be established.

iii) Access to aviation is necessary for those locations where this activity is to take place. Remaining underdeveloped areas of the South East could be unlocked through addressing the massive infrastructure challenges which have hindered their development to date. A new airport could act as both a catalyst and a growth pole.

Chapter three – Demand for Aviation

3.1 Introduction

³¹ Demand for travel by air is growing around the world, and is forecast to continue to grow. The wealth and opportunities that globalisation offers are spreading to new regions across the world. There is a close link between demand for aviation and globalisation.

3.2 Trends in worldwide demand

³² Demand has grown most quickly in the emerging markets of the Middle East and Asia. For example, in China, average annual growth in the last 40 years has been 16% per annum. High growth rates are expected to continue as economic development progresses¹⁵. Overall global aviation is expected to grow at an average compound annual growth rate of 5.6% for the period to 2025¹⁶.

³³ Since 1990, the number of seats available on scheduled non-stop flights between the EU and China has increased from approximately 275,000 to nearly 5.4 million in 2004¹⁷. The 2004 agreement between China and the EU under which the Community will enjoy an “Approved Destination Status” is expected to attract large numbers of Chinese tourists to Europe. By contrast, the aviation markets in Europe and North America are growing more slowly (4.7 and 4.6% per annum respectively)¹⁸.

³⁴ Demand for long-haul travel to/from the UK is likely to be driven by a number of factors. Rising UK incomes are associated with greater aspirations for new experiences and tourism is likely to grow at a faster rate, with more distant and remote destinations growing fastest. Rising incomes in other countries will also result in higher rates of business and tourist travel to the UK as well as other destinations using routes via the UK. Large emerging middle classes in countries such as Brazil, Russia, India and China are likely to drive high rates of growth in worldwide demand for aviation.

3.3 UK demand forecasts

³⁵ The most recent UK aviation passenger demand forecasts were published by the UK Department for Transport (DfT) in January 2009¹⁹. In a ‘central-case’, without capacity constraints, the DfT forecast that UK-wide demand will nearly double between 2007 and 2030, rising from 240mppa in 2007 to around 465mppa in 2030²⁰. Beyond 2030, if demand were to continue to grow at a similar rate, it could reach around 700mppa by 2050. This is a figure endorsed by findings of the Committee on Climate Change, (who report a figure of 695mppa²¹).

³⁶ ‘High’ and ‘low’ growth sensitivity scenarios are also defined. In the high scenario, passenger numbers could reach 500mppa by 2030, and in a low scenario, 415mppa, which still represents substantial growth. These UK-wide scenarios are illustrated in Figure 1²².

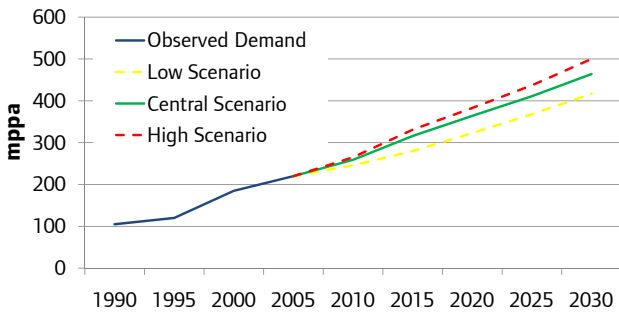


Figure 1: UK-wide unconstrained demand (including transfer passengers)

■ Proportion of UK's aviation passengers using London's airports
 ■ Proportion of UK's aviation passengers using non-London airports

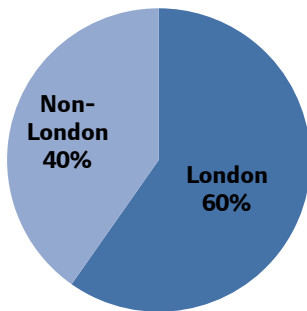


Figure 2: Proportion of UK's passengers using London's 5 primary airports

37 DfT demand forecasts exhibiting strong growth are endorsed by similar judgments from EUROCONTROL and the United States Federal Aviation Administration (FAA).

38 The scoping document for a sustainable framework for UK aviation which the Government has undertaken to publish in March 2011 will need to be based on a set of growth assumptions. It is currently unclear whether these will depart from previous DfT growth scenarios in which forecast demand was assumed to increase at a rate similar to that observed in recent years. The DfT have previously produced both an unconstrained case for future year UK aviation demand, in which supply is assumed to meet all the demand, and a capacity constrained case. The capacity constrained case is based on maximum use of existing UK airport infrastructure plus a second runway at Stansted by 2015 and a third runway at Heathrow by 2020.

3.4 London and the South East demand

39 The propensity to fly is substantially higher for residents of London and the South East than for other regions in the UK. They remain the UK's most productive regions. Demand at London's airports is equivalent to 60% of UK-wide demand. This is illustrated in Figure 2²³.

3.5 UK demand growth by category

- 40 DfT demand is broken down into a number of categories which are illustrated in Figure 3. All of these sectors are an important part of London's aviation offer and intrinsic to its ability to attract the range of skills and talents it needs to function as a world city.
- 41 The domestic market has a high growth rate. It is forecast that 150mppa will travel within the UK in 2030 if there are no constraints on growth, a 462 percent increase on 2000 levels. The constrained case is much lower (98mppa, with leisure demand being more significantly capped), but still sees rapid growth.
- 42 Business travel (both from the UK and to the UK from overseas) grows strongly up to 2030 in both cases reflecting the low price sensitivity of businesses. In the unconstrained case, the UK business passenger market grows by 139 percent and foreign business travellers by 114 percent. These figures drop to 130 percent and 107 percent respectively for the constrained case. The majority of these flights are short-haul.
- 43 The largest change however, is in UK Leisure demand; in the unconstrained case, it grows by 426 percent to 198mppa (both long and short-haul), the bulk of which are short-haul passengers. It is primarily the short-haul passengers who are deterred from travelling in the constrained case. The charter market is forecast to see a relatively small increase. In recent years, the charter market has seen

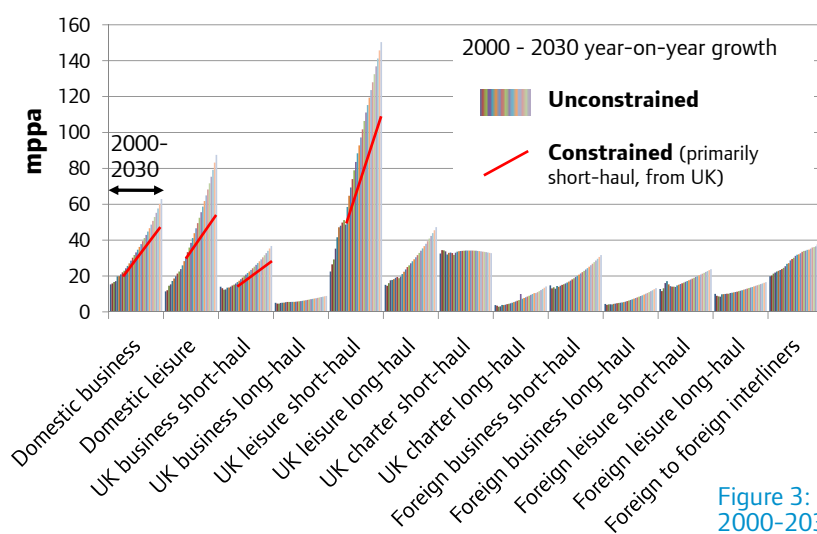


Figure 3: DfT Demand growth forecasts 2000-2030 by market type

a decline in passengers. This is primarily due to the explosion of low-cost, no-frills airlines offering competitively priced travel to an array of popular leisure destinations.

- ⁴⁴ Leisure travel to the UK from foreign countries is forecast to be less affected by the potential growth constraints although its growth is significantly slower than for UK Leisure. The number of passengers grows to 40 mppa in 2030 (short and long-haul), up 77 percent from 2000, in the unconstrained case. It rises to 37 mppa in the constrained case. This is a figure endorsed by findings of the Committee on Climate Change, (who report a figure of 695mppa).

Key Messages

i) The DfT and the aviation authorities in other developed nations are all forecasting continued, long-term demand growth.

ii) While the UK economy is anticipating relatively slow growth for several years, it is expected that demand will only be temporarily suppressed. It is important to anticipate the form and scale of this growth for trips to/from and within the UK.

iii) While growth is forecast to be greatest for leisure travel, growth in business travel is also substantial. All of these sectors are an important part of London's aviation offer and intrinsic to its ability to attract the range of skills and talents it needs to function as a world city.

iv) In a 'central-case', without capacity constraints, the DfT forecast that UK-wide demand will nearly double between 2007 and 2030, rising from 240mppa in 2007 to around 465mppa in 2030²⁴. Beyond 2030, if demand were to continue at a similar rate, it could reach around 700mppa by 2050. This is a figure endorsed by the findings of the Committee on Climate Change, who report a figure of 695mppa²⁵.

v) London airports currently accommodate 60% of UK demand²⁶. If this proportion was to be the same in the future, unconstrained demand in London could total an additional 139mppa by 2030 and 280mppa by 2050.

Chapter four – Compatibility of growth and climate change

4.1 Introduction

- 45 While aviation delivers significant economic and social benefits, there are a number of negative impacts that must be taken into account chiefly of an environmental nature.
- 46 The environmental impacts of aviation are of primary importance. Aviation generates significant disbenefits. UK aviation currently accounts for 6.4% of the UK's CO₂ emissions²⁷. However, there has been much good news from the industry in recent years. Aircraft are becoming significantly cleaner and more efficient.
- 47 Aircraft emissions contribute to climate change by changing the concentration of greenhouse gases (GHGs) in the atmosphere. GHGs are the main cause of global warming. The scientific concept behind global warming is radiative forcing. Aviation generates a number of radiative forcing components. These include emission of CO₂, NO_x, water vapour, soot, and sulphates. Together they have a net positive radiative forcing effect causing global warming. Less well understood GHG effects attributed to aircraft emissions include the formation of condensation trails (contrails) and cirrus clouds. If growth continues at the current rate, CO₂ emissions could increase by 50% by 2020, to three times the level seen in 1990. In

order to avoid this, the UK has agreed to enforce a reduction of CO₂ emissions of 20% by 2020²⁸. With the right mechanism, the aviation industry play its part. The industry must balance growth against the more harmful impacts of aviation.

4.2 Emissions targets

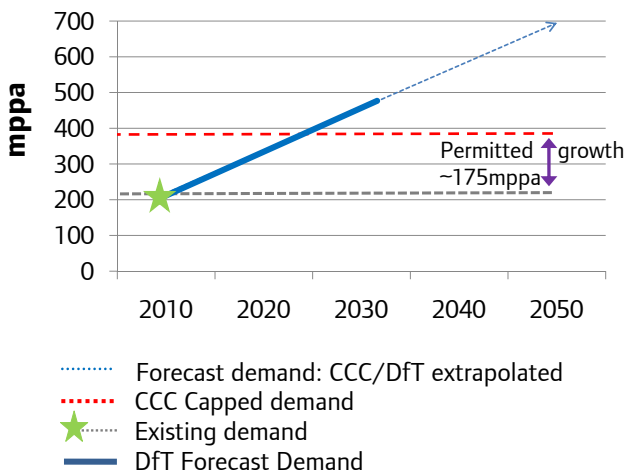
- 48 The Climate Change Act of 2008 places a duty on the Government to ensure that UK industry-wide emissions of six key GHGs are at least 80% lower in 2050 than they were in 1990²⁹. Furthermore, the Government has set a target for aviation. In 2050 aviation emissions are not to exceed 2005 levels. It is expected that other European countries will accept similar limits. It remains to be seen whether countries such as China and India decide to adopt similarly ambitious targets. The strong economic growth being enjoyed by the India and China is supported by plenteous aviation growth.

4.3 Sustainable growth

49 The Committee on Climate Change (CCC) have stated that aviation policy must be based on the assumption that air traffic demand growth between now and 2050 cannot exceed 60% (in terms of passenger numbers), and 55% in terms of air traffic movements (ATMs), if the UK is to meet the Government’s target that aviation emissions in 2050 do not exceed 2005 levels.

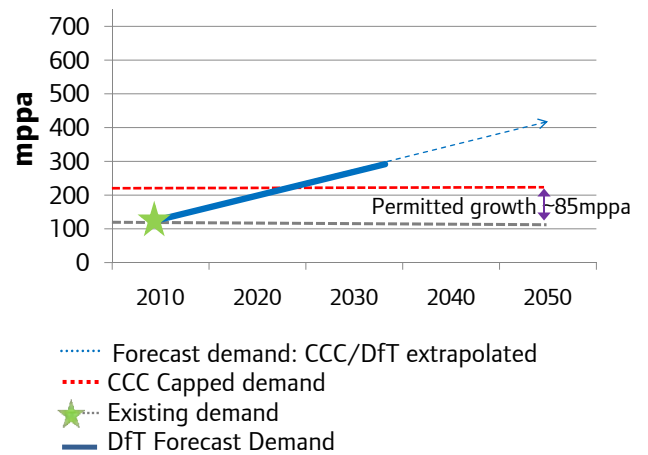
50 UK-wide growth, if unconstrained could equate to around 700mppa in 2050^{30,31}. If growth is restricted by a cap set at 60% extra passengers over 2005 levels (as per the CCC 2009 recommendations), the UK could accommodate an increase from 230 million passengers per annum in 2010 to 380 million in 2050. This is illustrated in Figure 4.

Figure 4: Forecast UK-wide passenger growth against permissible growth



51 It is clear that considerable scope for growth still exists, even within CCC targets. If the proportion using airports in London and the South East is the same as it is today (60% of total UK-wide demand as per Figure 2) an additional 85mppa could be accommodated within CCC targets. This is illustrated in Figure 5.

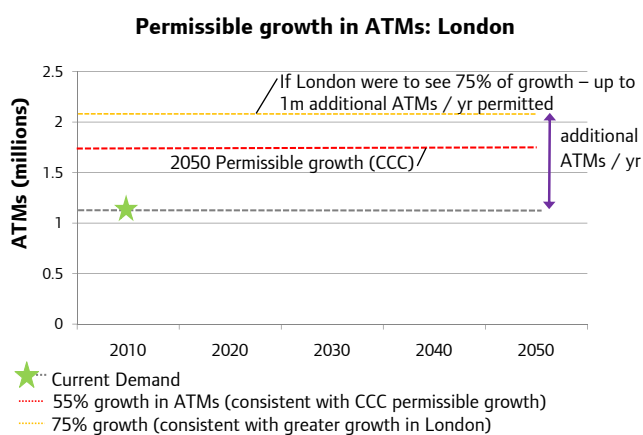
Figure 5: Growth at London’s Airports within permissible limits



4.4 Air traffic movements (ATMs)

- 52 The CCC believe that there could be a maximum increase in UK-wide ATMs of 55% from today's levels and targets would still be met. This would represent an increase of 564,000 ATMs per year by 2050, as illustrated in Figure 6.

Figure 6: Forecast growth in Air Traffic Movements (ATMs) in 2050, compared with CCC recommendations



- 53 If a 75% increase were permissible, as a result of a greater proportion of UK movements using London airports, this could permit up to 1m additional ATMs per year³².
- 54 By concentrating more demand at a national super-hub airport, nationwide benefits are potentially greater. Lower frequency point-to-point trips to overseas airports could be replaced by feeder

trips to the hub, or possibly assisted by high speed rail connectivity. This is discussed further in Chapter 8.

4.5 Are CCC targets reasonable?

- 55 It is possible to accommodate high levels of growth whilst operating within the targets set in order to reduce the emissions produced in the UK by 80% by 2050. However, accommodating this growth is dependent on a number of factors that are increasingly important to the future of aviation. These factors are discussed in more detail in appendix A.

Key Message

i) Assuming that the proportion of UK demand that is accommodated at London's airports remains at 60%, an additional 85mppa, or 564,000 annual ATMs, could be accommodated at London's airports within the environmental targets for 2050 set out by the Committee for Climate Change. This requires continued improvement across a number of industry activities.

Chapter five – Compatibility of growth with localised environmental impacts

5.1 Introduction

56 Aviation growth is of vital importance to London and the UK and it is compatible with the need to address climate change. Aviation growth therefore both supports the Mayor's Transport Strategy (MTS) challenges of supporting economic development and population growth and is consistent with the overall challenge of reducing transport's contribution to climate change.

57 However, there are a number of other potentially serious impacts of aviation which need to be considered if decisions about future capacity are to be properly informed. The above analysis has been concerned with macro level economic and environmental arguments, principally at a global level. This chapter is concerned with the localised environmental impacts and the extent to which these affect the case for accommodating additional demand. The following impacts are considered:

- aircraft noise impacts
- local air quality impacts
- impacts on transport networks used for surface access

58 These issues are key concerns to the Mayor and are directly related to the MTS goal of enhancing the quality of life for all Londoners. In fact they are relevant to all the challenges associated with this goal: improving noise impacts; improving air quality; improving health impacts; and improving journey experience.

59 The scale of these impacts, the number of people affected and the intensity of the impacts will vary according to the location of new aviation capacity. It is therefore clear that the amount of demand which can be reasonably accommodated depends on the location under consideration.

5.2 Localised impacts at London's airports

60 Heathrow and City airports are located inside Greater London. Gatwick, Stansted and Luton are located a significant distance outside. While medium size towns support and have developed around Gatwick, Stansted and Luton, the footprint and localised environmental impacts of these airports affect far fewer people.

5.3 Growth within Greater London is unacceptable

61 Runway expansion is unacceptable at Heathrow and City, as a consequence of the localised environmental impacts that would result. A third runway at Heathrow is strongly opposed by the Mayor. The Government withdrew its support for a third runway at Heathrow in May 2010. The issues associated with accommodating additional runway capacity at Heathrow were:

Aircraft noise

- 62 The requirement which was set by the previous government for the expansion of Heathrow was that the 57 dB noise contour around Heathrow should not be expanded beyond the 127 km² it covered in 2002. It is the Mayor's position that merely maintaining the extent of this area is not consistent with the MTS challenge of improving noise impacts. This was the last full year of Concorde flights and the method for calculating the contour area is inconsistent with the EU-directed method for drawing up noise action plans at airports.
- 63 57dB is the level at which the 2003 Aviation White Paper notes that there is onset of 'significant community annoyance' to aircraft noise. At 2002 noise levels, 250,000 people suffered noise disturbance within Heathrow's 57 dB contour in 2008. Millions more were also affected by the noise generated by arriving and departing aircraft³³.
- 64 There is recent evidence that noise causes far more annoyance than had been previously thought³⁴. In particular that the method adopted since the 1980s for measuring noise is too narrow and does not take into account either the growth in the number of flights or increasing public intolerance to noise.
- 65 While in excess of one hundred thousand people would fall within Heathrow's 57dB contour as a result of the third runway, hundreds of thousands more people would be exposed to substantially greater noise pollution³⁵. The World Health Organisation

has conducted research that states that serious annoyance starts at exposure to 55 decibels, and annoyance at 50 decibels³⁶. Currently, around 2.5 million people are affected by a 50 dB threshold at Heathrow³⁷.

Air quality

- 66 The previous government's condition for Heathrow expansion was that air quality within EU limits and aviation emissions would be limited to 2005 levels by 2050. It should be noted that Heathrow and the local area have some of the poorest air quality in Europe. The London Assembly note that since 2001/02, there has been little improvement area in concentration levels of two key pollutants in the Greater London – NO₂ and particulate matter (PM10)³⁸. NO₂ is a particular problem for the Heathrow area, already one of the worst affected areas in London. NO₂ is one of two main pollutants that make up oxides of nitrogen emissions (NO_x) in London, largely caused by road transport and heating systems. The other is nitric oxide (NO). Of the two, NO₂ is of most concern due to its impact on health. However, NO easily converts to NO₂ in the air, so it is essential to control all emissions of NO_x to reduce concentrations of NO₂ in the air.

Surface access impacts

- 67 There is little hard evidence about the effects of Heathrow expansion on the road network. However, it is clear that the highway network performs a vital economic function in serving the needs of West London, it faces enormous pressure, and that there is little opportunity for expanding it. Theresa Villiers stated in January 2009: “Road congestion around Heathrow, as anyone who has travelled there will know, is already a major problem, and the Government’s plans [for a third runway] will only make a bad situation worse—not just for people living around the airport, but for those attempting to use the M4 and the M25 for longer journeys...”³⁹

Key Messages

- i) Aviation growth should be tempered by concerns arising at the local and regional level about its negative impacts. This depends to a great extent on the location of the additional capacity.
- ii) A new airport which is planned from the outset to meet its ultimate purpose can avoid most of the negative local and regional impacts of Heathrow, which developed in a piecemeal way.
- iii) Heathrow’s location places constraints on the extent to which it can reasonably expand. Even with optimistic assumptions about changes in aircraft technology the quality of life impacts on large populations in West London and beyond are unacceptable. Part 2 of the report will contain detailed analysis of these impacts.

Chapter six – Capacity at London’s primary airports

6.1 Introduction

68 The capacity of an airport is principally defined by the limitations imposed by:

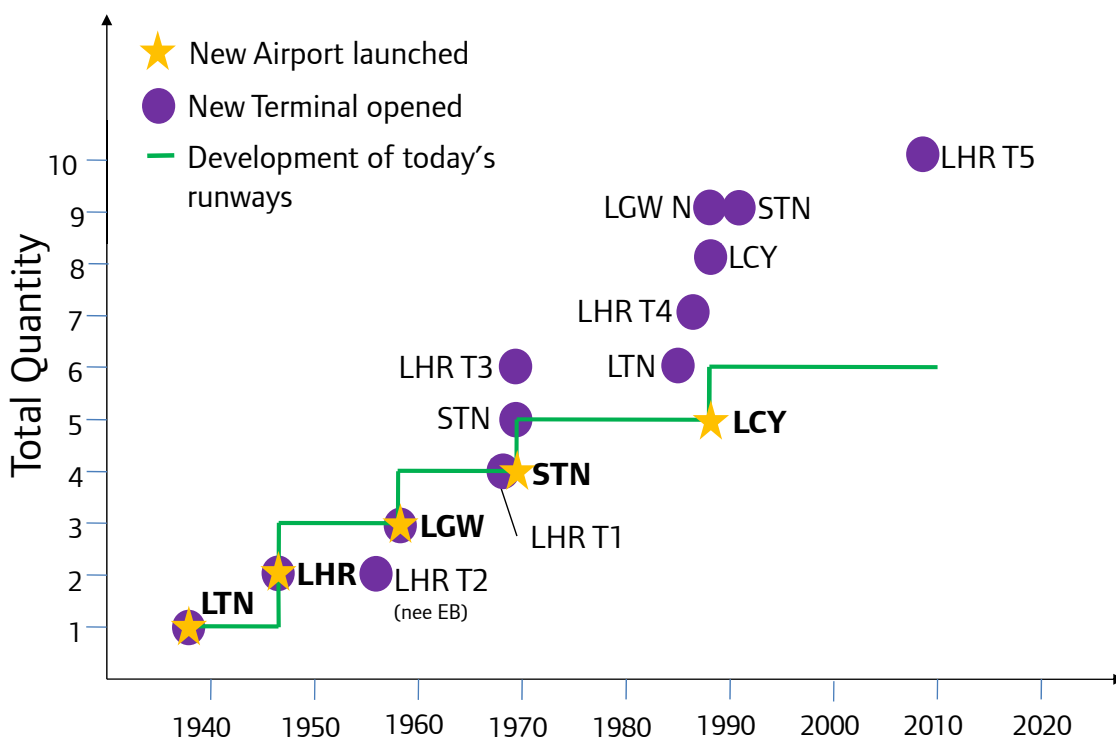
- Runway capacity - the number of aircraft slots available for landing and take-off. For some airports, (Heathrow, Stansted, City Airport), this is subject to a specific planning condition limiting total air traffic movements permitted each year. For other airports (Gatwick, Luton), rules, regulations, and laws governing safe runway operation are the effective constraint for the overall number of flights

- Terminal capacity - the number of passengers that can be safely processed through check-in, security, immigration and customs, and number of aircraft ‘gates’.

- Airspace capacity - air traffic control (ATC) regimes produce limitations. These have become more widespread in recent years as demand has grown. Constraints which would previously only be felt at peak times are often now experienced during large parts of the day.

69 In the case of London’s airports, runway capacity is the principal limiting factor.

Figure 7: Historic growth of London’s Primary Airports



6.2 History of airport growth in London

- 70 London's five airports have developed incrementally, in response to both commercial and political circumstances. There are now a total of six commercial runways⁴⁰ at these airports. The development of runway and terminal capacity is illustrated in Figure 7 (other airports which have closed in this period, such as Croydon, are not shown). No new runways have been added since 1988 (at City Airport).
- 71 In total, London's airports accommodate more passengers than those of any other city in the world. However, the runways at Heathrow and Gatwick are operating at capacity for much of each day. This means that they are especially susceptible to delays and disruption. This is revealed by EUROCONTROL data observing delays at major European Airports, illustrated in Figure 8⁴¹. There are a range of metrics used to benchmark and indicate the 'passenger experience' performance of individual airports. The EUROCONTROL data demonstrates one aspect, and is a useful marker as to the relative performance of Heathrow and Gatwick, as against other major European hub airports.

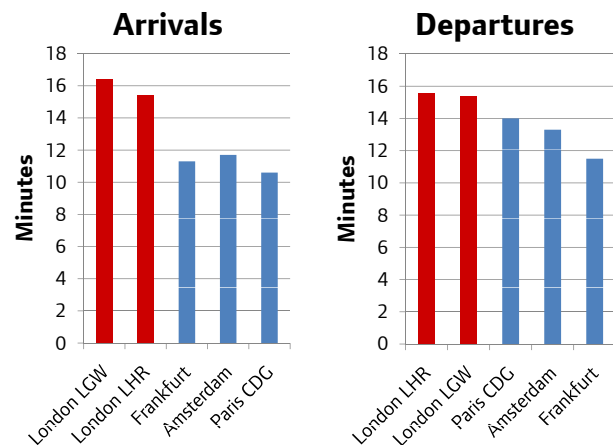


Figure 8: Delays per aircraft at major European hub airports – average across 2007-2009

- 72 The perception of the travel experience offered by airports is very important. In the last decade, London's airports have regularly scored badly in worldwide surveys examining the quality of traveller experience. A number of travel, aviation, and media sources have published personal accounts of poor experiences at Heathrow.
- 73 The focus of the South East Airports Taskforce activities is on improving elements such as delays and passenger experience. As of December 2010, three primary workstreams are being advanced: reliability and resilience; border controls; and security. The recommendations are due to be published in July 2011. However, whilst this task force will provide useful indications of how passenger experience can be improved in the short-term, it is not considering the wider need for additional capacity, and the potential for additional capacity to improve service quality. A key activity for the task

force should be to distinguish between the impacts of a shortfall in capacity, as opposed to other inefficiencies⁴².

6.3 Heathrow

74 Heathrow is handling up to 75,000 more passengers per day than it was built for⁴³. Heathrow's runways operate at 99% capacity. Runway utilisation is 70-75% at other major European hub airports, which provides much greater resilience against delays. Currently Heathrow operates four stacks for aircraft awaiting a landing slot. At busy times, planes can be held in a stack for 30 to 45 minutes. In the last twenty years, flight sector times between Amsterdam Schiphol and Heathrow have increased from 60 to 90 minutes to account for congestion and waiting to land.

75 Each minute an aircraft is delayed is costly to the airlines. In 2004, the costs were valued at an average of €72 per minute (taking into account costs to the airline, crew costs, passenger compensation and passenger opportunity)⁴⁴.

76 Queuing for take-off slots is also unusually lengthy. This increases the total fuel burned on some flights by a considerable percentage, particularly for short-haul flights. These emissions are classified within ground-based emissions⁴⁵ for the purposes of the Mayor of London's climate change policy. Improved operational efficiency at Heathrow could reduce such emissions, and potentially allow for

greater flexibility in the level of sustainable growth London can accommodate.

77 Heathrow has developed on an ad hoc basis with capacity and infrastructure added over time. The airport started as little more than an airstrip with no masterplan to make it the major world airport that it is today. This lack of comprehensive planning is visible in the sub-optimal layout of the terminal buildings, as illustrated in Figure 9. Attempts to address this are being made through the rebuilding of the older terminals and the building of the modern Terminal 5.

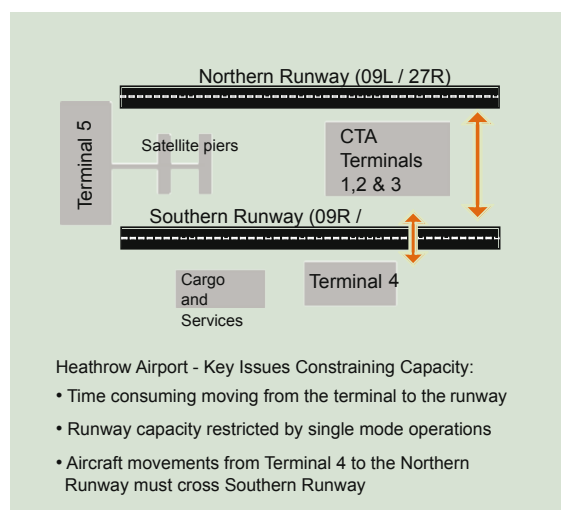


Figure 9: Constraints imposed by the layout of Heathrow

6.4 Gatwick

- 78 Strictly speaking Gatwick airport has two runways, but in practice, only one can be used at a time. They are adjacent to each other and too close together to be used concurrently. The airport operates in excess of 95% capacity and is deemed to be the busiest single-runway airport in the world.
- 79 The new owners of Gatwick have recently announced a £1 billion investment in upgrading the airport to improve the passenger experience and provide some small-scale terminal expansion. The key issues constraining growth at Gatwick are illustrated in Figure 10.

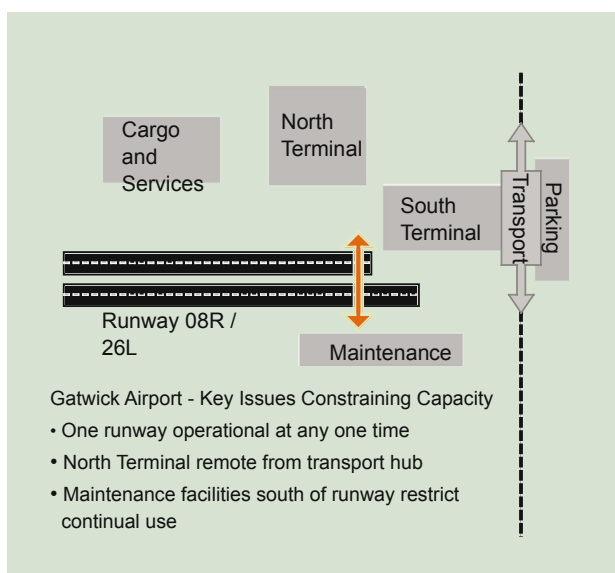


Figure 10: Constraints imposed by the layout of Gatwick

6.5 Stansted

- 80 Stansted has expanded rapidly in recent years as a result of the growth in demand for low-cost air travel. At Stansted, there is significant spare runway capacity available, but it is generally at times of day that are inconvenient and less desirable to the airlines that operate at this airport. The Stansted slot coordination data⁴⁶ shows that runway utilisation is at its highest, and very close to capacity, during peak hours, such as early and mid morning, as well as late afternoon. The main reason is that the predominant use of the airport is short haul flights by low cost carriers with similar timetabling preferences. The planning conditions governing Stansted's operation were changed in October 2008. Under the new conditions, it is permitted to accommodate up to 264,000 ATMs and 35 mppa (an additional 80,000 ATMs and 15mppa), using its single main runway. In 2009, the airport only accommodated 182,000 flights and fewer than 20 million passengers, well within its capacity limits.

6.6 Luton

- 81 Luton is a key base for Easyjet and other low-cost and charter carriers. It has one runway and a capacity of 10mppa. There is significant available capacity for growth at Luton; however, in the South East context this potential is not significant. Passenger numbers have risen quickly as a result of the growth of low-cost carriers.

6.7 London City Airport

- 82 City Airport operates from a single short runway which restricts the size and type of aircraft it can handle. It has a capacity of 5mppa, and a planning condition that limits the number of (noise-factored) aircraft movements to 120,000 per annum, although this decision is under judicial review by the High Court⁴⁷. Its operating hours are restricted, particularly at weekends.
- 83 The airport has capacity for a small amount of off-peak growth, but this can only be during the week. London City Airport is a close neighbour to residential communities, and its impact on these communities must be minimised.

6.8 Scope for increasing runway and terminal capacity within current planning permissions

- 84 Current Government policy indicates that no runway extension should be agreed to at Heathrow, Gatwick or Stansted, and there are considerable planning and physical barriers to runway extension to City Airport and Luton. A condition of the planning permission for Gatwick's North Terminal stipulated that no new runway could be built at Gatwick before 2019.
- 85 Within current planning permissions, a limited amount of extra capacity is possible at Heathrow, Gatwick, Stansted, Luton and

City. Figure 11⁴⁸ illustrates the approximate level of additional runway capacity available for Air Traffic Movements (ATMs).

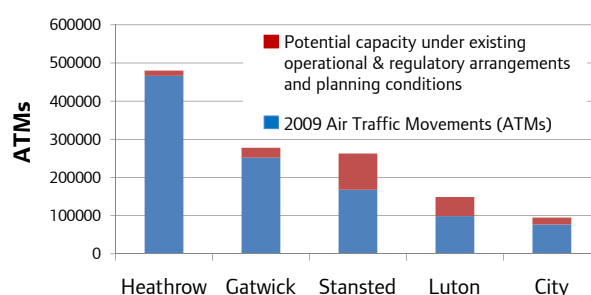


Figure 11: The potential for increasing the runway capacity at London's airports under current operational & regulatory arrangements and planning conditions

- 86 Additional spare capacity is potentially available through the greater use of Very Large Aircraft (VLA), such as the Airbus A380 since such aircraft allow for more passengers to be accommodated in a single take off or landing slot (though a slight increase in separation of aircraft is required). An A380 with 500 seats has as many seats as a Boeing 777 and an Airbus A320 combined. Airline costs per passenger and environmental disbenefits can be significantly reduced. However, the potential market for VLAs might be limited to a small number of principal routes. Boeing forecasts that despite increases in demand over the next 20 years aircraft size will not change much⁴⁹.
- 87 Options for improving the passenger experience at Heathrow include improving the connectivity between terminals. Contained within the Heathrow 'Capital

Investment Plan 2010⁵⁰ are plans to introduce a passenger transfer product which would be based on Track transit/Automated People Mover (APM). An APM could reduce connection times.

- 88 Terminal capacity is planned to increase with Terminals 1 and 2 becoming one main terminal for Star Alliance and capable of accommodating 30 million passengers⁵¹. This restructuring will result in a better minimum connecting time for a number of passengers, with Heathrow becoming more attractive for interlining and transferring.
- 89 Gatwick has relatively minor terminal expansion plans under its new owners GIP, but the North Terminal will be expanded in order to allow more passengers a shorter minimum connecting time and a better passenger experience. A second satellite terminal at Heathrow Terminal 5 to be completed in 2011 will accommodate BA's new fleet of A380s.

6.9 Capacity shortfall

- 90 An assessment of existing and future demand and available capacity against permissible growth targets is summarised in Appendix B.
- 91 According to London First, there is capacity for a maximum of 50 million passengers per annum at London's airports within existing planning consents and operational constraints⁵², although the commercial viability of this has not been

tested. Even in this optimistic scenario, there is a remaining gap of 35mppa.

- 92 As noted in Chapter 4, growth of up to 85mppa by 2050 could be accommodated within the limits set down by the Committee for Climate Change. In principle, by using all spare capacity at Gatwick and Stansted, and by providing a third runway at Heathrow, this growth could be accommodated. However, this would not allow Heathrow to meet the shortfall in capacity permissible within environmental limits in a way that allowed it to operate as an efficient and modern hub airport. This additional capacity would also worsen the extensive disbenefit to local residents (noise, air quality, increased congestion), as discussed in chapter 5.

6.10 Potential impacts of constrained capacity

- 93 Capacity constraints across London's airports will continue to force airlines to use take-off and landing slots to serve some routes at the expense of others. There may be severe economic consequences if London's offer is bettered by that of rival airports. If capacity constraints are not addressed adequately in response to demand growth, future economic prosperity will be threatened. In particular there will be:
- An increased susceptibility to delays and disruption and a deteriorating quality of airport experience for passengers

resulting in damage to London's reputation as a place to do business;

- A failure to expand the range of destinations and frequencies in response to emerging demand making London less accessible to important destinations than its rivals;
- Deterioration in London's competitiveness, resulting in slower economic growth and a failure to exploit fully new opportunities for innovation. This is an issue that requires a solution particularly in light of the current economic situation. The Government will properly wish to consider various ways of solving this problem.

Key Messages

i) Heathrow, the UK's only hub airport, and Gatwick are operating at capacity. Delays and poor reliability are a persistent problem.

ii) The Government is currently conducting a review into maximising the efficiency of existing airport capacity (the South East Airports Task Force). This is just the first step in dealing with the expected increase in demand predicted by the Department for Transport's own studies. Even coupled with a potential High Speed Rail strategy, maximising the use of existing capacity will not be able fully to meet the long-term capacity shortfall.

iii) Under current planning conditions, the additional number of passengers which could be handled over current volumes is 50mppa, (while an estimated 85mppa could in principle be permitted within environmental limits). However the 50mppa estimate is based on a set of assumptions regarding the extra capacity generated by the use of larger planes and the alteration of services which may in practice be neither commercially viable nor desirable.

iv) In principle by using all spare capacity at Gatwick and Stansted, and by providing a third runway at Heathrow, this growth could be accommodated. However, this would fail to address a further set of problems associated with the capacity shortfall. In particular Heathrow would still not be able to meet the performance requirements of a modern hub airport since this requires spare runway capacity of about 25% to provide timetabling flexibility and resilience. (This is discussed further in the next chapter)

v) There may be severe economic consequences if London's offer is bettered by that of rival airports. If capacity constraints are not adequately addressed in response to demand growth, future economic prosperity will be threatened.

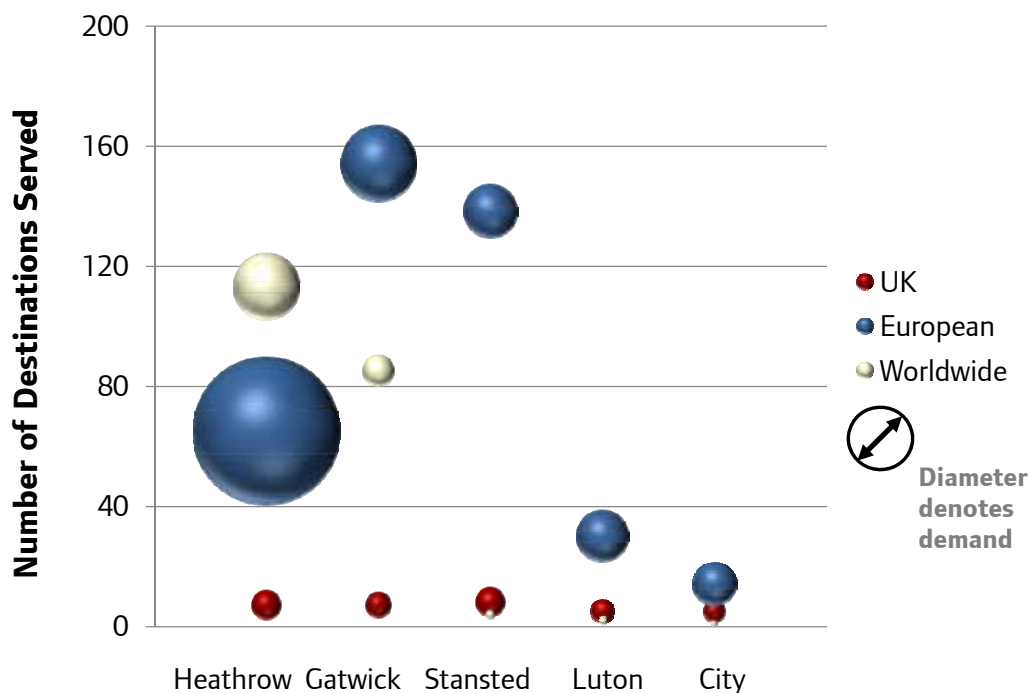
Chapter seven – London's aviation market

7.1 Functions of London's airports

⁹⁴ Each of London's existing airports in the South East has a distinctive role which has developed over time in response to coordinated planning and the commercial requirements of the airline industry. London airports serve a variety of markets. This includes the remainder of the United Kingdom, and European and worldwide destinations, for both business and leisure trips. This is illustrated in Figure 12⁵³.

⁹⁵ Heathrow, a global hub airport, is London's busiest, and offers over 800 flights per day to 185 destinations. In recent years, Heathrow has seen an increase in service frequency on a small number of the most lucrative routes, but its overall number of destinations served has reduced. Principal destinations have many flights each day. New York (Newark and JFK) is served by up to 30 flights in each direction. Heathrow also offers around 20 flights per direction per day to key destinations such as Frankfurt, Paris, Milan, Dublin and Amsterdam. Madrid and Rome have up to 15 per day. These high frequencies, make it an attractive airport for global businesses.

Figure 12: Destinations served by London's airports



- 96 Gatwick offers more destinations than Heathrow, particularly to Continental Europe. It serves 85 worldwide destinations, through an average of 28 departures each day and 154 European destinations. Heathrow serves 65 European destinations and 113 worldwide destinations, but its service frequencies are much higher. Gatwick is served by a large number of charter flights, operating once or twice a week, primarily to leisure destinations. Stansted, Luton and City primarily serve European destinations with a similar number of flights per day (range between 60 at City Airport and 90 at Stansted). Stansted's small number of charter flights boosts its range of destinations.

7.2 Passenger demand and air traffic movements

- 97 Heathrow is the busiest airport in Europe, handling 67 million passengers in 2009. It is significantly busier than Europe's other hub airports in terms of passengers per year. However, in terms of air traffic movements (ATMs), Charles de Gaulle has over 12.9%, and Frankfurt 2.2% more despite having fewer passengers (13.6% fewer for CDG and 25.6% for Frankfurt). The average flight loading from Heathrow is therefore significantly higher than other European hubs; Heathrow has an average of 142 passengers per flight compared with a European hub average of approximately 110. This is illustrated in Figure 13⁵⁴.

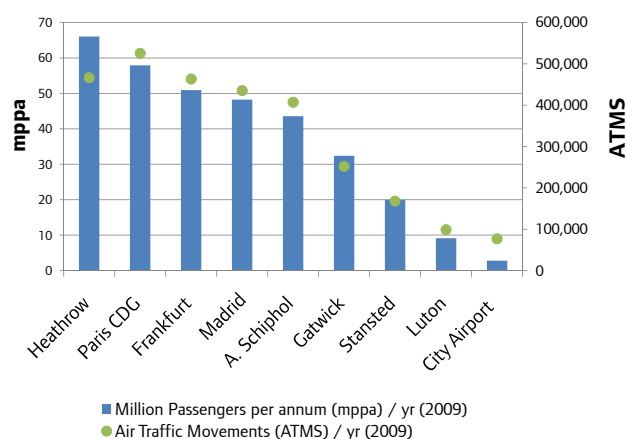


Figure 13: London's primary airports – Passengers and (ATMs) per annum, 2009

- 98 The total number of passengers arriving and departing on flights across London's airports exceeds that in all other world cities. This is illustrated in Figure 14⁵⁵.
- 99 By comparing London with other major cities that have multiple airports, it is evident that London's airports in aggregate (Heathrow, Gatwick, Stansted, City Airport and Luton) handle uniquely high levels of passenger demand. Figure 14 underlines the importance and strength of London and the South East as a centre for commercial aviation.

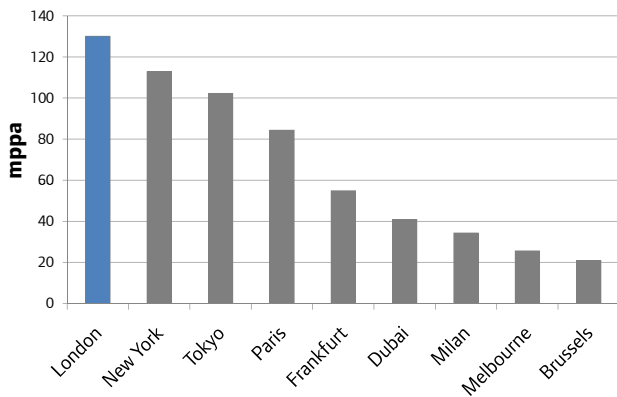


Figure 14: Total number of passengers at London's Airports, in comparison to other major cities, (average yearly figure for 2007-2009)

7.3 Trip purpose

- 100 Figure 15⁵⁶ illustrates the trip-purpose characteristics of all terminating passengers in 2008 at London's airports. The importance of leisure trips can be seen across all, including Heathrow. At Heathrow, leisure trips comprise 62.8% of all terminating trips. Gatwick, Stansted and Luton are even more dominated by leisure travel. With regard to business trips, Heathrow is the most important airport in the South East with nearly a quarter of trips (16m) being made for business purposes. Gatwick (5m), Stansted (4m), and Luton (1.84m) have much smaller shares of business demand. 56% of trips (1.83m) from City Airport are for business purposes⁵⁷.
- 101 Less than 6% of passengers at Gatwick are transfer passengers (interchanging with another flight). Less than a quarter are travelling for business. The leisure market at Gatwick (75% of travellers) is largely short haul (75%). Stansted has a smaller proportion of leisure passengers than Gatwick with 80% leisure and 20% business (the latter represents the third largest business market after that at Heathrow and Gatwick).
- 102 Of the total number of passengers using Heathrow, 35% (2008) are transfer passengers⁵⁸. It is anticipated that as Heathrow reaches capacity a greater number of people will prefer to interchange at other hub airports which are less constrained, with a lower risk of unreliability and delays.

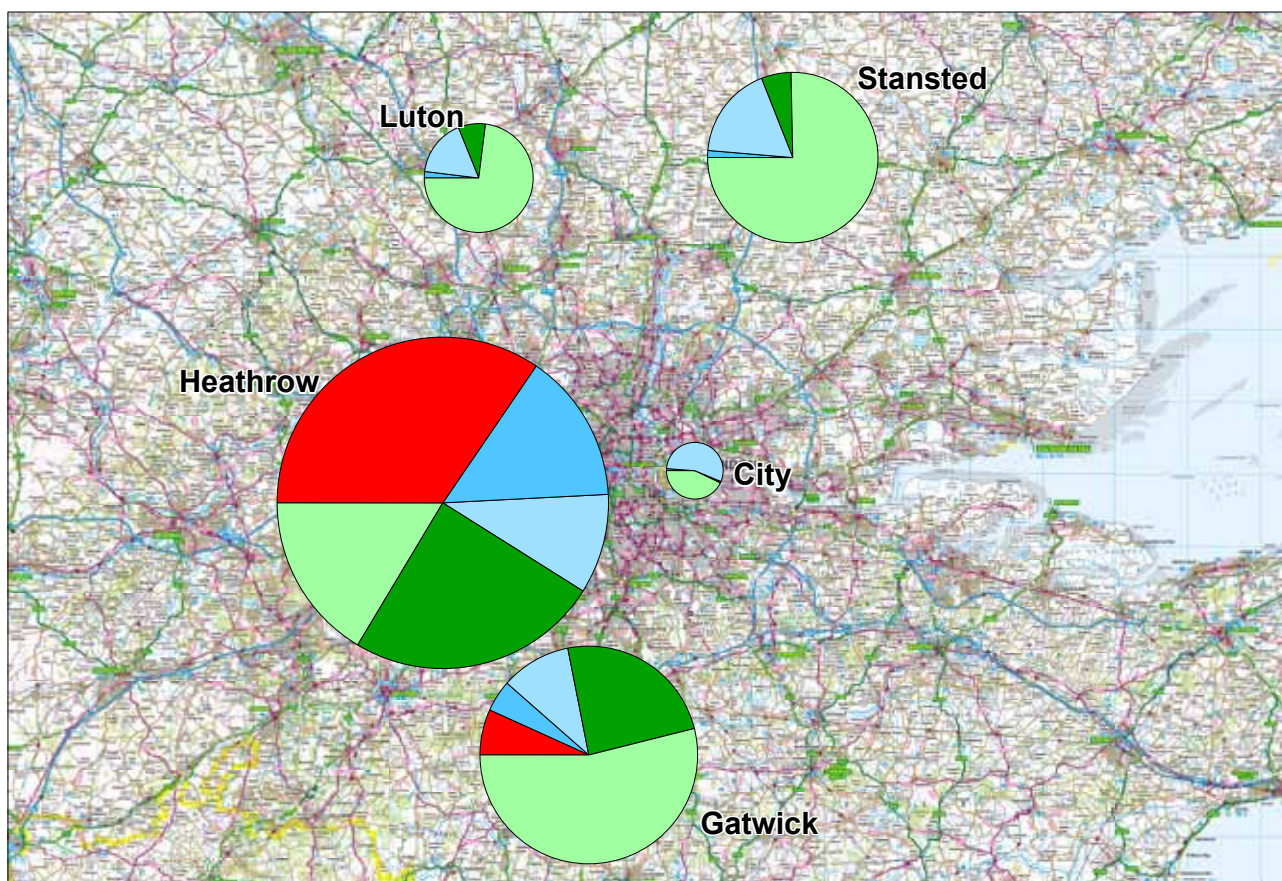



Figure 15: London's airports – passenger market context (opposite page)

- Connecting
- Long haul business
- Short haul business
- Long haul leisure
- Short haul leisure

 Diameter denotes demand

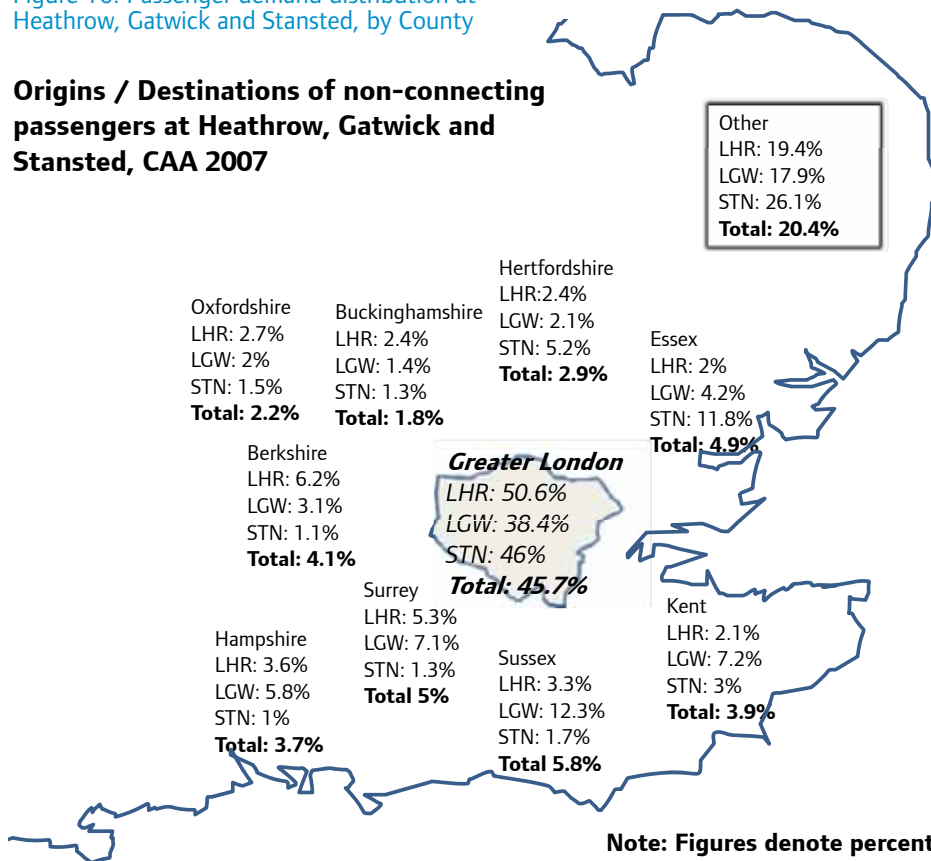
7.4 Trip Origins and Destinations

¹⁰³ Trip origins and destinations for current passengers at Heathrow, Gatwick and Stansted have been examined. Aviation demand is not evenly spread. Figure 16 illustrates the demand distribution, according to trip origins and destinations for those flying from Heathrow, Gatwick and Stansted⁵⁹. This has revealed the following:

- 45% of Heathrow, Gatwick and Stansted demand comes from the Greater London Authority (GLA) area.
- The remainder of the South East makes up 35% of demand.
- The rest of the country (outside of London and the South East) contributes 20%.
- Heathrow's catchment area is concentrated on Central London as well as areas to the west and North West of London.
- Gatwick has a strong draw from Central London and areas to the south of London.
- Stansted's catchment is quite wide. It is concentrated upon London, but also a wide spread of locations around the South East and Midlands.

Figure 16: Passenger demand distribution at Heathrow, Gatwick and Stansted, by County

Origins / Destinations of non-connecting passengers at Heathrow, Gatwick and Stansted, CAA 2007



Note: Figures denote percentage of total airport demand heralding to/from that County

- 104 Of the Home Counties, Sussex, Surrey, Berkshire and Essex have the strongest demand; each generates around 5% of total demand across Heathrow, Gatwick and Stansted.
- 105 There are clear ‘spikes’ in demand which demonstrate a consistent preference for the nearest airport. For instance Essex contributes nearly 12% of Stansted demand, and Sussex contributes 12.3% of Gatwick demand.

7.5 London’s airports are poorly connected with each other

- 106 London’s airports are generally well connected with Central London, but poorly connected to each other. A small number of passengers connect between flights at different London airports (for example, flying from Tokyo into Heathrow, and then travelling to Gatwick to fly on to Dublin). In 2007, these passengers (1.5M) represented around 1% of the total⁶⁰. The most significant flows are between Heathrow and Gatwick (in 2007, this was around 500 thousand passengers at each airport⁶¹).
- 107 In 1969, the Westward Airways Gatwick-Heathrow Shuttle was introduced, providing an air-link between London’s two largest airports. This service only lasted for a few months. In 1978, the Gatwick-Heathrow Airlink was formed. A joint venture provided a fast helicopter link between the two airports which operated until 1986, just

after through travel by motorway was made possible. Today, the route is regularly served by coach services, but journey times are not reliable. With current infrastructure, there is very little scope for London’s airports to act in a more coordinated manner. Routes are some of the busiest road and rail links in the country, and therefore suffer from poor reliability. Currently, fastest journey times between London’s airports are generally in excess of 1 hour across all modes.

Key Messages

i) There is little interaction between London’s airports. This is partly due to the roles each airport performs, but is also a result of poor access and journey times between them.

ii) The size, structure, and concentration of London’s air market is unrivalled. There is no independent evidence that the London and South East market is insufficient to support two hubs.

Chapter eight – The importance of hub airports

8.1 Introduction

108 London is by far the biggest aviation market in Europe. Economically it is highly integrated with the rest of the World, its airports have a large, prosperous catchment area, and since the UK is an island, it remains particularly reliant on air for international connections. London is also located ideally as a location capable of linking a high number and range of different aviation markets, in particular travel between North America and Europe. All of the major international business cities are within reach of London by direct flights. In principle, these attributes place London in a strong position to act as a location for airlines or airline alliances to base their hub operations.

109 Although Heathrow is a major international hub, with British Airways as the hub operator, there are some senses in which it does not meet the basic requirements for efficient hub operations. Furthermore, these shortcomings may thwart the opportunities which London's position and status offer as a potential hub for other airline alliances.

8.2 Hub airport characteristics and benefits

110 A hub is a location at which flights are organised in waves of arrivals and departures which allow passengers to make a wide range of connections. Such operations benefit the regions they are in. The additional passengers they handle beyond those of their home market allows them to sustain a network of exceptional connectivity in terms of the range of destinations they can serve and flight frequencies. There are also direct economic benefits arising from providing the additional aviation services.

111 A hub airport has the following main characteristics:

- A central geographical location linking a high number of locations and a wide range of markets
- Sufficient runway capacity and terminal transfer facilities to operate the intense waves of arrivals and departures which facilitate high volumes of connecting traffic
- A large route network is necessary and this is normally, though not always underpinned by strong local demand;

112 There needs to be an airline or alliance which establishes and maintains a hub strategy based on the airport. This means that they organize the timing of their arrivals and departures to facilitate large numbers of connections.

- 113 'Hubbing' allows for the scope of a network to be greatly increased relative to point to point operations. By funnelling flights through a hub, a wide range of connections are made possible. Figure 17 illustrates the basic difference between point to point and hub and spoke networks.

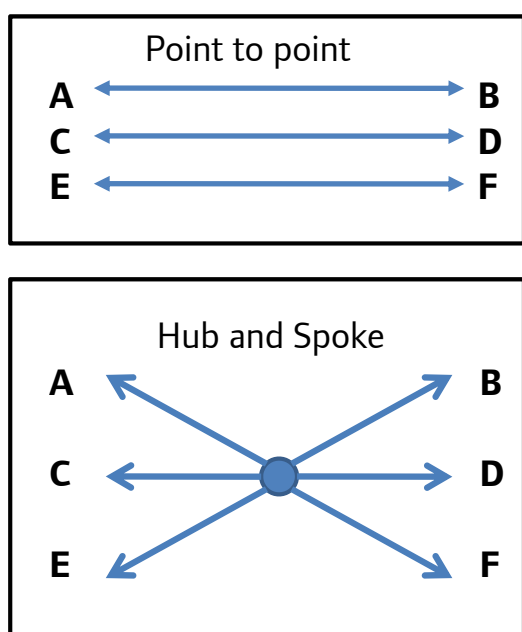


Figure 17: Point-to-Point vs. Hub and Spoke Networks

- 114 The nature of the benefits that arise from hub airports are the same as those which arise at other airports, as described in chapter 2. However, the size and distribution of these benefits is different. The home market has access to higher frequency services to a broader range of destinations than it otherwise would and the feeder airports in the network also benefit from significantly greater connectivity. It is for this reason that an efficient hub airport in London could be a genuine hub airport for the UK in a way that Heathrow currently fails to offer.
- 115 Aviation growth is most efficient and least environmentally damaging when configured at a hub. This allows consolidation of routes, optimisation of airline and alliance operations and maximisation of load factors.
- 116 Hub airports have high proportions of transfer passengers. At Frankfurt 54% and Amsterdam Schiphol 43% of passengers are neither starting or finishing their air travel at the airport⁶². At Schiphol, 69%⁶³ of KLM passengers are transfer passengers. Schiphol airport is a key global gateway to the regional economy, creating jobs, attracting investment, and providing a focus for communications.
- 117 The proportion of transfer passengers at Heathrow is lower, with 35% of passengers transferring. 30% of departing long haul passengers did not start their journeys in the UK. (The equivalent figure for Manchester Airport is 2%.) British Airways, the main hub airline at Heathrow, handles 57% of Heathrow's transfer passengers (13.4m out of 23.5m)⁶⁴.

Figure 18: Efficient hub operations can occur where there is the use of a number of runways – eg. Amsterdam Schiphol, which has up to 4 runways in use at any one time

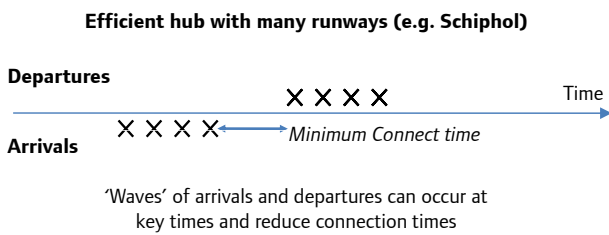
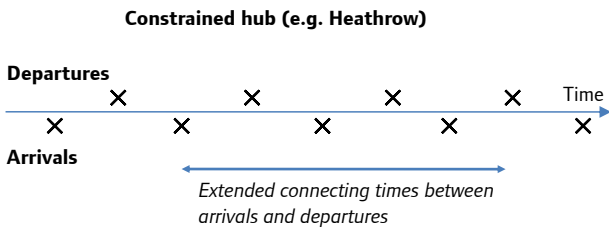


Figure 19: Constrained hub operations occur where runway capacity is limited – eg. Heathrow



8.3 Hub operations

- 118 Hub airports are designed to be able to process large volumes of traffic and connecting passengers in a short period of time. Arrivals and departures can be observed to occur in 'waves'. This nature of operation is maximised where a number of runways can operate concurrently.
- 119 A sufficient amount of runway space is required in order to accommodate the 'waves' of arriving and departing aircraft. A hub airport must be able to process large numbers of aircraft and passengers in short time periods. This offers passengers good minimum connect times with a comprehensive number of destinations. London airports are not designed to accommodate the wave system. Schiphol has five runways, two of which are available for landing and take-off at all times. Heathrow has to operate with only two runways and in a single mode operation, further compounding other capacity issues at the airport that are identified in Figure 9. The impacts of runway constraints upon arrivals and departures are illustrated in Figures 18 and 19, with reference to Amsterdam Schiphol and Heathrow.

8.4 Why a hub airport is important to London

- 120 In research carried out for the British Chamber of Commerce, it was reported that there are excellent, tangible economic benefits to a hub airport and its presence within London⁶⁵. There are a number of examples of key strategic decisions of business being influenced by Heathrow.
- 121 When BT and MCI proposed their merger in 1996, a joint headquarters had to be found for the London and Washington based companies. A location close to Heathrow was a compromise, as BT maintained its UK presence and connections to Washington DC were strong.
- 122 When British pharmaceutical giant GlaxoWellcome merged with Anglo-American Smithkline Beecham in 2000, the resulting company was to be UK-based. However, to keep the link to their US operations, at the heart of their most important market, a state-of-the-art headquarters were built near the smaller partner's offices in Brentford, West London to ensure easy access to Heathrow and thus to their US base in Philadelphia.
- 123 When Swedish pharmaceutical Pharmacia merged with American rival Upjohn in 1995, they set up the headquarters of the new company in London. Exceptional air links between the US and Sweden likely played a key part buttressing London's thriving pharmaceutical industry.
- 124 When Japan's Sony and Sweden's Ericsson set up their mobile phone joint venture in 2001, they chose London with its global hub connections as its headquarters – and specifically Hammersmith, West London, well placed for access to Heathrow. In 2009, in a similar vein, they moved their Americas headquarters from a research park in North Carolina to Atlanta, Georgia, citing proximity to a key client as well as to Atlanta Hartsfield-Jackson airport, one of the top tier US hubs, with excellent connections to Latin America.
- 125 Amsterdam Schiphol also offers some useful insight: In 1997, Philips moved from its company town, Eindhoven, to Amsterdam, in part because it would mean its managers would no longer need to take the connecting flight from Eindhoven to the Amsterdam Schiphol hub to reach its international operations. By 2006, KLM had ceased flights on the Amsterdam-Eindhoven route.
- 126 Hartford airport, Connecticut⁶⁶, is a secondary airport. Nonetheless, it serves an important catchment area with a number of major US businesses and key universities. In 2007, it received its first transatlantic route, not to London or Paris, but Amsterdam. In starting the route, it is unlikely that the main driver for Northwest Airlines was local Dutch traffic to and from Hartford, but rather that it saw an opportunity to

link Hartford to Europe and beyond via KLM's hub at Schiphol. It opened up opportunities across Europe for businesses in the Hartford area. Inevitably, the closest attention was paid to links with Amsterdam and areas around it. Reports suggest that some business links with the Netherlands and Belgium were developed as a direct result. The route was ended a year later in the face of the wider economic downturn; however, it had achieved good load factors and had demonstrated the potential for an unconstrained hub to support new routes, and thus new economic opportunities.

- ¹²⁷ The IATA has reported on the benefits of aviation connectivity as enhanced by transfer traffic flows through hub airports: 'the 25% increase in connectivity experienced by the EU accession countries between 2001 and 2004 boosted their long-run GDP by 2.75%, and that, in general, a 10% increase in connectivity relative to GDP will boost labour productivity levels by 0.07%'⁶⁷.
- ¹²⁸ While Heathrow is one of the UK's most significant locations for the import and export of goods, the vast majority of air freight at London's airports arrives in the belly of passenger aircraft. At present, cargo-only flights are priced out of using Heathrow and Gatwick. The focus of their UK activity is at Stansted and East Midlands Airports. Increased capacity at London's airports could generate opportunities for efficient and sustainable freight-handling.

8.5 Can London retain a hub airport?

- ¹²⁹ Heathrow's ability to operate successfully as a hub is compromised by a lack of runway capacity. Not only is it restricted to two runways, capacity is further compromised by the fact that the runways are operated in segregated mode, which means that at any given time, one runway accommodates arrivals only, the other departures only. Heathrow's operations cannot be optimised as they can at other hub airports, better able to facilitate arrival and departure 'waves'. A further issue is that the main hub operator (BA and its alliance partners) controls less than half of all slots. Industry experts believe the minimum proportion for viable hub operations at a two runway airport to be approximately two-thirds. As a result there are far fewer well timed connections on offer from Heathrow than from airports such as Paris CDG, Frankfurt and Amsterdam. Furthermore minimum connecting times at Heathrow are higher than competitor hub airports in Western Europe and the Middle East because of infrastructure's piecemeal evolution.
- ¹³⁰ Runway capacity constraints also mean that Heathrow is being left behind in terms of connections to important emerging economies such as China, India, Russia, as well as established economies such as Japan. The number of destinations served directly by major European hub airports including Heathrow, is illustrated in Figure 20⁶⁸.

- 131 The major hub airports in the United States all have at least three runways with at least one set of independent parallel runways. It is predicted that Heathrow's ability to function as a hub airport will be eroded further as it caters increasingly to growth in demand associated with its home catchment area. This is likely to result in reductions in short haul services, particularly by overseas airlines and an increase in long haul operations, which is not consistent with balanced hub operations. Ultimately BA might be forced to establish a second hub on the Continent if it is not to be reduced to the status of a second tier 'mega carrier'.
- 132 A means of increasing Heathrow's ability to function as an effective hub would be if BA and its partners were able to control a higher proportion of the available slots. This could happen if some airlines' operations were moved to a different airport. The chances of this being attractive to airlines would depend on the nature of the available alternative. A new airport of the same scale as Heathrow would be more likely to succeed and would have enough demand to be able to attract, potentially, a second and possibly a third airline alliance to establish London as a hub for their operations, (possibly as second European hubs concentrating on the Europe – North America market).
- 133 Gatwick was trialled as a hub in the 1990's⁶⁹. It failed for a number of reasons, including the capacity limitations imposed by single runway operation. BAA owned both airports at the time, and the Competition Commission has reported that the true potential of Gatwick was not explored as Heathrow and Gatwick were not operated in competition with one another, and it was instead in the interests of both BAA and British Airways to favour investment in the most lucrative routes at Heathrow.
- 134 Aviation has evolved since the attempt at creating a hub airport at Gatwick.

Figure 20: Comparison of major European hub airports

	Passenger numbers (mppa)	Runways	Destinations served	Current ATMs	Runway Capacity (2010)*	Runway utilisation (%)
Heathrow	67.3	2	180	473,000	480,000	98.50%
Frankfurt	51.9	3	262	490,000	660,000	74.50%
Paris CDG	53.5	4	223	522,000	710,000	73.50%
Amsterdam Schiphol	44.1	5	222	420,000	600,000	70%

*Runway Capacity (2010) under existing operational arrangements (ATMs)

Source: Ferrovial, 2010. <http://www.ferrovial.com/en/index.asp?MP=18&MS=801&MN=4>

This includes the development of airline alliances and the liberalisation of commercial aviation. The development of such alliances, such as Star Alliance, could in theory allow for airlines such as Lufthansa and Continental Airlines to compete on routes with British Airways out of a new hub airport. At present these airlines are only able to compete to a limited extent at Heathrow. The artificial market for slots creates substantial barriers to expanding operations. The liberalisation of many international Air Service Agreements (ASAs) will also continue to play an important role, cultivating competition in the market.

- 135 The two-hub model has worked in other parts of the world such as New York. New York accommodates two large hub airports; New York JFK and Newark (EWR) in New Jersey. The former acts as a hub for Delta and to a lesser extent for American Airlines; the latter for United Continental. Despite heavy competition between the airlines on many international and domestic routes, the demand is high enough for two or more airlines to have similar hub operations from airports serving the same urban area.
- 136 In the long-haul market, Continental (out of EWR) and Delta (out of JFK) operate routes from New York to a number of the busiest airports in Europe and the Middle East. Domestically, of the 64 domestic routes served by Continental from Newark Airport, some 32 of these routes are also served by Delta from JFK. New York also supports La Guardia airport, which accommodates mainly domestic services. Of the 64 domestic routes served by Continental from Newark

Airport, Delta competes on 24 of the same routes from La Guardia. Further examples of cities and regions with two successful hub airports is provided in Appendix C.

8.6 Airlines – insiders and outsiders

- 137 The severe capacity constraints at Heathrow have created an ‘insider’ – ‘outsider’ market whereby it is very difficult for new competitors to enter the market and displace incumbents who hold the rights to landing slots. The evidence for this is the existence of a ‘grey market’ for slots. It is understood that these ‘grandfather rights’ are traded for up to £30m for a pair of slots at a ‘choice’ time of day. This is substantially higher than the value at which slots trade for at any other airport in the world. Indeed, that slots have a price at all is a phenomenon unique to a small number of capacity constrained airports that can generate high yields on lucrative routes.
- 138 This provides important context for airlines’ arguments against new capacity at Heathrow and in London and the South East. Incumbent airlines have an interest in protecting their position at Heathrow. Slot values are capitalised on airline companies’ balance sheets, and can constitute a large proportion of their total assets. Caution is needed in assessing the arguments of airlines that might have strong interests at stake which are potentially at odds with the wider public interest. This suggests there may be better ways of increasing

capacity than the well-rehearsed, extreme alternative that Heathrow is either expanded or closed. It may be possible to maintain Heathrow as a hub and have a second hub for London. This would increase competition between airports, help reduce fares for consumers and help London to fully capitalise for the first time its unique advantages in international aviation.

Key Messages

i) Hub airport operations allow for the number of routes to increase exponentially. By funnelling all services through a hub airport, a larger number of destinations can be offered to passengers and to the residents of the surrounding hinterland. This extra connectivity is a great benefit in attracting business and investment to an area.

ii) Current capacity constraints limit the ability of London's existing airports to maximise their potential to operate as hub airports. Any additional airport capacity which is provided for London and the South East to respond demand growth should be designed and configured to facilitate hub activities and operations. London is favourably positioned to maximise its role as a key worldwide aviation hub and destination

iii) The severe capacity constraints at Heathrow have created an 'insider' - 'outsider' market whereby there is an incentive to the 'insiders' to keep the 'outsiders' out.

iv) Examples in the United States demonstrate that two hubs can work in the same city. The similarities between New York and London are manifold and so their comparison is relevant.

v) If Heathrow is to be maintained as a leading international hub, it may be necessary to rationalise operations there by transferring some flights elsewhere. This is only likely to be feasible if a new airport of similar scale and capability is built. Such an airport would not only allow Heathrow to compete better as a hub but could also offer the possibility of a second or third airline alliance setting up a hub operation in London, bringing further benefits to London and the UK.

Chapter nine – Key findings and next steps

9.1 Introduction

- 139 This report identifies the case for new aviation capacity serving London and the South East, and in what form it should be delivered. It is intended to stimulate further debate around which a new consensus might be built about the need for a new London airport.
- 140 Part 1 of the study is structured around the answers to two main questions:
- (a) Does London have sufficient capacity for its future needs?
- (b) If not, does it matter how and where new capacity is provided?
- 141 The rest of this chapter provides a summary of the main arguments and key findings which inform these conclusions and a set of proposed criteria against which the options will be assessed in part 2 of the study.

9.2 Does London have sufficient capacity for its future needs?

- 142 London draws on a deep international pool of talents and skills to provide a range of specialised international financial and business activities which place it at the heart of the global economy. This has benefitted the whole country. These activities are predicated on excellent international transport links.
- 143 The UK economy needs to be rebalanced away from excessive government expenditure and consumption and towards higher private sector investment and overseas earnings. The UK regions need to become less economically dependent on London's prosperity. The importance of London's air links is likely to grow as a result of this since it will be more important for people from all parts of the UK to have good access to the air connections which London enjoys.
- 144 A return to traditional industry is not possible. Instead, more of the outward-looking and aviation-intensive sectors which generate wealth in London and the South East will need to spread to other regions. To do this they will need to share the excellent international links which London and the South East enjoy and take fuller advantage of the specialised financial and business services which London offers.
- Key finding 1: London's economic success is critically dependent on the quality of its international air links and the economic rebalancing which is now needed makes the success of the UK as a whole increasingly dependent on them.**
- 145 In spite of its current strength, there are a number of potential threats to London's global economic position. Some of these are external and beyond our control but others, in particular infrastructure inadequacies, are not.
- 146 In terms of destinations served, Heathrow has fallen from second in 1990 to seventh in

2010. The number of destinations is 156, which compares to Paris CDG with 224 and Frankfurt with 235⁷⁰. Moreover capacity utilisation at Heathrow and Gatwick is approximately 99%. This causes delays and reliability problems. Heathrow is handling up to 75,000 more passengers a day than it was built for. Runway utilisation is typically 70-75% at other major European hub airports.

- ¹⁴⁷ The very high capacity utilisation at Heathrow causes delays. 40% of arriving flights at Heathrow are delayed, compared with only 25% at Frankfurt, Paris and Amsterdam⁷¹. Currently Heathrow operates four stacks for aircraft awaiting a landing slot. At busy times, planes can be held in a stack for 30-45 minutes. In the last twenty years, flight sector times between Schiphol and Heathrow have increased from sixty minutes to ninety minutes, to account for congestion and waiting to land.
- ¹⁴⁸ Each minute an aircraft is delayed costs airlines €72 (taking into account costs to the airline, crew costs, passenger compensation and passenger opportunity)⁷².
- ¹⁴⁹ Queuing for take-off slots is also unusually high. This increases the total fuel burned on some flights by a considerable percentage, particularly for short haul flights. These emissions are classified within ground based emissions⁷³ for the purposes of the Mayor of London's climate change policy. Improved operational efficiency at Heathrow could reduce emissions.
- ¹⁵⁰ Moreover airlines are forced to prioritise the use of scarce take-off and landing slots

which means that some potential demand has already been choked off, most notably between Heathrow and the UK regions, which denies them the full potential benefits of London's international connectedness. Capacity constraints are therefore likely to be having negative economic consequences.

Key finding 2: There is evidence that London's airports have been performing their vital economic function less than optimally for the last fifteen years.

- ¹⁵¹ The increasing number of countries which are integrated into the global economy brings more competition to those sectors in which new entrants have a cost advantage. This makes it all the more important that London and the UK take full advantage of the opportunities which globalisation presents, which principally arise from the increase in the size of the market for those specialised, high value goods and services for which the UK has a comparative advantage. This will require capitalising on existing strengths including maintaining air links to a comprehensive range of cities which participate in the global economy and high frequency flights to major business and leisure destinations.
- ¹⁵² While London continues to have excellent air connections to its traditional business partners it lags behind its European competitors in serving the large emerging economies. For example while it has 30 departures per day to New York it has only 5 flights per day to the whole of China⁷⁴ (Beijing and Shanghai). This is in contrast to the 11 daily services offered

to 4 destinations in China from Paris CDG, and the 10 daily services to 6 destinations from Frankfurt. Additionally, Sao Paulo is the only South American destination served directly from London⁷⁵. The number of destinations served in this region from London is dwarfed by the operations of Air France from Paris CDG who offer services to six destinations in South America⁷⁶, with multiple frequencies through one week.

Key finding 3: To maintain the system of world-class air links which London needs will become increasingly difficult as the volume of flights needed to maintain a sufficiently comprehensive and attractive network increases.

- 153 The Government has cancelled all plans for runway expansion at Heathrow, Gatwick and Stansted. It is Government policy that all growth is accommodated using the existing six runways at London airports.
- 154 However, while the UK economy is expecting relatively slow growth for a number of years, it is expected that aviation demand will only be temporarily slowed. The DfT and the aviation authorities in other western nations are forecasting long-term demand growth in both the leisure and business sectors.
- 155 At most it is estimated that maximum capacity with existing runways at London's principal airports could be increased from the current 130mppa to between 185mppa⁷⁷ and 189mppa⁷⁸. This includes further switching of services to larger planes and the reallocation of services to more

concentrated routes. However, this may be neither commercially viable nor desirable.

- 156 Unconstrained, demand is forecast to outstrip capacity at airports in London and the South East by approximately 55mppa in 2030 and 215mppa in 2050.
- 157 Furthermore, whatever the national benefits of a high speed rail strategy for serving domestic and / or near Continental destinations (such as Frankfurt and Amsterdam as well as Paris and Brussels), high speed rail is only expected to be capable of abstracting demand equivalent to about 10% of Heathrow flights.
- 158 The capability of continental competitors in combination with this shortage of available capacity at London's airports, poses a substantial competitive threat to London's leading position.

Key finding 4: The required level of growth cannot be accommodated within the constraints of the government's aviation policy and a failure to act is likely to cause London to lose out to its competitors.

- 159 It is vital that aviation is incorporated into policy frameworks and commitments to tackle manmade climate change. There is no doubt that if unchecked, aircraft emissions would be likely to be excessive and unacceptable, despite continued improvements in aircraft technology and airspace management regimes. On the one hand policies need to encourage investment in technological

means of minimising emissions and their uptake so that a given amount of flying produces fewer harmful effects.

- 160 On the other hand it needs to be acknowledged that within an overall system for reducing emissions, some sectors will find it harder and more expensive to adjust and that the contributions different sectors make should reflect this. Most European airlines have offered their support in principle to emissions trading. A widely adopted scheme would ensure that individual airlines / alliances or nations are not unduly disadvantaged.
- 161 It is consistent with the Government's ambitious climate change targets for aviation to grow considerably faster than the constraints of the Government's aviation capacity policy would otherwise allow. An additional 85mppa or 564,000 ATM's could be accommodated at London's airports within the environmental targets the Government has adopted. This is equivalent to an airport even larger than the existing size of Heathrow.
- 162 Expansion of Heathrow through construction of a third runway is both unacceptable and insufficient. Substantial capacity growth at Heathrow is unacceptable, as a result of the localised environmental impacts that would result. In any case, a third runway at Heathrow would not meet the shortfall in capacity permissible within environmental limits in a way that allowed it to operate as an efficient and modern hub airport.

Key finding 5: Heathrow's location places constraints on the extent to which it can reasonably expand. Even with optimistic assumptions about changes in aircraft technology the quality of life impacts on large populations in West London and beyond are unacceptable. At other locations, significant growth in aviation is compatible with environmental commitments. There would be substantial economic benefits of accommodating this growth.

Conclusion (a) London does not have sufficient capacity for its future needs, and there is a strong case for accommodating the growth in aviation demand that is permissible within environmental limits at locations other than Heathrow.

9.3 Does it matter how and where new capacity is provided?

- ¹⁶³ London offers a unique concentration of air services. Although 45% of demand at the three main London airports comes from Greater London, London airports account for 60% of the UK market, which itself is one of the biggest aviation markets in the world.
- ¹⁶⁴ This demand is principally split between five airports, which between them have six runways. Together they accommodate substantially more aviation demand than any other city in the world. While each airport has a distinctive role that has developed over time, there is relatively poor connectivity between them and they do not work together as a regional hub. Economic benefits are lost as a result.
- ¹⁶⁵ Germany has a smaller aviation market but nevertheless supports two hubs (Frankfurt and Munich). Recent commercial activity by both the airport owners and the incumbent flag carriers at Charles De Gaulle and Amsterdam Schiphol has meant that the airports have taken on a 'dual-hub' role. However, while a small number of routes have consolidated, there remains considerable duplication of a large number of short and long-haul routes from both airports. A two-hub model has worked in other regions of the world such as New York: New York JFK and Newark. Despite heavy competition between the airlines on many international and domestic routes, the demand is high enough for two or more

airlines to have similar hub operations from airports serving the same urban area.

- ¹⁶⁶ None of these total markets (Frankfurt and Munich, Paris and Amsterdam, and New York JFK and Newark) are as large as the market in London. There is no independent evidence that the London and South East market is insufficient to support two hubs.
- ¹⁶⁷ The 'grey' market for slots at Heathrow, in which 'grandfather rights' are traded for up to £30m per pair, provides important context for airlines' arguments about new capacity at Heathrow and in London and the South East. It is evidence of an 'insider-outsider' market by which incumbent airlines have an interest in protecting their position at Heathrow. This suggests airlines may have strong interests at stake that are potentially at odds with the wider public interest.
- Key finding 6: The size and structure of London's air market is unique and there is no independent evidence to suggest that London is unable to support two hubs**
- ¹⁶⁸ Hub airports increase the number of possible connections, and the overall level of connectivity for all points on the network is improved. Modern hub airports can accommodate waves of arrivals and departures. This is capacity hungry as intense periods of use are required at certain times with lighter use at other times. Current capacity constraints at Heathrow limit its effectiveness as a hub because feeder flights cannot be timed appropriately and the number of runways is the most significant limiting factor.

- 169 Hubs produce a range of substantial additional benefits. They help airlines operate an efficient network and improve their capacity utilisation. They also benefit passengers and enhance the development of the wider economy they serve. They can offer journeys between points on their network they would otherwise be unable to operate, whether for economic or regulatory reasons.
- 170 A hub airport greatly benefits large airlines and alliances and many of these benefits feed through to lower prices and better services for passengers. Aircraft of different sizes can be better deployed to meet the needs of the market. Such aircraft utilisation allows for high aircraft yields through high load factors. Heathrow performs poorly as a hub. A second airport capable of supporting hub operations could help address this as well as encourage further airline alliances to choose to locate hub operations in London. These might specialise in Europe – North American long-haul markets.

Key finding 7: Building capacity at a hub airport will generate a range of significant additional benefits

Conclusion (b) The size and structure of London's air market is unique and there is no independent evidence to suggest that London is unable to support two hubs. Hub airports provide larger benefits and they spread the benefits of aviation to regions away from their 'home' market. Heathrow is the only hub airport in the UK but its capacity constraints reduce its ability to operate as a hub efficiently.

9.4 Next steps

- 171 These conclusions endorse proceeding with Part 2 of the study, and the exploration of options is underway.
- 172 All possible options, from doing nothing to building a brand new hub airport are contentious. There are many and varied interests at stake. However this difficulty reinforces the importance of identifying the options, at least in broad terms, which could meet long-term needs. The time needed between this and implementing a solution is likely to be many years. A failure to progress options for providing additional capacity risks a prolonged period of inertia in which decision makers shy away from taking action which inevitably some people will not like.
- 173 The courage to start a difficult debate should be rewarded with the benefits which proper planning can yield over time, namely the best overall outcome for all, including future generations. The Mayor acknowledges that it will require great and sustained political determination to deliver the solution

Figure 21: Proposed option assessment criteria

Objectives and Requirements	Challenge
CORE OBJECTIVE 1	Meeting the shortfall in capacity permissible within environmental limits
CORE OBJECTIVE 2	New capacity facilitates hub operations
Economic Objectives	Maximising range of destinations and frequency of service
	Improving airport reliability and quality of passenger service
	Supporting economic regeneration and tackling deprivation
Spatial Objectives	Accommodating economic and population growth sustainably, tackling inequality and improving quality of life
	Maximising London and the UK's international competitiveness and success
	Supporting easy, safe and convenient access to jobs, opportunities and facilities for everyone
Aviation Industry Requirements	Sustain London's key business markets
	Sustain London's key leisure markets
External airport Requirements	Wider benefits from associated surface access infrastructure
	Access to labour markets
	Impacts upon other areas - Quality of Life
	Impacts upon other areas - Business
Environmental Requirements	Seek compatibility with climate change and emissions targets
	Adhere to UK and EU air quality requirements
	Adhere to UK and EU noise requirements
	Minimise adverse impacts on key habitats and environmentally sensitive areas
Cost Requirement	Investment constitutes an attractive proposition to the private sector
	Airport infrastructure costs
	Surface access infrastructure costs

London increasingly needs. This work programme is intended to start the debate.

174 An important principle in this work programme is that ways of providing increased aviation capacity should be examined in a fair and open manner. For this reason a proposed set of criteria against which the options should be assessed are set out Figure 21. Two core objectives and several other groups of objectives are identified. They are based

on the vision, objectives and goals set out in the Mayor's London Plan and Transport Strategy, together with a number of basic requirements for realistic options to be likely to succeed. Background to the development of these criteria is set in Appendix D. These criteria will be finalised at the outset of Part 2 of the work programme.

- 175 This section discusses those factors which mean that substantial aviation growth is permissible within environmental targets:

Modern aircraft

- 176 The two major airframe manufacturers, Boeing and Airbus, have both made large strides in the development in new aircraft technology. The Boeing 787 'Dreamliner' and the Airbus A380 have received the most publicity. In different ways, both have revolutionised fuel efficiency. The former has been designed with weight reduction in mind: 50% of the aircraft being constructed using lightweight composite materials, and Boeing claim that this aircraft will use 20% less fuel than other similarly sized aircraft⁷⁹. The Airbus A380 has advanced aerodynamics. It is able to take off and land with lower thrust. It can seat up to 800 people (in an all economy configuration). It is the largest commercial aircraft in operation today, and if highly loaded, can boast efficient fuel burn per passenger/km flown and is competitive with other modes.
- 177 The CCC has estimated that the development of new aircraft technologies could reduce aircraft emissions by 35-45% by 2025⁸⁰.

Operational efficiency

- 178 Air traffic management can be a key factor. Improving control systems so that aircraft can fly directly to destinations, without being suspended in holding patterns, could contribute significantly to a reduction in emissions. Changes in the current systems could result in a 13% reduction in CO₂ emissions by 2050⁸¹. UK National Air Traffic Services (NATS) have made their own commitment to increase fuel efficiency by 10% while aircraft are under its control⁸², by 2020 .
- 179 The European Commission's 'Single European Sky' initiative is intended to design, manage and regulate European air space in a more coordinated fashion. It is anticipated to produce fuel efficiency savings of up to 10%⁸³.

Emissions and Bio-Fuels

- 180 The aviation industry has committed to halting the growth of harmful emissions by 2020. This target was backed by members of the International Air Transport Association (IATA) in June 2009. This is in line with an aspiration of the International Civil Aviation Organisation (ICAO) for industry-wide 'carbon neutral growth' by 2020.
- 181 IATA have asked for assistance from governments worldwide to achieve their target. It should be noted that IATA has a poor representation in the low-cost sector; for example, EasyJet, Ryanair and Southwest Airlines are not members. The ICAO believes such a target will be difficult to achieve without mechanisms restraining demand.
- 182 There is a strong prospect of a 'cap and trade' emissions regime. This is likely to offer an effective method of managing demand. In 2008, the European Parliament

voted to include aviation in the European Union Emission Trading Scheme (EU ETS) from 2012. All airlines operating within the EU, which includes airlines not registered in the EU but which are using EU airports, will be included in the EU ETS as trading entities. Allowances will be distributed to individual cargo and passenger airlines and an open trading system is proposed i.e. the airline sector can trade with all other sectors covered by the EU ETS.

- 183 The aviation sector is expected to purchase allowances from the other sectors covered by the EU ETS and use low-cost credits from other Kyoto-flexible mechanisms (e.g. funding sustainable projects in developing countries).
- 184 A closed-trading system is also being considered by the EU. Such a system could be a driver for more rapid technological change in the aviation sector but may not be politically feasible. Aviation demand growth will likely remain strong, even in the event of more rigorous environmental constraints and regimes. This view is endorsed by the Eddington Transport Study⁸⁴.
- 185 An emissions trading scheme might be accompanied by greater UK Government and European Union support for companies who are at the forefront of the research and trialling of aviation biofuels, and stronger commercial incentives for their use. Bio-fuels have been widely trialled by the aviation industry. They are currently viewed as a real long-term alternative to fossil fuel sources, despite concerns regarding their performance and sustainability.

- 186 Much attention is focussed on GHGs such as CO₂ and methane which have a direct effect. However, aircraft also emit gases with indirect effects, such as water vapour, nitrogen oxides (NO_x) and aerosols. Less well understood, their impacts are nevertheless 'enhancing' and 'upward'⁸⁵.

Figure 22: Summary of findings

Demand (mppa)	London	UK	Source
Existing	~135	~240	CAA
2030	~240	~465	DfT Unconstrained (2009)
2050	~400 (assuming 60% as per current proportion)	~700	CCC (2009) and projected DfT Unconstrained (2009)
Available capacity within existing planning permissions and operational constraints	~50 (may not be commercially desirable)		London First (2010)
Shortfall in capacity against unconstrained demand 2030	~55		Derived from the above (unconstrained - existing + available)
Shortfall in capacity against unconstrained demand 2050	~215		Derived from the above (unconstrained - existing + available)
Limit of permissible growth within 2050 environmental targets	~85		CCC

187 Figure 22⁸⁶⁻⁸⁹ presents a summary of findings from Chapters 3,4, and 6 regarding aviation demand forecasts, available capacity, and permissible growth at London’s airports.

Appendix C

Lessons from other major international airports

- 188 This section reviews different approaches to meeting air passenger growth at other cities, and key factors that have influenced their success or failure.
- 189 It is important that the future options for London's airports are considered with reference to what has been viewed in other cities. A number of cities have pursued an aviation policy of future-proofing capacity by building a brand new airport, as opposed to pursuing a 'building-block' approach to expansion, as seen in London, through the incremental addition of new terminals and runways.

Singapore

- 190 Singapore sought to develop an airport capable of being one of South East Asia's principal hubs. Changi airport was constructed, partially from reclaimed land. Phase one of the project included a terminal building and runway with 45 aircraft parking bays. Phase two saw the introduction of another runway and additional airport facilities. A second terminal was constructed later as a budget airlines terminal, able to handle 2.7mppa. Terminal three opened in 2008 and expanded the capacity of the airport dramatically from 22 to 68.7mppa.
- 191 With a third runway planned as well as a fourth terminal building, Singapore Changi is designed to accommodate long-term

growth. The Government awards a range of financial incentives to operators at the airport, to increase its attractiveness, and the airport consistently remains rated the best in the world for passenger experience.

Dubai

- 192 Dubai International (DXB) is similar to Heathrow, as it relies on the national carrier, in this case Emirates, for the bulk of its traffic: Emirates process 60% of traffic and accounts for 38% of all ATMs. Like Heathrow the feed from spoke airports is essential to sustaining a number of routes offered by the airport. In order to accommodate growth, a second airport is being built. The Al Maktoum airport will be ten times larger than the original Dubai airport. It will cost an estimated \$82bn USD, opening in phases. It is being designed to handle 160mppa and 12m tonnes of cargo per annum and may be linked to the existing airport by a 40km high-speed rail link. Emirates are seeking to offer competitive major world trunk services with an expansive network centred on Dubai.

Hong Kong

- 193 In the 1980s Hong Kong's Kai Tak airport was in a similar position to Heathrow. It was a major hub airport operating above design capacity, and constrained by runways and a confined city location (which similarly limited its hours of operation). By the end of the 1980s it had become clear that Kai Tak was wholly unsuitable

to meet the needs of Hong Kong as the city and demand continued to grow.

- 194 Planners wanted a 24-hour operation airport with room for expansion. Sites away from the city were deemed most appropriate. The island of Chep Lap Kok was selected, with the bulk of the airport to be built on reclaimed land. The new location would have the benefit of rerouting flightpaths away from one of the world's most densely populated urban areas.
- 195 Chep Lap Kok (HKIA) airport opened in 1998. It is Hong Kong's hub airport, with two runways. When it opened, it had the biggest airport terminal in the world at the time and a second terminal has since been built. Today the airport handles 46.1mppa and 3.35m tonnes of cargo per annum. Feasibility and environmental impact studies are currently underway for a third runway, which would entail further land reclamation.
- 196 Crucially, the airport was built in tandem with a fast rail link to the city. The 35km journey to Hong Kong island takes just 24 minutes. New motorway connections were also provided. Further links are provided through the SkyPier, built in late 2003, enabling a network of high speed ferries to connect the airport with major cities in Mainland China, including Shenzhen, Zhuhai, Zhongshan and Macau. Notably, airport check-in is at the port of departure and passengers can transfer through the airport without the need to pass through Hong Kong immigration.
- ## Montreal
- 197 Montreal at the start of the 1970s was at its zenith as Canada's leading commercial centre. Its hub airport at Dorval, 12 miles from the centre was facing a shortage of capacity and limited room for expansion. A grand plan for a new hub was envisioned. 400km² of land was set aside for the new airport at Mirabel, including scope for substantial future expansion. The airport would be 24 miles from the city centre, but with dedicated express road and rail links planned.
- 198 The airport was opened in 1975 but within 5 years, the context in which the airport was conceived had substantially changed. Montreal's star had slipped, undermined by the city's crippling post-Olympic debt and Quebec's newly introduced language laws. Advances in jet technology had also increased aircraft range, enabling more transatlantic flights to by-pass Montreal and serve Canadian cities further west.
- 199 The new road and rail links never materialised, leaving the airport a 50 minute drive from the city centre. Faced with substantial public opposition, the plan to close Dorval was reversed, keeping it open but restricting it from offering long-haul flights. Though some short-haul services moved to Mirabel, the majority remained at more convenient Dorval. Short and long-haul services thus were split, severely curtailing transfer opportunities and destroying Montreal's ability to serve as an intercontinental hub. The void was filled by Toronto's Lester B Pearson

airport, which today remains Canada's main hub and transatlantic gateway.

- 200 The failure of Mirabel was recognised in 1997 when long-haul restrictions were removed from Dorval. Mirabel subsequently closed to passengers, but it looks unlikely that Dorval can recapture its pre-eminent role as Canada's foremost hub airport in the short or medium-term.

Dallas

- 201 The existing airport at Love Field was approaching capacity in the early 1970s. In 1974 the new 'DFW' airport was opened jointly by the neighbouring cities of Dallas and Fort Worth, located equidistant between the two. The site has made expansion possible, though not without opposition. Today DFW boasts 7 runways and 5 terminals.
- 202 Like most major US airports, its success has been tied to the network carriers, and specifically the decision by American Airlines to establish its headquarters and main hub at DFW. This has ensured the airport's long-term success, even with the closure of hub operations by Braniff in 1982 and Delta in 2004. Today DFW is the 4th busiest airport in the United States with 27m ppa with 85% of flights operated by American Airlines.
- 203 As part of the agreement to build DFW, the city of Dallas was to restrict the services offered by much closer Love Field. Indeed, when DFW was conceived, the airlines at Love Field signed an agreement committing them to withdrawing from Love Field once they started serving DFW. However, new low-cost carrier Southwest Airlines had been established in 1971 – after the agreement was signed – serving Texan destinations from Love Field. They refused to move to DFW and were supported by the Supreme Court. Following deregulation of the US air industry in 1978, Southwest sought to offer flights to Love Field from outside Texas. Fearing that this would seriously undermine DFW, the Wright Amendment was passed by Congress, restricting Love Field to flights to Texas and four neighbouring states, except for planes with a capacity of 56 passengers or less.
- 204 Though this situation has remain largely unchanged, the wrangling and legal challenges continued until 2006 when American, Southwest Airlines, DFW airport and the two cities agreed to support repeal of the amendment in exchange for several conditions, one of which reduces Love Field's gate capacity, limiting its potential in the future to abstract traffic from DFW.

Washington Dulles and Baltimore Washington International

- 205 Washington Dulles (IAD) and Baltimore Washington International (BWI) have marked hub characteristics and are approximately 35 miles apart. Both process a similar number of passengers per year, over 20m ppa in 2009. Unlike New York, both airports focus on different markets. IAD is the international hub for Washington

DC, serving many worldwide destinations. The only international routes replicated at both IAD and BWI are to Heathrow and Toronto. BWI is a hub for Southwest Airlines and Air Tran, both of which are Low Cost Carriers, whereas IAD is a hub for United and hosts other 'full service carriers' such as KLM, Lufthansa and Air France. A third Washington airport, Ronald Reagan National (DCA) is a domestic hub for United and as well as Delta on a smaller scale.

Berlin

- 206 Following the fall of the Berlin Wall, the city was left with three medium-sized airports, each providing good access to the city but none equipped to meet forecast growth nor designed to serve as a hub. As the united capital of a united Germany, the city saw an opportunity to develop a major hub airport, with a view to the economic benefits that would bring for the city and wider region.
- 207 Berlin Brandenburg Airport (BBI) is under construction on a site adjacent to the existing Schönefeld airport, and is scheduled to open in 2012. The smallest airport, Tempelhof, closed in 2008, whilst Tegel will also close by 2012 at the latest. Schönefeld's existing facilities are to be supplanted by those of the new two-runway airport. The new airport has involved the relocation of two entire villages, as well as new sections of motorway and railway, the latter connecting the airport to the high speed rail network, and to Berlin's main station in just 20 minutes.

- 208 There have been problems in identifying uses for ex-airport land. The Tempelhof site was the subject of much wrangling – and it was a year after its closure that a permanent use was agreed, as a city park. An estimated EUR 60m is to be spent developing the park between 2010 and 2017. The future of Tegel is still being determined, but likely to include an eco-industry park, housing and a nature reserve.

Munich

- 209 As early as 1963, the city recognised that its existing Riem airport would reach capacity and that its further expansion would be politically difficult. A site 18 miles away from the city was selected in 1969. However, local opposition to the plans, which included demolition of a village, meant construction did not start until 1987, finishing in 1992.
- 210 Munich airport was very much built with future growth in mind, but its fortunes were transformed by events at rival Frankfurt Airport. Frankfurt had long been flag carrier Lufthansa's main hub but by the mid'90s it was facing severe capacity constraints and plans for a third runway had met with stiff resistance. In order to maintain growth and reduce reliance on developments at Frankfurt, Lufthansa took the decision to develop Munich as a second hub. With Lufthansa building up both its short- and long-haul network, Munich entered the list of top ten European airports for the first time in 1997 and a year later agreement was reached on construction of a second terminal, exclusively for Lufthansa and

its partners, 40% owned by Lufthansa. The terminal was completed in 2003 and plans for a third runway and a terminal extension are already in the pipeline.

- 211 From 12m passengers in 1992, it has become Lufthansa's second hub, numbers almost doubling to 23m in 2000, overtaking Dusseldorf. It has continued to grow, reaching 35m in 2008, and now boasts more destinations served than London Heathrow.
- 212 New road and rail connections were built for the airport, with the latter served by regional (stopping) trains, taking 45 minutes to reach the city. Plans for a 'Transrapid' maglev link to the airport (envisaged journey time: 10 minutes) were ultimately rejected on cost grounds.
- 213 Also worth noting is the transformation of the former airport site at Riem. After a four-year hiatus during which the site was "Europe's largest party zone", development began including a new Congress and Exhibition Centre, a shopping centre, eco-residential districts, new technology business parks, a lake and a series of parks and woodlands – hosting the prestigious National Garden Festival in 2005. The metro has also been extended to serve the site.

Milan

- 214 Milan has two main airports, Linate and Malpensa. The former, just 5 miles from the city, historically served destinations in Italy and Western Europe. Malpensa, 25 miles from the city, served Eastern European and long-haul destinations. In the 1990s, the city recognised the need for increased airport capacity and the "Malpensa 2000" proposals were drawn up, including a brand new terminal and second runway and new fast rail link to the city with flights from Linate gradually phased out. The process was fully supported by Alitalia who identified the new Malpensa as its future main hub, with Rome Fiumicino to play a secondary role.
- 215 The new Malpensa hub terminal was inaugurated in 1998, with a 30 minute rail link, but remained less attractive compared Linate, closer to the city centre. As a result, Linate was not closed, but instead restricted to domestic flights, enabling Alitalia to use it to feed its Rome hub. This drew a legal challenge from rival flag carriers forced to use Malpensa; their claims were upheld and Linate's route network was fully restored, undermining Malpensa's ability to function as Milan's principal hub airport.
- 216 Alitalia continued to operate intercontinental hubs at both Malpensa and Rome Fiumicino until its collapse and re-establishment in 2008. This finally brought about a decision for the airline to focus on a single hub – with Rome winning out, in part due to the complications that arise from Milan's two airports. Alitalia have now all but completely pulled out of Milan Malpensa, cutting

two-thirds of flights, triggering a 20% fall in passenger numbers at the airport. The vacuum has been partially filled by foreign carriers, most notably EasyJet and Lufthansa who have both established short-haul bases at the airport. Nonetheless, the airport has been damaged, with plans for a third runway on hold and the hub aspirations that accompanied Malpensa 2000 a distant memory. The airport today captures only 38% of air traffic in Northern Italy, compared to 50% in 1998.

Paris

- 217 The two Paris airports, Le Bourget and Orly, both in suburban locations, were witnessing rapid growth in the late twentieth Century. Once it was recognised that they would soon reach capacity, a decision was taken to build a new hub airport 16 miles northeast of Paris. The site was chosen for its lesser localised environmental impacts, and potential for future expansion. The new airport, Paris Charles De Gaulle (CDG), opened in 1974 and has grown considerably, overtaking Frankfurt in 2004 to become Europe's second busiest airport with 58m passengers in 2009. This has been helped by its four runways which give it a considerable operational advantage over both London Heathrow and Frankfurt.
- 218 When a new high speed bypass rail line was built to the east of Paris in 1994, it was routed through a station in the heart of the airport, offering daily connections to most major French cities, as well as Brussels. There is also a suburban rail service to Paris, taking 30 minutes, but there is a proposal to build a dedicated express rail line to the airport by 2016, cutting the journey time to 20 minutes.
- 219 Following the opening of CDG, Le Bourget was closed to international flights in 1977 and all scheduled services in 1980 and is now only used by business jets. It also hosts the French Air and Space Museum as well as the Paris Air Show every other year. By contrast, Orly has remained open, but with dominant state-owned Air France moving the majority of its flights to CDG and rivals following suit, Orly specialises in certain routes; in particular those to the French regions and French overseas territories. Restrictions imposed on the number of slots at Orly combined with a slot allocation system that favours incumbent airlines, Air France in particular, has ensured that new rivals – such as EasyJet – have been frustrated in their attempts to build a sizeable network from Orly that might challenge CDG.
- 220 Recent commercial activity by both the airport owners and the incumbent flag carriers at Charles De Gaulle (CDG) and Amsterdam Schiphol (AMS) has meant that the airports have taken on a 'dual-hub' role. However, while a small number of routes have consolidated, there remains considerable duplication of a large number of short and long haul routes from both airports.

Tokyo

- 221 In the early 1960s, the city's main hub at Haneda on the shores of Tokyo Bay was reaching capacity. The perceived difficulties of land reclamation and the possible hindrance to the development of the Port of Tokyo meant the government ruled out expansion, in preference for a new airport, and a site was found 36km east of the city at Narita. Following publication of the plans in 1966, there followed one of the fiercest anti-airport campaigns ever witnessed which included riots and occupations and a special emergency statute was even enacted to stem the unrest. In the face of the opposition, the five planned runways had become three, of which only one had actually been built by the time Narita airport finally opened in 1978.
- 222 Similarly, plans for a high-speed rail link to the airport were shelved with only some of the necessary land having been obtained. Other train services were provided, but offering a fastest journey time of one hour to Tokyo, and usually longer by road due to traffic. Only in 2010 was that improved with the construction of a new line linking city and airport in 36 minutes.
- 223 Following the opening of Narita, Haneda was restricted to serving domestic destinations only. As the Japanese economy soared, demand at Narita grew quickly, placing strain on its single runway and terminal. The Japanese Government remained nervous about pursuing expansion. By 1992, Narita was the then busiest single-runway airport in the world, handling 22m passengers a year against its 13m design capacity. The need was ultimately recognised. In December 1992, a second passenger terminal was opened. A new runway followed in 2002, and while it was initially too short to accommodate the largest aircraft, it was extended in 2009.
- 224 While Narita suffered capacity constraints, alternatives were sought. Expanding Haneda was revisited. Tokyo city had started using Tokyo Bay for landfill on which the airport could expand, and new runways and terminals were built. In 2010 a fourth runway and a third terminal dedicated to international flights opened, paving the way for the return of international service to Haneda, but with government-imposed restrictions on slots and operating hours.
- 225 What the future holds for Narita will depend on the extent to which restrictions on international flights at Haneda are maintained. The government is also understood to be investigating options for a new relief airport, possibly on an artificial island in Tokyo Bay.

Osaka

- 226 The city's Itami airport was located in densely populated suburbs, limiting expansion potential and restricting the airport's operation, including a ban on flights after 9pm. Faced with growing public concern about noise and air pollution, planners began work in the 1970s on a new airport. Following the protest that surrounded the land expropriation needed for Tokyo's new Narita airport, an offshore location was chosen which could permit 24-hour operations. The new Kansai airport was seen as key to revitalising the region, enabling it to better compete with Tokyo.
- 227 Construction commenced in 1987, though as a pioneer of offshore airports, it was not without its difficulties, ultimately costing around USD\$20bn. The airport, opened in 1994 and has a single 1.1 mile-long terminal, 2 runways as well as a road/rail bridge to the mainland.
- 228 The old Itami airport was to be closed, but local concerns about the economic impact meant the airport was retained, albeit restricted to domestic flights only. Further restrictions at Itami were imposed in 2006 with a ban on aircraft with more than two engines, and other Government measures are being considered to ensure Kansai airport's viability.

Appendix D

Core objectives

- 229 Chapters 5 and 6 present evidence that shows that airports in London and the South East are already experiencing a shortfall in capacity. Aviation demand is forecast to remain strong, even in the event of more rigorous environmental constraints and regimes. Capacity shortfalls will get worse.
- 230 Unconstrained demand is forecast to outstrip capacity at airports in London and the South East by approximately 130mppa in 2030 and 200mppa in 2050. Environmental targets reduce this growth to 85mppa by 2050.
- 231 Chapter 2 of this report outlines the consequences of capacity constraints for London:
- Lost business productivity and economic benefits associated with connectivity to a maximal range of destinations and service frequency.
 - Increased susceptibility to delays and disruption and deterioration in the airport experience a reduction in the competitiveness of London relative to, and to the benefit of, other cities and nations.
 - Reduced flights and journey opportunities
- 232 Therefore, the first core objective is meeting the emerging shortfall in capacity permissible within environmental limits. This is an issue that requires a solution. The Government will properly wish to consider various ways of solving this problem.
- 233 London and the UK must plan to meet future aviation growth and maximise the benefits of doing so, in a way that meets a number of economic objectives and other requirements.
- 234 The second core objective is that the new capacity is provided at a hub. The reasoning behind this objective has been set out in chapter 8 of the report.
- 235 Core objective 1 will be applied to all the options that have been identified in stage 1. All the options meeting core objective 1 will then be progressed to stage 2, where they will be tested against core objective 2 as well as a number of other objectives which are set out in the remainder of this chapter.
- 236 Core objective 2 is that the shortfall in capacity is met at a location that facilitates airport operation as a major hub. Hub airports provide larger benefits and they spread the benefits of aviation to regions away from their 'home' market. The results of this assessment are to be outlined and discussed in Part 2 of the report.

Economic objectives

- 237 Three principal economic objectives are identified. The importance of aviation to the London and UK economy is discussed in chapter 2, whilst the limitations of the current situation are outlined in chapter 6. The economic objectives seek to recognise these arguments. These include the need for excellent connectivity and world-class airport facilities which act as a gateway to the city and the regional benefits associated with servicing an airport.

Spatial objectives

- 238 Three principal spatial objectives have been identified. Appropriately located airport expansion has the potential to support a growing population and a growing economy. Airports can provide a strong economic

anchor, distributing wealth and opportunity across a large area. Airports require substantial supporting infrastructure, but the benefits can be distributed regionally.

Aviation industry requirements

- 239 Two principal aviation industry requirements are identified. The aviation industry has a clear preference for hub airports due to the efficiencies they bring. This has been described in chapter 8 and has already been captured in core objective 2. However, the aviation industry does have other requirements when considering additional airport capacity in the South East. These include that any locations and operating models selected should be able to sustain London's key business and leisure markets.

Access requirements and external dependencies

- 240 Five access and external dependency requirements are identified. This set of objectives aims to evaluate the options away from the actual airport itself. It therefore considers the wider benefits from the surface access network, the costs of which are considered later. It also asks whether there is a sufficient local workforce to serve the airport and whether airport development is in areas which require regeneration. Finally it considers what impacts the options might have on other areas of the country.

Environmental requirements

- 241 Four principal environmental requirements are identified. The impacts of aviation on the environment are both global; with regards to emissions and climate change,

and localised. These impacts must be balanced against aviation's social and economic benefits. Environmental impacts are subject to tight legislation and adverse impacts must be minimised and mitigated. These are discussed in Chapters 3 and 4. In addition, the expansion of existing airports and construction of new ones also generates significant impacts that must be considered upon locally sensitive environments such as sites of historic or cultural significance, and water and marine environments.

Costs and financing

- 242 One financial objective and two additional cost criteria form the last objectives:
- 243 It is important to identify an indicative cost estimate for both the airport infrastructure costs and the associated surface access costs. Any investment that takes place at existing airports has to be funded by the private sector and recovered from a range of aeronautical and non-aeronautical revenue sources. New aviation capacity must be attractive enough to secure private funding with the minimal need for taxpayers money. It is essential that expansion opportunities offer an attractive proposition to the private sector.
- 244 The Middle East and China offer clear examples of where Government intervention and funding enables airports to generate and accommodate massive growth in passenger numbers.

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