Airports Commission Discussion Paper 01: Aviation Demand Forecasting

Heathrow Airport Limited Response

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This document is Heathrow's response to the Airports Commission's Discussion Paper 01 on Aviation Demand Forecasting. This response addresses the three issues at paragraph 1.4 of the Commission's paper, namely: patterns of domestic and international demand for air travel; the competitive landscape for air travel; and, dealing with uncertainty. It also seeks to comment on a number of other issues raised in the Commission's paper and ends by specifically answering the 16 questions set out at paragraphs 6.4-6.5 of the Commission's paper.

Contents

Overview

Heathrow supports the Government's vision for 'dynamic, sustainable transport that drives economic growth and competitiveness' and welcomes the opportunity to contribute to the Airports Commission work to identify how to maintain the UK's position as Europe's most important aviation hub.

The UK has been home to the world's largest port, then international airport, for the last 350 years. Heathrow is the UK's only international hub airport, a national asset, providing the connectivity that has supported the UK's leading position in the world economy. Heathrow handles more international passengers than any other global hub. The Heathrow hub provides the UK with the vast majority of its intercontinental connectivity, with direct connections to 77[1] destinations not available from any other UK airport. Over 90% of the South East's long-haul passengers travelling for business fly from Heathrow[2].

However, Heathrow is already operating at its permitted capacity. The Department for Transport (DfT) forecasts indicate that by 2020 there will be 11m of un-served passenger demand at Heathrow and 28m by 2030[3]. More hub capacity is urgently needed and whilst longer term demand forecasts are inherently uncertain, the more immediate demand case for a three runway hub is very clear. The longer term forecasts also show that any potential demand case for a fourth runway is highly uncertain and may not materialise.

Heathrow believes that the DfT forecasts provide a good high level estimate of future passenger demand. However, there are two important areas in the model's approach to allocating traffic between UK airports that need strengthening. Firstly, it must take account of network or hub economics and secondly it must properly account for transfer passengers.

The DfT forecasts incorrectly assume that with Heathrow constrained, long haul demand, and to an extent transfer demand, will get picked up at other UK airports. In practice, network economics and the related airline business model, make this highly unlikely. Instead overseas hubs and economies are the beneficiaries. The issue is leading the UK Government to underestimate the very pressing nature of the hub capacity constraint and its damaging impact on UK intercontinental connectivity. With weaker connectivity comes lost trade opportunities. Frontier Economics estimates that the UK may already be forgoing trade worth £14bn p.a., 0.9% of UK Gross Domestic Product (GDP)[4]. Once lost, these opportunities are much harder to recover as relationships, systems and investments become more entrenched elsewhere.

Similar to the DfT, Heathrow forecasts constrained traffic growth of ~0.5-1% p.a. at the UK's hub, with growth slowing as the hub capacity constraint tightens. This low level of growth reflects the reality that Heathrow is already operating at over 98% of its 480k Air Traffic Movement (ATM) cap. Heathrow's unconstrained central case forecast for hub demand growth to 2030 is 2.4% p.a. This is close to the DfT forecast for Heathrow for the same period. Other reputable forecasters also anticipate long run growth of 2% to 3.5%[5, 6, 7]. Heathrow regards any forecasts to 2050 to be too uncertain to be a reliable planning tool at this stage.

Whilst the UK is already suffering from hub capacity constraint, the current political and planning landscape means that it will likely be 2024 before significant additional hub capacity could be operational in the UK, with Heathrow being the location where this can be delivered the quickest. By 2024 the UK's hub will have been capacity constrained for two decades and a significant proportion of the un-served hub demand will have been lost, either for good, or for the very long term until it can be recaptured. Overseas governments, airlines and hub airports, such as Dubai and Istanbul, are already making major investments that exploit the UK's hub capacity constraint. As a result, Heathrow anticipates that adjusted unconstrained hub demand will be somewhat lower than forecasts might suggest. It is important that the Airports Commission's assessment of need for additional hub capacity does reflect that some hub demand will have been lost by the time new capacity is in place to serve it.

The UK has an urgent need for hub capacity to meet continued growth in hub demand and UK connectivity needs. Heathrow looks forward to supporting the Airports Commission in evaluating how to maintain and improve the UK's position as Europe's most important aviation hub.

1. The role and importance of the hub for aviation demand

The hub is critical for connectivity and the UK economy

1.1 Heathrow supports the Government's key objective 'to ensure that the UK's air links continue to make it one of the best connected countries in the world'.

1.2 The UK government is right to be concentrating on hub capacity as connectivity enables trade, foreign direct investment and jobs. Research by Frontier Economics found that a lack of capacity at Heathrow airport might already be costing the UK economy as much as £14 billion a year in foregone trade[8]. Wider analysis of Dutch trade following the opening of a new runway at Amsterdam's Schiphol Airport suggests that significant growth in trade follows new direct flight connections. For example the new capacity was used to enable new direct connections to 15 countries. Five years afterwards, Dutch exports to those countries saw a trade growth outperformance of 26% more than comparator countries, representing $1bn p.a. in additional Dutch exports[9].

Mix of passenger demand at hub and point-to-point airports

1.3 In order to deliver against the Government's objective, it is important to distinguish between hub demand and the wider demand handled at point-to-point airports. Heathrow has summarised the defining characteristics of a hub airport and the urgent need for more hub capacity at a single UK hub in a recent report "One hub or none", found at the link below:

Link to 'One hub or none'.

1.4 In 2011, Heathrow handled 69m passengers, around 31% of all UK traffic[10]. As the UK's hub airport, Heathrow has a very different mix of passengers than other UK airports. This is illustrated at Figure 1 below. The distinct mix of passengers at Heathrow can be referred to as "hub demand", being: transfer passengers, long haul network passengers and short haul point-to-point passengers reflecting a strong business mix. All other UK airports are overwhelmingly point-to-point. 66% of Heathrow's passengers are either transfer passengers or long haul. This is in marked contrast to the 12% at Gatwick, and 6% at airports outside the South East. Different types of passenger demand require different services and consequently direct long haul and transfer passengers (key components of hub demand) are only really observed at Heathrow.

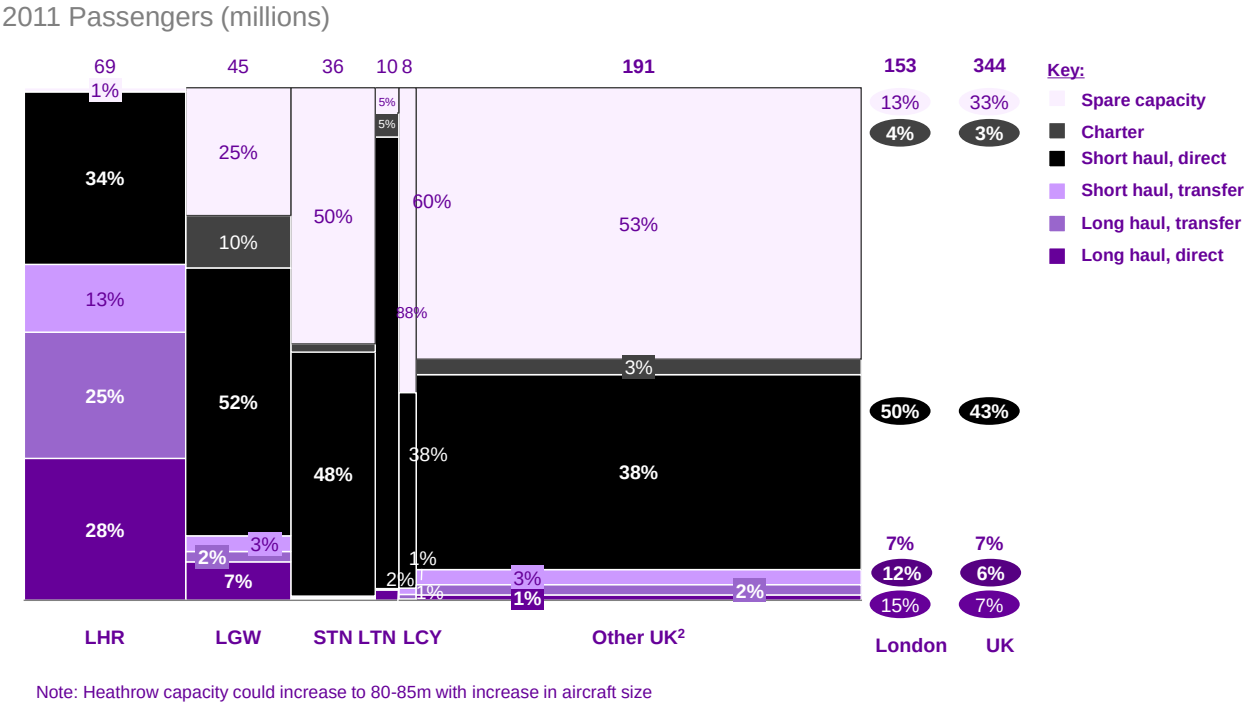
1.5 The nature of Heathrow's short haul point-to-point passengers is also different from that observed at point-to-point airports. 41%[11] of them are travelling for business versus 17% at Gatwick and 15% at Stansted and Luton. This difference is because business passengers prefer the better frequency and timing of services at hub airports, the network of primary airports that hubs tend to connect with, the proposition offered by full service network carriers as well as the airport facilities e.g. business lounges and better surface access. The higher prices typically paid by these business passengers helps to secure the viability of a short haul route and enable network airlines to carry the transfer passengers that in turn make their long haul networks viable. The hub model involves a mix of transfer, long haul and short haul demand which are interdependent. It is a necessary mix which makes economic sense for competing network airlines. Splitting the components of this hub demand between different airports would render a hub un-viable and result in the UK's connectivity and global hub status being diminished.

1.6 As the Commission's paper recognises, the DfT allocation model does not appropriately recognise this "hub demand", instead treating all types of passengers as a commodity that can be handled at any airport. We make suggestions on how this issue can be addressed in Section 4 and Section 8 (below).

1.7 **Primary implication of hub demand for hub capacity:** The Airports Commission needs to distinguish between the need to meet hub demand and the need to meet overall demand,

including point-to-point, and identify the airport capacity needed to maintain hub status as opposed to meeting South-East demand in total.

Figure 1- UK aviation passenger traffic and capacity, 2011[12]



Note: Heathrow capacity could increase to 80-85m with increase in aircraft size

2. Patterns of domestic and international demand for air travel

2.1 In the coming decades, the UK will need new connections to cities in the East – and particularly China – while maintaining connectivity to the West. Demand for connections to cities in the East is being driven by two significant trends. Firstly, the economic centre of the world is pivoting east. East Asia's share of global GDP is forecast to increase from 15% today to 26% by 2030. Secondly, the world is urbanising, by 2030 55% of global GDP will be concentrated in 600 cities, 200 of which will be in East Asia. This is likely to drive demand for new long-haul routes from the UK to the East to support trade and tourism[13].

2.2 London is exceptionally well placed to compete in the global race for economic success. Jim O'Neill, the Goldman Sachs economist who first recognised the importance of the BRIC (Brazilian, Russian, Indian and Chinese) economies, identifies London as being the global city that stands to benefit most from the 21st century being the Asian Century. He identifies key reasons why London should be the capital of the BRICs: time zone, language, geographic position, legal system, open for trade, and international talent[14]. However, European hubs are stealing a march on the UK in connectivity to the East – boasting 2,200 more flights to mainland China than Heathrow each year[15]. To realise this growth opportunity the UK needs the intercontinental connectivity that can only be delivered by a world leading hub airport. UK and international transfer passengers are vital to supporting the hub.

2.3 North American routes will continue to be critical. North American GDP is set to increase by 50% by 2030, and the region will remain one of the largest economic regions globally. New York is predicted to be the city with the third highest GDP globally in 2025 (the only city in the top ten outside of China)[16]. Given historic ties and trading links, connectivity to the West will continue to be very important.

2.4 **Primary implications of demand patterns**: The UK should not choose between connectivity to the West and connectivity to the East; it needs both, urgently. It will be important to establish and grow the number of direct connections from the UK to these Asian growth markets at the same time as building on the existing strength of our North American connectivity. This can only

be sustainably achieved at the UK's hub airport, with the support of the transfer passengers that network airlines supply.

3. The competitive landscape for air travel

Heathrow faces strong competition from European hubs and emerging hubs in the Middle East

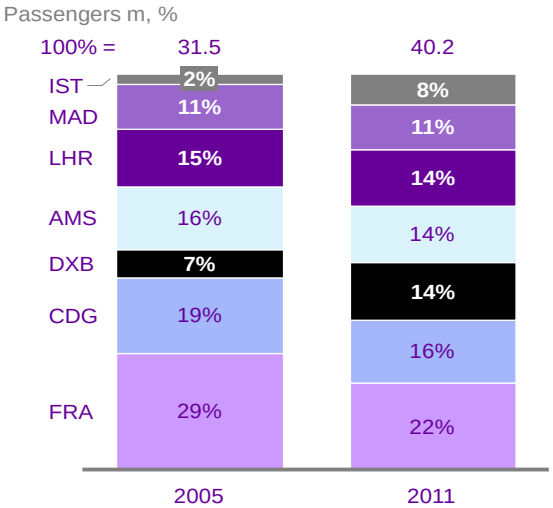
3.1 Heathrow faces increased competition for hub traffic from the other European hub airports – Frankfurt, Amsterdam, Charles de Gaulle, and Madrid. Unlike Heathrow, each of these airports has spare capacity to expand and serve more passengers. Since 2005, while Heathrow's passenger volumes have increased by 1% p.a., passenger traffic at these competitor hubs has increased 1-4% p.a.[17].

3.2 In addition, Dubai and Istanbul are developing major new hub airports on Europe's border and are taking a greater share of European international passengers from European hubs. Dubai is creating a 6 runway hub and is forecasting an increase in passenger volume to almost 100m p.a. by 2020[18] (45% bigger than Heathrow today). Almost half of passengers using Dubai are transfer passengers (a key component for a hub to thrive), and Dubai is attracting these passengers from Europe. Istanbul has similar aspirations, with the creation of a new 5-6 runway hub[19].

3.3 Dubai and Istanbul pose a real and growing threat to the future connectivity of a constrained Heathrow and the other European hubs. Heathrow has managed to broadly hold its share of European transfer traffic among the major hubs at around 15% since 2005 (see figure 2). However this will become more challenging as the capacity constraint further tightens. 1.4m passengers from UK regions are now bypassing the constrained Heathrow hub, and using Dubai and Istanbul instead[20].

3.4 This need not be the case. Heathrow's geographic location positions it well relative to other hubs for European - Asian traffic flows. For example, it is 900 miles further to fly from Beijing to Zurich via Dubai than via Heathrow[21]. The same Beijing to Zurich journey is a very similar distance if you were to fly via Istanbul, Paris or London. To maintain UK's global hub status, passengers need to be encouraged to connect via Heathrow instead of other non-UK hubs.

Figure 2 - Passengers travelling to or from Europe transferring via an EU or Middle Eastern hub[22]



3.5 Competitor hubs are also benefiting from political support of government and expansionary ambitions of the national airline. In Amsterdam, the government is clear that the airport, and the connectivity it provides, is a critical part of the economy. In Dubai, Emirates is rapidly expanding its fleet to grow and provide the passenger traffic to fill the new airport. Meanwhile Turkish Airlines is creating new routes and connections, with the support of the Turkish government, to become 'a major global player' in air transport.

Network airlines will continue to consolidate

3.6 Recent years have seen Lufthansa, Air France and IAG make acquisitions and enter into joint businesses. British Airways acquired bmi, and Virgin is planning to establish a joint business with Delta. Lufthansa now operates 65% of the ATMs at its home hub, Frankfurt. Air France now has 58% of the ATMs at its home hub, Paris Charles De Gaulle, and British Airways now has 51% of the ATMs at Heathrow[23]. This consolidation amongst network airlines is expected to continue globally. The impact of airlines in the UK operating in a competitive European and increasingly global, rather than purely British, marketplace can be seen already. Airlines have increased choice between UK and non-UK hub airports. UK aviation policy must be designed to encourage investment from globally integrated carriers, particularly our home based network carriers, who have many choices in how and where they operate.

The number of hub airports in Europe will reduce

3.7 There is clear evidence from North America and Europe that the role of different airports, in line with airline consolidation, is changing over the longer term. Long haul connectivity has been concentrating in the larger hub airports. Europe's ten largest airports each added an average of 12 network long haul routes (net) since 2003 whilst the rest of Europe's 25 biggest airports added an average of only 1 network long haul route each over the same period[24]. This demonstrates network economics and the market taking effect after government actions to liberalise aviation e.g. via Open Skies. In another 30 years, it is likely that there will be fewer, larger hubs across Eurasia – not all of the five major EU hub airports are expected to survive as major players over the longer term. London must retain one of them if it is to maintain its status as a global hub. The UK Government's aviation policy should support this objective without delay.

Point-to-point airports continue to be valuable for UK capacity, but are not a substitute for the hub

3.8 London and the UK have benefited from a highly effective combination of airport types: a leading global hub providing global connectivity, and numerous point-to-point airports providing local catchments with excellent connections to Europe and a handful of long haul holiday destinations. This combination provides a significant competitive advantage for the UK and also provides UK passengers with very competitive airline services.

3.9 The DfT forecasts show that the Heathrow hub is already operating at its permitted runway capacity. A third runway at the UK's hub is clearly needed now. The forecasts also indicate that the South East's point-to-point capacity will become full in the not too distant future, with Gatwick full by 2020 and the other point-to-point airports full by 2030. This position is somewhat overstated as a result of Heathrow being at capacity and the DfT's subsequent assumption that hub demand will be spilled to point-to-point airports. If there were a new runway at Heathrow then it would be much later than 2030 before the South East's point-to-point airports become full. However, with the significant lead time required to plan and construct any new runway, the Airports Commission should also recognise the longer term need for more capacity at one of London's point-to-point airports in order to meet anticipated growth in short haul point-to-point demand.

3.10 Heathrow primarily competes with overseas hubs, as opposed to other UK airports. Passenger purchase decisions are the most important measure of the competitive environment in UK aviation. Passengers tell us that hubs continue to play a very different role to point-to-point airports. According to CAA (Civil Aviation Authority) passenger surveys only 13% of Heathrow long haul passengers consider Gatwick as an alternative airport option, with even fewer considering other UK airports an alternative (see figure 3). This perspective is even more marked for transfer passengers. Indeed, of the passengers transferring through Heathrow, only 7% consider Gatwick as even their second preference, with competitor hubs in Amsterdam,

Paris and Frankfurt being the second airport preference for most passengers transferring at Heathrow[25] (see figure 4).

3.11 The perspective of passengers is unsurprising given the services offered at respective airport types. For example Heathrow offers regular daily services to 67 long haul destinations whilst Stansted, Gatwick, Birmingham and Manchester offer only a handful of scheduled long haul destinations outside of traditional holiday destinations[26]. Instead these point-to-point airports offer local catchments an extensive and valuable short haul network and charter type services to long haul leisure destinations.

Figure 3 - UK alternatives for Heathrow long haul passengers[27]

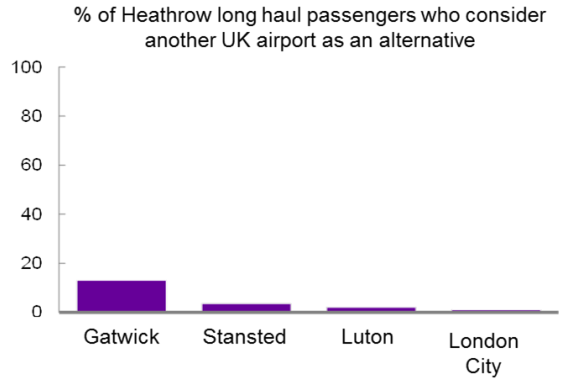
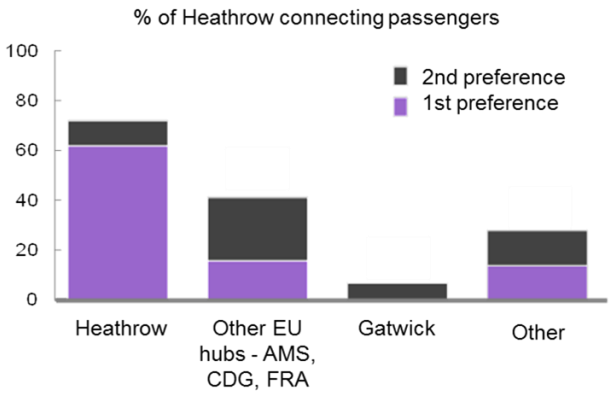


Figure 4 - Airport Alternatives for Heathrow transfer passengers[28]



3.12 The perspectives of airlines are equally as informative as those of passengers. In its assessment of Heathrow's market power in 2012 the CAA summarised airline's perspective of Heathrow's position in the market as follows:

Home based carriers: *"British Airways and bmi said that Heathrow is the only viable airport from which to operate a hub operation. In addition, Virgin said that Gatwick can be considered a substitute for Heathrow for leisure passengers to a limited extent, but not at all for business passengers."*

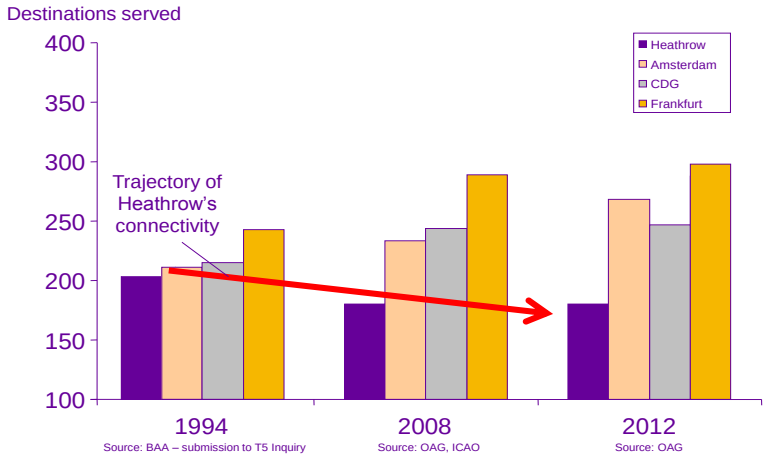
Inbound carriers: *"The inbound carriers responding to the survey were consistent in stating that they do not consider another London airport as a viable substitute... Air Canada, SAS, Swiss and TAP all said that no other London or BAA airport represented a viable substitute for Heathrow, citing reasons including the premium yields and connecting passenger feed available, and the cost of replicating existing infrastructure investments at the airport"* [29].

3.13 Airline and passenger perspectives were key contributors to the CAA's finding in 2012 that *"Heathrow's position of Substantial Market Power (SMP) stems from its strong market position as a hub airport with airline network operations, a lack of viable substitutes, and its strong position for long-haul services. However, the nature of airline economics at Heathrow means that the airport's SMP extends also to surface and connecting passengers, short-haul services, and to the airport's operations overall"*[30].

The constraint at Heathrow means UK connectivity is falling behind other EU hubs

3.14 Heathrow is also falling behind other European hubs in terms of the overall number of destinations it serves. Consequently the UK's connectivity has weakened over the last two decades as capacity constraints at Heathrow have started to bite. Going forward this decline will be more marked amongst long haul destinations which require the support of a hub to be viable.

Figure 5 - Destinations served from Heathrow has declined versus competitors[31]



3.15 Analysis by Frontier Economics suggests that, if it had spare runway capacity today, Heathrow could immediately serve the following destinations:

- Five daily flights to emerging market long haul destinations (Caracas, Lima, Santiago, Bogota and Manila).
- Eight additional long haul emerging market destinations with lower service frequency (Hanoi, Ho Chi Minh City, Cancun, Jakarta, Dammam, Chengdu, Nanjing and Cali).
- At least weekly services to 30 other long haul destinations (in developed and emerging markets)[32].

3.16 In contrast there are numerous examples of failed long haul services from other South East airports, with those failures driven by the commercial reality of airlines' network economics, which requires transfer passengers to support long haul services. Examples include:

- Hong Kong Airlines to Hong Kong from Gatwick: launched the service from Gatwick in March 2012 and ended it in September 2012[33].
- Korean Airlines to Seoul from Gatwick: launched in Apr 2012 and suspended in Jan 2013[34].
- Air Namibia from Gatwick: started Windhoek - Gatwick operations in 2005. Suspended the service in May 2009[35].
- Etihad from Gatwick: started to Abu Dhabi in Sep 2004, withdrew in March 2007[36].

3.17 **Primary implication of the competitive landscape:** If the UK wishes to stay in the top tier of connected global countries, it urgently needs more hub capacity at the UK's hub airport, Heathrow.

4. Opportunities to strengthen the DfT passenger forecast model

4.1 Heathrow believes that the DfT model provides a good basis for forecasting constrained and unconstrained air passenger demand. However, there are areas where we believe the model should allocate demand more appropriately and areas where it should forecast unconstrained demand more effectively.

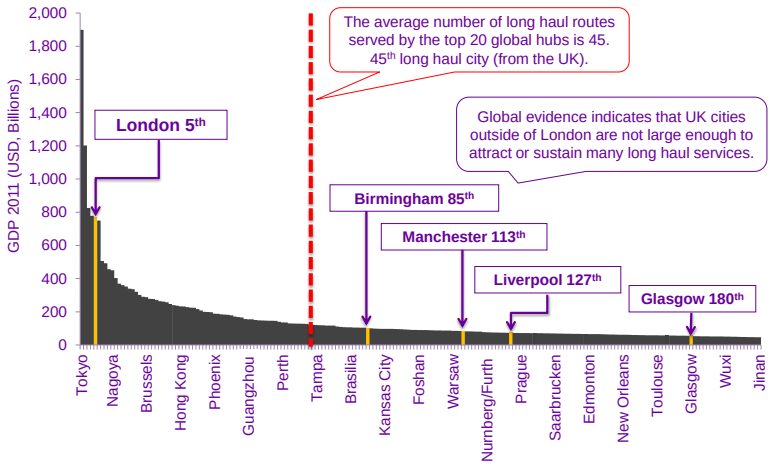
4.2 In respect of the National Air Passenger Allocation Model (NAPAM, the DfT's allocation model), we raise two key issues. Firstly, the Commission's paper correctly recognises the NAPAM's limitations in only partially including 'international transfer passengers connecting via a UK hub' and wholly excluding 'international transfer passengers connecting via an overseas hub'[37]. These two streams represent important potential traffic for a hub airport. Although they do not represent passengers destined for the UK, they nevertheless play a vital role in building connectivity and route frequency to the benefit of international passengers who are destined to the UK, and UK passengers travelling abroad.

4.3 The NAPAM allocates traffic between UK airports, subject to capacity limitations and service availability, on the basis of a number of variables estimated to reflect passengers preferences for different airports. The NAPAM's use of a multinomial logit model is entirely appropriate to do

this. However, there is a fundamentally important relationship missing between the volumes of passengers (including international transfer passengers referred to above) on an airport's individual routes, and the airport's overall route availability – in other words the self-reinforcing effect of network economics at a hub. International hub airports are able to add new destinations 'one on another', and equally are at risk of deteriorating when multiple routes are lost. The importance of this in terms of the DfT's model is that, without this relationship, the forecasts from the DfT's model will over-estimate the viability of long haul routes at point-to-point airports.

4.4 Consequently whilst the DfT forecasts assume that with Heathrow constrained, long haul demand, and to an extent transfer demand, will get picked up at other UK airports, in practice network economics and the related airline business model, make this highly unlikely. The availability of the much wider pool of demand at hub airports, particularly transfer passengers, enables airlines to operate long haul services with better passenger loads at better prices. Without the support of a major hub it is very difficult to make a long haul service viable and even for major hubs it is challenging to make large numbers of long haul routes viable. Global evidence shows that the world's 20 largest airports are only able to sustain regular flights to an average of 45 long haul network destinations each[38]. Only 6 of these hub airports are able to operate regular flights to more than 50 long haul destinations. Given this context, if we consider that Birmingham, the UK's second biggest city by GDP, is ranked as the 85th largest city globally[39], we might recognise that airports like Birmingham, Gatwick and Manchester have already "over-achieved" by establishing the handful of long haul network services they currently have.

Figure 6 - The world's 200 largest cities by GDP in context with long haul connectivity[40]



4.5 Instead of the DfT's assumed displacement of long haul traffic from the hub to UK point-to-point airports, overseas hubs and economies are the beneficiaries. Rather than increasing regional connectivity, lack of hub capacity in the UK is forcing regional passengers to connect via overseas hubs: there has been 49% growth (2005-11) in UK regional passengers connecting at overseas competitor hubs[41]. This flaw in the forecasting is leading Government to underestimate the very pressing nature of the hub capacity constraint and its damaging impact on UK intercontinental connectivity and competitiveness.

4.6 In respect to the National Air Passenger Demand Model (NAPDM, the overall unconstrained demand model), we agree that the DfT's econometric modelling provides the most comprehensive national-level approach to passenger forecasts, and also provides a good basis for forward projection. But we do raise two issues that should be addressed within the DfT's model.

4.7 The first issue is that the existing model cannot correctly be described as 'unconstrained demand'. This is because the NAPDM consists of a rigorously estimated set of econometric

relationships using data from 1984-2008. Heathrow has, to an increasing degree, been affected by capacity constraint for the last decade, not since 2011 as assumed in the paper. The capacity constraint cannot be considered as a 'brick wall' that is suddenly hit. Rather the impact will be felt gradually over a period of years as capacity utilisation nears 100%, and the capacity limit is reached at increasingly more times of the daily schedule.

4.8 This capacity constraint at Heathrow will be reflected in the historical data used to estimate the model. To the extent that this constraint has simply re-allocated traffic between airports it should not affect the model estimation, but to the extent that traffic has been lost or displaced the model will not represent true unconstrained demand. We believe that displacement, of hub demand to other airports, is a potentially important feature in the last decade, and should be investigated by testing for a structural change in the model from the year 2000. If this structural change were found to be significant, then a true unconstrained forecast could be derived from the period prior to the constraint taking effect.

4.9 The second issue is with the model's imposed judgements on 'market maturity', which assumes that demand slowly saturates over time. We acknowledge the evidence from the academic literature for market maturity effects, and agree there is a good theoretical case for their inclusion where they can be statistically identified and projected forward from the DfT's dataset. But we do not believe it is appropriate to rely on purely subjective guesses that have no or little empirical basis. The DfT forecasts impose market maturity judgements onto demand growth even though, as they state, *"it was not possible to uncover quantified evidence of how the response to key drivers changes over time"* [42].

4.10 **Primary implications for strengthening DfT demand forecasts:** A summary of Heathrow's recommendations to strengthen the DfT forecast model are included in Section 8 below.

5. Dealing with uncertainty

5.1 Heathrow views the sensitivity analysis, scenario testing and ranging of the NAPDM model to be broadly sufficient to inform the development of long term strategic aviation policy in the UK. The scenarios tested by the DfT are a generally coherent econometric set, covering for example changes to oil prices, air fares and GDP growth. However, a wider set of market based scenarios should also be considered. The maturity sensitivity also captures the potential for behavioural change over time.

5.2 One area where uncertainty could be more accurately reflected is in the economic environment. The paper relies on the Bank of England GDP fan chart. Although extremely useful, this does not fully capture the uncertainty of economic outlook. To check this it is necessary to read the footnotes that the Bank of England places below its fan charts:

'The fan chart depicts the probability of various outcomes for GDP growth. It has been conditioned on the assumption that the stock of purchased assets financed by the issuance of central bank reserves remains at £375 billion throughout the forecast period…. If economic circumstances identical to today's were to prevail on 100 occasions, the MPC's best collective judgement is that the mature estimate of GDP growth would lie within the darkest central band on only 10 of those occasions' [43].

5.3 The critical assumptions behind the Bank of England's fan charts are, therefore: that Quantitative Easing (QE) is maintained and, more generally, that economic circumstances are identical to todays.

5.4 In other words, the fan chart reflects uncertainty only under a particular set of assumptions (or a scenario) where there are no shocks from either a deterioration in UK inflation that may cause the Bank of England to alter the level of QE or more generally, a deviation from current economic circumstances through, for example, a Eurozone breakup, political failure to agree on US fiscal policy, or oil price hikes.

5.5 Further scenarios the Commission may want to consider are primarily market based or fiscal. For example: varying the levels of transfer passengers, varying impacts of High Speed 2, a

significant and sustained step up in inbound tourism from Asia, and the reduction of Air Passenger Duty. In this respect it is useful to note:

- Competitive, market based scenarios: e.g. the impact of share loss in hub demand to Middle East competitor hubs; further concentration of hub demand across fewer European hubs.
- Transfer passengers are price elastic. Two decades of capacity constraint will affect them.
- High Speed 2 has the potential to change travel patterns in the UK.
- The World Tourism Organisation predicts that the number of overseas trips made by Chinese tourists will increase from 70m in 2011 to 100m by the end of the decade (and from just 5m 15 years ago)[44]. The UK received just 147k visits from Chinese tourists in 2011[45], whereas France received 1.2m visits in 2010[46].
- A recent study by PwC on 'The economic impact of Air Passenger Duty' found that abolishing APD would make UK aviation more competitive, supporting increased passenger traffic and subsequently boosting UK GDP by 0.46% in the first year[47].

5.6 Heathrow also supports the Commission's suggestion that probability based analysis may enable a better understanding of uncertainty. Adopting a ranged probability based approach is expected to widen the range, conveying an even greater level of demand uncertainty over the longer term. The potentially less transparent nature of probability modelling will make it particularly important that there is full visibility of input data and assumptions.

5.7 **Implications for dealing with uncertainty:** The longer term outlook for demand is more uncertain than currently reflected by the DfT forecasts. Adopting a ranged probability based approach should better reflect the uncertainty. Considering and accounting for a wider set of market based scenarios is also important. However, over the much longer term, forecasts to 2050 are too uncertain to be a reliable planning tool at this stage.

6. Opportunities to strengthen the DfT CO_2 emissions forecasts

6.1 We believe there are three issues that should be recognized by the DfT's CO_2 emissions forecast.

6.2 First, the CO_2 forecast does not take into account the incremental CO_2 generated by transfer passengers switching journeys out of Heathrow to non UK hubs as a consequence of UK capacity constraints. In our submission to the DfT's aviation scoping document[48] we presented evidence that indicates that the loss of transfer passengers to hubs outside the UK results in greater global carbon emission than if demand had been met in the UK's hub airport, Heathrow.

6.3 Second, we note that the DfT's CO_2 forecast is based on a single view of aviation's carbon efficiency (CO_2 per passenger km) to 2050. As members of Sustainable Aviation we have produced an alternative forecast of UK aviation's carbon efficiency that would reduce UK aviation's CO_2 emissions to near 2005 levels by 2050[49]. Similarly, the Committee on Climate Change has 3 future scenarios of carbon efficiency[50], including a scenario that is broadly similar to that produced by Sustainable Aviation. We therefore suggest that the Commission should examine alternative scenarios of carbon efficiency, including Sustainable Aviation's forecast.

6.4 Third, we note that the CO_2 forecast is for gross UK emissions and that the Committee on Climate Change have recommended that aviation's international emissions are included in UK carbon budgets on a net basis. Furthermore, DfT's proposed policy objective (as described in its draft aviation policy framework) is to reduce global emissions and to enable emissions trading to be supported by policy instruments at an EU level and, subsequently at a global level. We therefore recommend that the Commission should consider future CO_2 forecasts on both a gross and net basis.

6.5 **Implications for strengthening the DfT CO_2 emissions forecasts:** Three issues should be better addressed, being; lower CO_2 from direct flights; forecasts for alternative scenarios; and, measuring net as well as gross UK emissions.

7. UK aviation hub demand and implications for hub capacity

Heathrow forecasts "constrained" traffic growth of 0.5-1% p.a. at the UK's hub

7.1 Looking forward, and assuming the on-going capacity constraint, Heathrow and its airline customers expect passenger traffic to grow by around 0.5-1% p.a. into the 2020s (although the near term growth may be restrained by the current economic climate, oil price increases, APD etc.). Heathrow is not permitted to operate more ATMs and consequently this passenger growth can only come from larger aircraft and more seats being occupied on each plane. Achieving growth via either of these means is inherently incremental and multiyear. For example "larger aircraft" is primarily achieved by airlines replacing their fleets. Airlines are investing in new aircraft and some of these, for example the A380, have more seats than the aircraft they are replacing. However other new aircraft e.g. the B787, are expected to have fewer seats than the aircraft they are replacing. Beyond the 2020s, and given the current constraint, it is unclear whether Heathrow and its airline customers will be able to accommodate any further hub growth at all. Heathrow's unconstrained central case forecast for hub demand growth to 2030 is 2.4% p.a.. This is close to the DfT forecast for Heathrow for the same period. Other reputable forecasters also anticipate long run growth of 2% to 3.5%[51, 52, 53]. Heathrow regards any forecasts to 2050 to be too uncertain to be a reliable planning tool at this stage.

Hub demand is being lost, and will continue to be lost

7.2 It is important for the Commission's assessment of need for additional hub capacity to reflect that, by the time significant additional hub capacity could be put in place at Heathrow from ~2024, a significant proportion of this hub demand may well have been lost, either for good, or for the long term. UK policy and planning timelines imply additional hub capacity might only be operational from 2024, this assumes a Government decision in principle on capacity in 2015, followed by around nine years of planning and construction.

7.3 The DfT forecasts indicate that by 2020 there will be 11m of un-served passenger demand at Heathrow and 28m by 2030. This implies that ~16m p.a. of "un-served" hub demand will have been created by 2024, versus the DfT's unconstrained forecast. Passengers, airlines, overseas hub airports, and Heathrow have been, and will all be, adjusting their services and investments to address this un-served demand. For example, Emirates and other Middle Eastern carriers have been investing in their fleet and adding services to the larger UK regional airports to carry long haul passengers via their overseas hub.

7.4 Some of the un-served demand will be displaced, potentially permanently, and some may be destroyed. To understand this better, the un-served demand can be divided into three categories: transfer passengers (UK and International), direct long haul passengers and direct short haul passengers:

- Transfer passengers will bypass the UK hub, choosing to connect via overseas hubs. Once passenger flows are established at competitor hubs they become difficult to recapture. The overseas hubs will then use these additional transfer passengers to strengthen their own network and connectivity, offering direct services to more destinations, more frequently at more attractive timings and at lower cost.
- Direct long haul passengers: Some UK residents may be able to choose to fly out of a UK point-to-point airport, instead of the hub, and fly indirectly via an overseas hub to their final destination. Other UK residents will choose not to fly due to the absence of a reasonable alternative. Some business passengers will choose not to develop business relationships due to the absence of a direct connection. Much of the demand from overseas residents will be lost, often for good. For example, Chinese tourists will be more likely to choose to visit France, Germany or other European countries with direct connections, than fly indirectly via an overseas hub to the UK. Foreign direct investment will also have established headquarters in countries with hubs offering better connectivity.
- Direct short haul: Some demand will be destroyed, for example some short haul leisure passengers with a significantly less convenient or more expensive surface access journey to an alternative airport will choose not to fly.

7.5 If significant new hub capacity were to become operational from 2024 there is a wide range of subsequent demand scenarios, reflecting the combined impacts of the two decade hub capacity constraint, econometric variables, and the effects of competition. However we might reasonably expect a central case range between the DfT's central and low cases for Heathrow. This range recognises that the hub would not reclaim all the un-served demand that accumulated over the two decades constraint. Clearly there is significant uncertainty around this central case range. It will be important that the assessment of need for additional hub capacity does reflect that some hub demand will have been lost by the time the capacity is in place to serve it.

7.6 The DfT forecasts show a clear and immediate demand case for a third runway at the UK's hub airport. By the time a third runway could open, the DfT forecasts imply unserved passenger demand at Heathrow of 16m p.a.. If it had spare runway capacity today, Heathrow could serve a number of new long haul destinations, directly connecting the UK to a greater proportion of global GDP and growth. This connectivity cannot be created at other airports.

7.7 The evidence also shows that any potential demand case for a fourth runway is highly uncertain and may not materialise. Longer term forecasts to 2050 are too uncertain to be a reliable planning tool at this stage. For example, by 2050, the current unconstrained DfT forecasts imply a difference of around 110m passengers between a Heathrow low case and high case[54]. Furthermore, a significant proportion of un-served hub demand will be lost over the two decade hub capacity constraint to ~2024. We should also consider that long run efficiency gains and technology improvements will increase the number of passengers a three runway airport can handle. The hub needs a third runway now, but the need for a fourth may not materialise.

Moving the hub could materially reduce demand and threaten the viability of a UK hub

7.8 The DfT forecast model, quite rightly starts with a baseline of established passenger traffic. As the Airports Commission undertakes its assessment of hub capacity options it will be extremely important to recognise that any change to the location of the UK's hub would precipitate significant changes in the nature and scale of hub demand. These changes would have a material impact on the hub's health and viability, along with wider economic costs and benefits.

7.9 There are good reasons why Heathrow has grown to become the world's leading international hub and support substantial economic benefits for the UK. One of Heathrow's key strengths is its proximity to demand. Most London airport passengers start or end their journey to the west of London; this is especially true for business passengers. As a result, the centroid of London passenger demand is only 12 miles from Heathrow[55]. The average London airport passenger would have to travel 22 more miles to get to Stansted, 24 more miles to get to Gatwick and 41 more miles to get to an Estuary airport on the Isle of Grain. If the UK's hub airport was moved to Stansted or Estuary, average journey times would increase for ~90% of passengers. Business passengers in particular value Heathrow's proximity and ease of access.

7.10 The economy west of London has grown to be closely tied to Heathrow, as for 40+ years, firms have chosen to locate near the airport. This economy is highly productive, and made up of a series of clusters of firms in similar industries. These include business services, IT, R&D, and pharmaceuticals. 60% more Thames Valley jobs are now in management than is the national average[56]. The importance of the proximity of the Heathrow hub to passengers and business cannot be underestimated. Moving the hub away from its demand base creates an incentive to pull the hub apart, reducing hub demand at a new location, either via spillage to other airports or via demand destruction. Either of these effects could prove fatally damaging to the competitiveness of any hub.

7.11 **Implications of demand for hub capacity:** There is clear and immediate demand case for a three runway hub. However some hub demand will have been lost by the time new hub capacity is in place to serve it. Any potential demand case for a fourth runway is highly uncertain and may not materialise. Moving the hub could materially reduce demand, threatening the hub's viability and the UK's global hub status.

8. Summary of responses to Airports Commission questions, and our recommendations

Airports Commission questions at paras 6.4-6.5	Summary of Heathrow Airport Limited (HAL's) response to the question	Paragraphs in this paper where further detail is provided
1	DfT forecasts support an urgent need for more hub capacity. Whilst longer term demand forecasts are inherently uncertain, the more immediate demand case for a three runway hub is very clear.	Section 7 3.8-3.9 4.3-4.4
2	Capacity constraints will mean the frequency and number of destinations served will continue to decline relative to competitor hubs, with the decline in destinations relatively greater than the decline in frequency. The decline will also be more marked amongst long haul destinations which require the support of a hub to be viable.	3.14-3.17 4.2-4.5
3	The DfT forecasts provide a good high level estimate of future passenger demand. However this assessment is subject to addressing a number of important issues as summarised in Sections 4 to 6 (above), most importantly, taking proper account of network economics and transfer passengers. The forecasts take reasonable account of econometric developments but do not take sufficient account of the hub capacity constraint or the changing effects of competition, e.g. from the Middle East.	Sections 4 to 6 1.7 7.2-7.11
4	The opportunities to strengthen the DfT model are laid out in Sections 4-6 (above).	Sections 4 to 6
5	To forecast UK share of the international aviation market the DfT should either estimate a reasonable share of 'origin and destination' flows for the UK or, grow transfer volumes from a baseline prior to them becoming constrained. HAL suggests demand scenarios to test in paragraph 5.5.	Section 3 4.3-4.5 5.5
6	The DfT allocation model incorrectly assumes that with Heathrow constrained, long haul demand, and to an extent transfer demand, will get picked up at other UK airports. In practice, network economics and the related airline business model, make this highly unlikely. HAL suggests how the model could be improved in Sections 4-6 (above).	Sections 4 to 6 1.4-1.7 4.3-4.5
7	Yes, we agree with the input data and assumptions, subject to our comments in Sections 4 to 6, particularly: over reliance on the Bank of England GDP fan chart; the need to evidence market maturity; the need to recognise the implications of the pent up capacity constraint at Heathrow	Sections 4 to 6
8	Yes, we agree with the choice of outputs shown, subject to: a clearer distinction between hub demand and south east point-to-point demand; a wider range of scenarios being recognised; an adjustment to reflect that a significant proportion of hub demand will be lost by the time additional hub capacity can be put in place; scenarios to recognise how any change to the location of the UK's hub impact the nature and scale of hub demand.	1.4-1.7 4.3-4.5 5.5 7.2-7.11
9	The DfT forecasts provide a good high level estimation of future passenger demand. However this assessment is subject to addressing the important issues summarised in Sections 4 to 6 (above), most importantly, taking proper account of network economics and transfer passengers within the allocation model.	Sections 4 to 6 1.4-1.7 7.2-7.11
10	Yes, it could be suitable to underpin an assessment of capacity needs, subject to addressing the important issues as summarised in Sections 4 to 6 (above), and, in particular, taking proper account of network economics and transfer passengers.	Sections 4 to 6 1.4-1.7 7.2-7.11

11	To better assess the impact of international competition the DfT should adjust the allocation model to take account of network economics. Either do this by splitting the allocation model in two: "hub demand" and "point-to-point demand", or by applying different allocation rules which more accurately reflect market realities. Adjustment should also be made to account for the known capacity constraint, by reflecting that a significant proportion of hub demand will be lost by the time additional hub capacity can be put in place. Finally, we suggest that the Airports Commission should recognise a wider set of competitive scenarios and on a ranged probability basis e.g. loss of transfer passengers, impact of HS2.	Section 3 1.4-1.7 4.3-4.5 5.5 7.2-7.11
12	Opportunities to strengthen the DfT forecasts are laid out in Section 4-6 (above) & 8.5 (below).	Sections 4-6 Section 8
13	Yes, it is granular enough, subject to addressing the important issues as summarised in Sections 4 to 6 (above).	Sections 4-6 Section 8
14	Yes, HAL views the approach to demand uncertainty to be broadly sufficient, subject to HAL's recommendation that: uncertainty could be better dealt with by recognising a wider set of scenarios and on a ranged probability basis (which is expected to widen the range) e.g. loss of transfer passengers, impact of HS2, changed APD. However any forecasts and ranging to 2050, are theoretical at best.	Section 5
15	Yes, a probability based approach would help to deal with uncertainty, and would likely widen the ranges.	5.5, 5.6, 5.7 7.2 – 7.11
16	The four alternative forecasts are reasonable references. IATA and the FAA also provide a useful reference for central case forecasts.	7.1

8.1 Heathrow's recommendations to the Airports Commission on Aviation Demand Forecasting are summarised as follows:

- Distinguish between the need to meet "hub demand" and the need to meet 'overall demand', including point-to-point, and identify the airport capacity needed to maintain 'hub status' as opposed to meeting south-east demand in total.
- Adjust down unconstrained hub demand [Heathrow] to reflect that a significant proportion of this demand will be lost, either for good, or for the long term, as a result of the two decade constraint.
- Revisit DfT's assumption that Heathrow only became constrained in 2011 by testing for a structural change in the model from the year 2000. Correct the model accordingly.
- Revisit imposed judgements on 'market maturity', which assume that demand slowly saturates over time. Seek instead to replace the judgements with evidence.
- Adjust the forecast model to take proper account of transfer passengers, either by estimating a reasonable share of 'origin and destination' flows or by growing transfer volumes from a baseline prior to them becoming constrained.
- Adjust the allocation model to take account of network economics. Either do this by splitting the allocation model in two: "hub demand" and "point-to-point demand", or applying different allocation rules which more accurately reflect market realities.
- Better reflect uncertainty by adopting a probability based analysis to the econometric forecast. Adopting a ranged probability based approach is expected to widen the range, conveying an even greater level of demand uncertainty over the longer term.
- Better understand uncertainty by recognising a wider set of scenarios e.g. impact of increased competition, loss of transfer passengers, impact of HS2, changed APD.
- Address the three issues identified in relation to the CO_2 forecast: lower CO_2 from direct flights, forecast alternative scenarios, measure net and gross.
- Use CAA passenger survey data to understand how any change to the location of the UK's hub would impact the nature and scale of hub demand.

Heathrow would be happy to provide assistance to the Airports Commission and the DfT in these key areas.

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