



## **Unite Submission to the Mawhinney Review of the route taken by the HS2 High Speed Rail extension**

### **1 Introduction**

- 1.1. Unite is the UK's largest trade union with over 1.5 million members across the private and public sectors. The union's members work in a range of industries including manufacturing, financial services, print, media, construction, transport, local government, food, agriculture, education, health, not for profit and, of particular relevance to this submission, the rail and aviation sectors.
- 1.2. Within civil aviation, Unite represents over 70,000 members in virtually every aspect of the industry. Our docks, rail, ferries and waterways sector has a further 19,000 members and is continuing to grow. In the rail industry Unite has membership across most areas including TOCs, FOCs, Network Rail, Rolling Stock Manufacturing, Maintenance & Repair, Work Shops, Underground & Metro systems, Signallers, Supply chain, and rail construction companies. Within the wider transport industry Unite represents over 250,000 members involved in the provision of public transport and freight movement.
- 1.3. Unite therefore has a far more directly impacted membership than most organisations over the decisions made over the route of the proposed High Speed 2 rail route.

### **2 Heathrow**

- 2.1. Heathrow is the busiest international airport in the world and third only to Atlanta and Chicago. The airport is also home to the second busiest UK bus depot outside London Victoria, with routes serving not just the local communities but also destinations far further afield. The airport is also served by the Piccadilly line and Heathrow express with future developments to include air track (a connection to Slough) and CrossRail.
- 2.2. Due to lack of capacity the domestic air routes served by Heathrow have diminished significantly over the last few years. It has reached a stage where customers travelling from a regional location within the UK are much more likely to be able to get to their destinations via either the hub airports of Amsterdam Schiphol, Paris Charles de Gaul or Frankfurt than via Heathrow. As a consequence Unite believes that the provision of a high speed rail line between London and the Midlands would not provide any significant reduction in demand for short haul aviation via the UK's only hub airport.

Figure 1. Hub Airport Passenger Number growth

Airport	1989	1999	2009	Variation in Annual Volume (2009 v 1989)	Average Annual Growth (1989 to 2009)
Paris CDG	579,818	1,596,907	2,297,775	1,717,957	7.10%
Frankfurt Main	228,419	600,047	749,597	521,178	6.10%
Amsterdam Schiphol	869,897	2,920,231	3,665,181	2,795,284	7.50%
Sub-total European Hubs	1,678,134	5,117,185	6,712,553	5,034,419	7.20%
Heathrow	7,115,240	7,141,253	5,254,605	-1,860,635	-1.50%

Source: CAA airport statistics<sup>1</sup>.

- 2.3. A hub airport is very similar to a bus depot in that it is the location where passengers can interchange between routes to their destinations. To continue the analogy, a regional airport operates much like the local bus stop, providing connectivity between a handful of routes. If a business is looking to site its operation they tend to look to find the best connected locations and hence would normally site their business as near as possible to the hub rather than on the periphery.
- 2.4. In the case of Heathrow, this is clearly illustrated by the European offices for Smith Kline Beecham, Diageo, Boeing and others. West London has a thriving business community with 51,000 VAT registered businesses and a growth rate since the 1990's of 3.9 percent per annum. 90 percent of businesses in the Thames Valley Economic Partnership stated that Heathrow was important to the success of the region, with 76 percent stating the airport is of critical importance.
- 2.5. With such a proliferation of routes on offer, airlines are prepared to offer sums in the millions for the ability to connect their services to Heathrow but with the current restrictions on growth this demand has been forced to go elsewhere losing the British economy billions of pounds in the provision of these connection services and trade with the transiting customers. Despite this, 2007 figures suggest that, measured as Gross Value Added (GVA), the aviation sector directly generated £8.8 billion of economic output, or 0.7 percent of the total GVA of the UK economy<sup>2</sup>.
- 2.6. You cannot suddenly turn every airport into a hub. If you did so it would water down the potential passenger density to a level where it becomes financially and environmentally unsustainable to provide the frequency of services needed. The transfer passenger will always subsidise the availability of routes making it responsible for up to a third of all passengers aboard some routes. On the Manchester to Heathrow service this percentage accounts for over 70 percent of the passengers on board. To enable these transfer passengers to move seamlessly between airlines with the minimum of delay and hassle a high frequency of flights is required to avoid the need wherever possible for a stop over lasting into days rather than hours.
- 2.7. Although British Caledonian operated Gatwick as a "secondary" London hub between 1970 and 1987, there was insufficient capacity on Gatwick's single

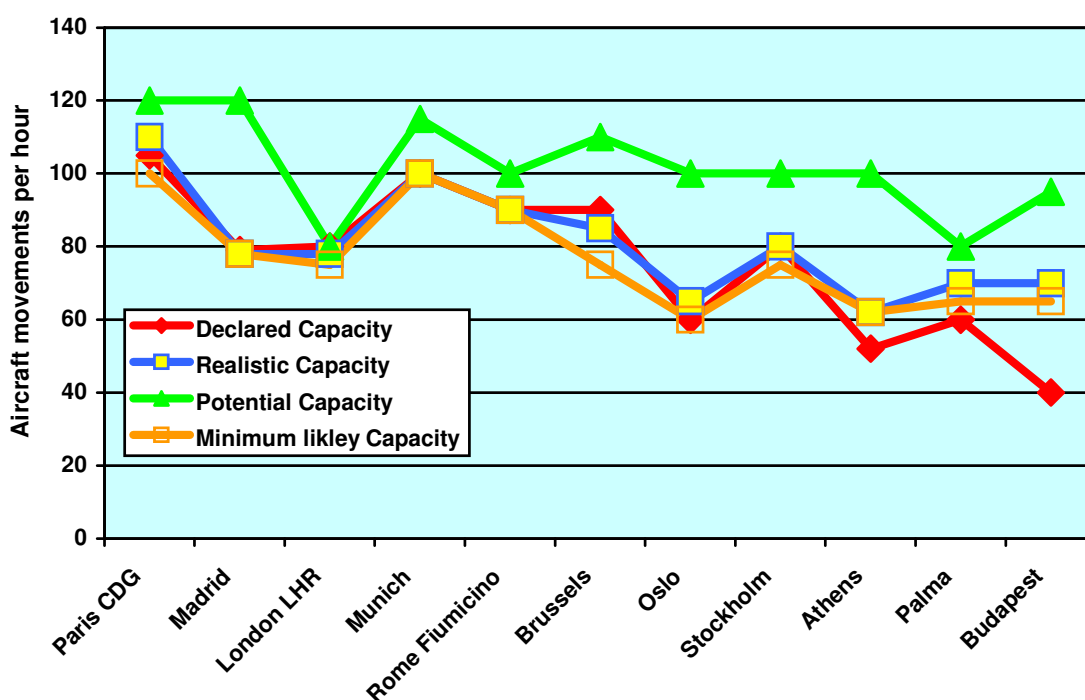
<sup>1</sup> UK passengers using European hubs excludes passengers to/from London airports.

<sup>2</sup> Source 2009 Oxera report

runway to meet peak demand to sustain a hub operation there. Today demand is requiring hub airports to have the facility to have at least three runways operational. Frankfurt airport had been showing signs of congestion limiting growth and hence it is now in the process of constructing a fourth runway. Madrid already has three runways but is looking to expand this further. Although Amsterdam Schipol has five runways there are plans for it to expand to incorporate a further two runways. In the face of this growth in capacity Heathrow has been standing still seeing a decline in runways since it opened<sup>3</sup>.

- 2.8. The DfT January 2009 passenger forecasts indicate that passenger traffic for South East England is around 3.1 percent a year, suggesting long-term Air Traffic Movements (ATM) growth of some 2.9 to 3.0 percent per annum. According to a study into the capacity of European airports conducted by the Omega group, Heathrow has very little potential for growth without the addition of a new runway and could be overtaken by the likes of Brussels, Oslo and even Budapest. This study concluded that Heathrow's declared capacity was above what could realistically be provided, a situation only matched by Brussels airport. At Brussels there is, however, the potential for further capacity growth which is not the case at Heathrow without the new runway.

Figure 2. Comparative European Airport Capacity<sup>4</sup>



- 2.9. The principal barriers to expansion of capacity at the airport are the need to reduce greenhouse gas emissions and the provision of surface connectivity. Heathrow is the only airport within the UK with the provision of four holding areas to accommodate aircraft queuing up in the air awaiting landing slots. Equally, its taxiways can often accommodate a considerable number of aircraft awaiting departure.

<sup>3</sup> When Heathrow opened it originally had six runways configured in a star of David formation.

<sup>4</sup> Source Climate Related Air Traffic Management (ATM) - Dr Tom Reynolds (Cambridge University), Dr Lucy Budd, Dr Bob Caves & Dr David Gillingwater (Loughborough University)

2.10. Due to the design of a jet engine, it is at its least fuel efficient while taxiing. As illustrated below (Figure 3) jet engines burn almost ten times as much fuel per minute while sat on the ground, effectively going nowhere, as it does at altitude in cruise configuration. When you consider that 22 percent of all air transport movements in the UK occur at Heathrow moving almost a third of all UK passenger traffic and over half of all air freight<sup>5</sup> it is worrying to see that all these flights are forced to endure long delays brought about by the lack of investment into much needed capacity.

Figure 3. Comparative Fuel Burn Rates

Condition	717	727	737	747	757	767	777
Taxi* (kg per minute)	11.3	27.3	11.3	45.5	18.2	22.7	27.3
In Cruise (kg per minute)	1.8	2.3	1.8	5	1.8	1.8	4

\*Assumes all engines in operation during taxiing movements.

Source Boeing

2.11. Environmentally, therefore, it is far more sustainable to provide enough spare capacity at an airport to enable it to receive and dispatch aircraft as swiftly as possible. Limitations on utilised capacity can then be introduced by legislation to ensure that this flexibility is maintained. If a 747 is on the ground for 20 minutes with all engines running it burns enough fuel for the same aircraft to cruise 2400 km<sup>6</sup>.

2.12. It is extremely unlikely that even if Heathrow was connected to the high speed network that it would provide enough transmodal traffic to reduce the need for a third runway in order to meet demand. As was shown previously with the London Docks, the inability to meet market demand only results in the market relocating to a location that can. Such a move could have significant negative effects, not just to West London but to the whole of the UK. Willie Walsh has even gone on record to suggest that British Airways could in future be utilising Madrid as its principal base in Europe, simply due to the restrictions placed on growth within the UK.

<sup>5</sup> Source CAA

<sup>6</sup> A Boeing 747 cruises at 805 km/h using around 300 kgs of fuel. At a burn rate of 45.5kgs of fuel per minute, a 20 minute delay on the ground would burn enough fuel to keep the 747 aloft for over 3 hours enabling it to cover a distance of over 2400 km. A significant amount of fuel is burn during the take off and landing phase resulting in a situation where actual range on saved fuel would be significantly lower.

### **3 High Speed Rail Connectivity**

- 3.1. Unite believes that the provision of a high speed rail network has provided considerable financial benefits to the European nations that have invested in this technology. The environmental improvements realised from these electrically powered lines has the potential to be considerable if the energy supply chain is directed towards a low carbon model. Such a network enables the wealth of the nation to be moved far more freely to the regions and neighbouring nations.
- 3.2. Within Europe the role of rail is seen as just one small part of an intermodal transport model for freight and passengers. Such an approach offers the individual traveller or company a variety of transport options to suit their needs rather than dictating which mode has to be utilised. Education into the benefits and pitfalls of each option then help shape the travel plans that best suit the circumstances.
- 3.3. The American comedian Steve Wright once said that everywhere is within walking distance if you simply have the time. In today's modern society the desire to move goods and people from A to B is principally dictated by the duration of the journey rather than the environmental impact. With the provision of a high speed rail line it has potential to deliver the twin benefits of providing a low carbon and high speed transport option.
- 3.4. The key requirement of such express service is to minimise the number of stops on the route to a minimum and to utilise the straightest route possible between the departure point and its destination. For it to be a truly intermodal option, however, there needs to be the provision for inward and onward connectivity at both ends of the line to enable the greatest catchment area possible to the network.
- 3.5. Connectivity to Heathrow would therefore offer a real alternative to car use for those transiting Heathrow not by air but by coach and rail from the South West of the airport and Wales. As an intermodal transport hub Heathrow is ideally placed to offer such an interchange. Heathrow is the only major European hub airport that is not connected to the high speed network which should be a source of national shame.

### **4 The HS2 proposal**

- 4.1. Unite believes that the evaluation and modelling of potential passenger demand for a high speed rail line via Heathrow was seriously flawed as it chose to only take account of passengers utilising a connection to the line via air connections, apparently ignoring the volume of onward connections to the West Country and Wales in particular, to a service running beyond London. Such a connection would enable passengers to avoid the hassle of transfers within the Central London network of buses and underground to reach Euston or St Pancras.
- 4.2. Unite would suggest that as is proposed for the current route to the new Birmingham International station a spur line is constructed from the proposed route into either a transport hub on the Great Western line north of the airport as has been suggested by ARUP or to a central location at Heathrow. Such a spur could at some later date be utilised as the embryo

of a line to the West and South much along the line of that proposed by Green gauge.

- 4.3. Unite does not agree with the idea that the Heathrow Express line should call additionally at Old Oak Common as this would add additional delay to the journey time on what was designed to be a shuttle service. There may well be significant advantages to building the link between Euston/St Pancras to the Old Oak Common, North End maintenance facilities and to the gauge cleared HS1 slow line via Waterloo, but there is no reason to stop a high speed line at this location which currently has limited onward travel options and delay the transit of passengers on their journey.

## **5 The ARUP hub station north of Iver proposal**

- 5.1. Unite believes there are advantages in constructing a new rail hub station on the Great Western Line as proposed by ARUP as it would enable the smooth transfer of passengers from the airport onto both the High Speed rail network and the existing lines to the west. The suggestion by ARUP that this could in time become the site of a terminal where passengers could check in luggage for flights would, however, cause major security problems and issues in ensuring that luggage reaches flights in time for departures.
- 5.2. A shuttle service to connect the terminals could also provide a much needed service allowing fast and easy connectivity to each of the satellites. This could provide a solution to the need for a single northern terminal. The provision of such a service should not require the high speed line to connect to a hub on the Great Western line but could run into a station under the central terminal area or into a new northern terminal which would be required to service the new runway reducing the need for aircraft to taxi across what is currently the North main runway.
- 5.3. There are already proposals to link the airport to the Great Western Line via Cross Rail and hence this would also remove the need from passengers from the west to travel into London to catch a train back to Heathrow. Additionally, as outlined earlier, the airport is also home to the second busiest UK bus depot outside London Victoria at the central terminal area currently serving terminals 1, 2 and 3. Two of these central terminal buildings are to be demolished anyway to make way for the approved Eastern Terminal building whose design could be amended to incorporate a new sub surface station.

## **6 Birmingham**

- 6.1. There is already a traditional rail service between Birmingham New Street station and Birmingham International airport which currently takes approximately 12 minutes to complete the 8 mile journey between these locations with a stop at Marston Green. If this service was non stopping between the two, the time differential between a dedicated high speed line station and the existing service from New Street would be minimal. It is therefore difficult to see the justification for there being two stations in the Birmingham area.
- 6.2. The cost to the nation of the construction of two new stations would be considerable and the probable decrease in passenger take up of this service

would be minimal when compared to a link to Heathrow. Additionally, the Birmingham International airport has the potential to become a major transport hub with bus and national rail connectivity situated beside two major motorways. This would provide far greater onward connectivity options to the local community than a station located deep in the heart of one of the most congested city centres in the UK away from the rail hub of Birmingham New Street.

- 6.3. The creation of a Javelin style connection between city centre and the Birmingham International station could easily be achieved at some later point but it appears to be folly to slow the progress of every high speed train from Manchester or Leeds to London or beyond simply to traverse the 16 mile round trip to the centre of Birmingham, especially if the location connected into was not the existing New Street station with its onward connectivity to the rest of the UK.

## 7 The Line to Leeds

- 7.1. A high speed line ceases to be a high speed line if the journey is populated by a series of stops along the way if the locations of the stations are only a short distance apart. It takes 7 km of track for a high speed train to reach 300 kmph from a standing start and 12 km to break from this speed to a stop meaning that the minimum distance between stops should be no shorter than 19 km (12 miles) apart if the trains' superior speed is to be fully utilised. Increasing speed does, however, require a considerable increase in power consumption.
- 7.2. On any vehicle, at higher speeds, irrespective of the propulsion system, aerodynamic resistance dominates. This resistance increases with the square of the velocity, thus the power to overcome the resistance at a given speed varies with the cube of the velocity. This is fundamental physics and has been discussed for many forms of transport by Gabrielli and von Karman.<sup>7</sup>
- 7.3. The 200 kmph 2004 Pendolino trains, utilise 5.1 MW of installed power compared to 20 MW unit on a High Speed train. Utilising a high - speed train to replace a conventional line over a short distance would therefore result in a significant increase in electrical power consumption for only a modest reduction in travel time and a resultant increase in the required electrical generated total emission levels for the journey.
- 7.4. It is understandable that each major city centre would like to be connected to the line but such a short distance stopping service is best conducted by an existing line allowing the high speed line the potential to be fully utilised. If not, every passenger has to endure the stop – start journey as opposed to the seamless end to end service expected of a line designed to rival domestic air travel.
- 7.5. Unite would therefore argue that rather than providing each city centre on the route with a connection, that some degree of centralisation takes place centred of a transport hub such as the East Midlands Airport. As Unite

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<sup>7</sup> Gabrielli, G & von Karman, Th., "What Price Speed?" Mechanical Engineering, 72, 1950, pp775-781.,

represents members in the rail construction and maintenance industry, we are more than happy to see this.

## **8 The design of a High Speed Rail Network in the UK**

- 8.1. The impact of the introduction of the high speed rail network in Europe has had the positive effect of increasing the number of people travelling between destinations with Eurostar not just catering for current demand. Judging from the experience elsewhere it would suggest a potential doubling of the market. Although this has reduced the numbers flying it has not stopped the provision of aviation on these routes. This is especially true on routes which carry a significant volume of air freight in the belly hold of passenger aircraft on that route such as that between Heathrow and Brussels.
- 8.2. Heathrow is one of only a few hub airports in Europe which is not connected to the High Speed rail network. Such a connection allows a far cleaner surface journey to the airport reducing the dominance of the car as the principle transport option. Currently Heathrow only provides a limited and decreasing domestic connectivity to the regions due to increased demand. A high speed rail connection would therefore open up the financial connectivity benefits of a link to Heathrow to the likes of Birmingham and beyond where there is not a current link. A direct link to Heathrow would also create a greater amount of air to rail passenger substitution on routes between Manchester, Paris and Heathrow. Over 80% of passengers now choose to use Eurostar to travel from London to Paris and Brussels rather than flying. Unite believes that there is therefore a clear need for the introduction of both a high speed line connection and further runway capacity at Heathrow to meet the future needs of our nation.
- 8.3. The advantage of a having a trunk with branch structure to a high speed network design is that the train can swiftly take the most direct route from any of the branches to their destination along a central corridor taking in destinations to meet demand. Utilising this premise would also avoid the high cost to existing city centres of accommodating the land take for a new line and station and the additional parking facilities. Such a land take is far less expensive both on a financial and social disruption basis if the international station is based out of the city centre provided it is well connected to the local transport network. With the growth in major out of town retail and industrial parks, the combination of an out of town transport hub becomes a viable option.
- 8.4. Unite, therefore, believes that it is imperative for the HS2 line to connect to the HS1 existing line, possibly just outside St Pancras. This would then allow High Speed trains to travel to Heathrow, Birmingham or Manchester direct from Brussels, Paris or beyond without having to stop in London.

## **9 Freight**

- 9.1. Rail transit of freight has the potential of removing 50 long distance lorry loads from the nation's roads. In all the proposals for a high speed network there does not appear to be any details of provisions for freight traffic. Currently the vast majority of the UK's imports arrive on our shores via the ports with just 5% arriving by air. Currently there is almost no freight

travelling by rail from continental Europe unless this freight is in a trailer of a lorry on the back of a Euro Tunnel train.

- 9.2. Once in the UK the vast majority of freight is hauled over long distances to inland distribution hubs by road. Given the growth in the demand for freight movement and the expansion of just in time delivery, the UK road networks are becoming more and more congested. At the same time the growth in passenger rail travel is increasing the pressure on the existing network squeezing out freight. Whilst the introduction of a High Speed network would relieve some of the pressure on the existing rail lines, this released capacity will quickly be swallowed by passenger rail demand.
- 9.3. Unite would therefore suggest that at off peak periods high speed rail freight is allowed access to the network. This would allow continental rail cars the opportunity to run directly from the European hub to central UK locations without the need for transition on to the roads mid way through their journey.

## 10 Conclusion

- 10.1. Unite believes that there is a clear requirement to connect the route of the high speed rail extension to Heathrow if the nation is serious about providing a truly environmentally friendly intermodal transport model for the UK. Linking the airport to the network via a rail link such as that provided by the Heathrow Express will only serve to discourage passengers from using the line to get to the airport and reduce the numbers transiting via Heathrow to the high speed rail network.
- 10.2. Unite believes that the high speed line needs to make the minimum number of stops on its journey between point of origin and destination via the most direct route. As a consequence, a branching tree-like structure would encourage maximum time savings by removing slower services to destinations onto the branches leaving through services to utilise the most direct route. Such an approach would avoid the wide scale demolition of properties and the cost of tunnelling to create a route into city centres.
- 10.3. Unite also believes that provision should be taken for freight operations at off peak periods to allow rail to remove some of the congestion from the road network on long distance journeys.

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