

Chapter 6



Carbon Impacts of HS2

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6.1 This chapter relates to the following questions listed by the Committee:

- 6.1 What will be the overall impact of HSR on UK carbon emissions? How much modal shift from aviation and roads would be needed for HSR to reduce carbon?

Overview

High speed rail is also an important part of our plans for a low carbon economy, helping us meet our climate change targets by encouraging millions out of their cars and off the planes onto the train. (Philip Hammond, Foreword to High Speed Rail: Investing in Britain's Future.)

6.2 DfT claims that HS2 will be broadly carbon neutral. The vagueness of the statement is commensurate with the standard of the Green House Gas report presented by DfT. Unfortunately this broad assessment fails to properly consider a number of factors that affect carbon emissions.

6.3 The DfT's own business plan for 2011 – 2015 states it will:

Simplify transport funding and decision making, driving smarter investment to encourage low carbon transport and green growth.

6.4 HS2 will have a number of impacts on different factors which are considered in this chapter which will demonstrate that HS2 is not part of a low carbon future:

- Consumption of electricity.
- Change from domestic slots to medium and long haul flights.
- Assessment of construction carbon.
- Modal shift from domestic air to rail.
- Impacts on road transportation.

Consumption of Electricity

- 6.5 HS2 will have quite high CO2 emissions related to the consumption of electricity. The amount of emissions will be dependent on the carbon intensity of grid electricity and whether or not the UK moves to cleaner greener fuels in line with targets that have been set. The assumptions made about electricity consumption in the carbon report are broadly adequate and provide a range of results which are fair given the amount of information provided. It is therefore accepted that HS2 will have relatively high carbon emissions from its operations.

Change from Domestic Slots to Medium and Long Haul Flights

- 6.6 The Green House Gas report (Chapter 6) sets out the impacts on carbon emissions as a result of a switch in domestic flights to HS2. The first methodology provides a theoretical best case reduction of 23.2 MtCO₂, although this relies on a complete switch of domestic flights to HS2 and no reuse of these slots. A much more realistic best case scenario suggests no change in emissions based on the assumption of no change in domestic flights. Both of these are highly unlikely, the second more so, since HS2 is being promoted as an alternative to domestic flights.
- 6.7 The second methodology sets out the worst case scenario (as well as those mentioned above) but cannot quantify what it is. The uncertainty relates to the subsequent impacts of freed up domestic flights slots being switched to international flights e.g. HS2 Ltd do not know if a domestic slot will then be taken up by a medium haul flight to Europe or a long haul flight to America. The report therefore does not try to quantify and instead opts to base its broad conclusion on emissions on a scenario that does not see the re-use of domestic flight slots.
- 6.8 International flights are more commercially viable for airport operators and Heathrow's domestic flights have continued to reduce in recent years (see chapter 11). Furthermore, DFT has publicly claimed that the HS2 Heathrow spur is about enhancing international connectivity. DFT claim the Heathrow Link will:

Bring Manchester and Leeds city centres within 70 and 75 minutes respectively of the country's main hub airport and transforming its accessibility from the Midlands and the North release runway capacity so that Heathrow could enhance its operational resilience and potentially develop its route network (DFT Exhibition Banner, The case for high speed rail)

- 6.9 However, in order to enhance international connectivity more use has to be made of the constrained capacity at Heathrow. Colin Matthews, BAA's Chief Executive is quoted as saying:
- ...BAA would like more passengers to arrive [at Heathrow] by train. High Speed rail would attract people who currently arrive by short-haul flights, freeing slots for more long-haul flights***
- 6.10 And Nigel Milton, Director of Policy and Political Relations at Heathrow told the ENDS Report (an environmental website):
- No sensible, well-informed person still seriously pretends HS2 is a green alternative to a third runway. The question now is given no third runway, how we can maximise the effectiveness of our limited capacity at Heathrow. That means more long-haul flights...every time BMI or British Airways have cancelled a domestic route in the past, they've replaced it with a more profitable medium- or long- haul route. That's exactly what will happen when HS2 comes and more domestic routes get cut.*
- 6.11 DfT is relying solely on the EU Emissions Trading Scheme (EU ETS) to control the likelihood of domestic slots going international, and therefore reduce HS2 impacts on carbon. No assessment of this has been carried out and HS2 Ltd would appear to be 'hoping' this has the desired effect. However, the aviation industry led by BAA would suggest that this control is highly unlikely to be effective. This assumption is supported by an academic study by Dr Elena Ares for the House of Commons Library, Science and Environment section which concludes:
- "According to the EU Commission's estimates the theoretical impact of inclusion is that emissions reductions of 183 millions tonnes of CO2, a 46% reduction compared to business as usual will be achieved by aviation as they will be capped at 2004-06 levels. However as the Commission points out the option of purchasing credits from within the EU ETS and the Kyoto schemes mean that other options are available to the aviation industry and actual cuts are not likely to be anything as significant." (Dr Elena Ares, 27 April 2011, House of Commons Library, Science and Environment Section).*
- 6.12 HS2 Ltd has not done the work to enable a proper assessment of what effect the EU ETS would have on the freed up domestic slots switching to international. There is no inclination within the aviation industry, particularly at BAA to freeze domestic slots for the good of the environment and the EU ETS is untried, untested and is currently considered to be relatively ineffective. Therefore, the HS2 claim that it will be "broadly

carbon neutral” is based on the hope that freed up domestic slots will not be used for international purposes and HS2 Ltd’s own report acknowledges that the impacts could be negative if this were not to happen. The case presented by the aviation industry reduces this hope to a highly unlikely scenario.

Lack of Consideration of Construction Impacts

- 6.13 There is also a serious concern that the carbon emissions related to the construction impacts is flawed. HS2 Ltd has used a methodology that fails to consider Government endorsed approaches set in the Greenhouse Gas Guidelines for Business (2010 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting). JMP (Sustainable Transport Consultants) has used this approved methodology to assess the impacts of emissions associated with the construction impacts of HS2. The findings are considerably different from HS2 Ltd whose assessment is based on a more simple CO₂ / £ equation. Using the approved methodology above, JMP has assessed the likely emissions for construction as being in the region of 13.6 million tonnes of CO₂ compared with HS2 Ltd’s assessment of 1.2 million tonnes.
- 6.14 More importantly, there is confusion within the report as to what is being assessed. There is a suggestion at the start of the report that the ‘Y’ network is being considered, yet the assessment in section 6.2 is clearly based on the proposed route, London to Birmingham. If the report is meant to consider the whole ‘Y’ network then the total embedded emissions is even further from the JMP assessment. A proper assessment should be completed that allows a direct comparison of carbon emissions related to the construction of the whole ‘Y’ network and links to Scotland against the modal shift from road and air to rail. The current assessment is far from adequate.

Modal Shift from Domestic Flights to HS2

- 6.15 HS2 acknowledges that the major competitor with High Speed Rail is air travel. This is also the area where any significant carbon savings are likely to exist as in theory the operational carbon generated by HSR (per passenger km) should be less than that for the equivalent journey by air.
- 6.16 The first issue to note from the report is that there is no data on modal shift is used and there are no details on how the related carbon emissions have been calculated. The carbon benefits rely primarily on the ‘Y’ network, but more so the benefits to Scotland. Therefore any CO₂ benefits would

happen after 2033 and the completion of the 'Y'. This means that HS2 would be in considerable carbon debt until the full benefits can be explored. With no supporting data, it is difficult to assess the information provided, and more importantly it's difficult for HS2 to be able to justify their conclusions.

- 6.17 However, using the information provided in all the reports and basing the carbon impacts on the demand forecasting, over 100% modal shift is required from Leeds and Manchester flights to compensate for the construction and operational impacts of the London to Birmingham route. Obviously this cannot be achieved, and is further undermined by the need to build the whole 'Y' network in order to achieve the modal shift from Leeds and Manchester flights to HS2.
- 6.18 In 2007 Booz Allen Hamilton's produced a report for DfT which assessed the carbon impacts of a possible new North-South rail line. The analysis included CO2 emissions from construction and operations over a period of 60 years. The 2007 report showed that carbon emissions parity could not be achieved for the London-Manchester route. The rail mode share required to offset additional emissions would exceed 100%, i.e. the entire carbon emissions generated by domestic flights is less than the increase in emissions from high speed rail.
- 6.19 JMP's analysis of HS2 for 51M uses assumptions on the rail services beyond the 'Y' network for the Scotland links because no information has been provided by HS2. The broad analysis shows that alongside the 100+% shift from Leeds and Manchester flights to HS2, 88% of all flights from Glasgow would also need to switch to HS2. It must be acknowledged that this is only to make up for the impacts of the London to Birmingham route. The impacts of the whole 'Y' network are not yet known.
- 6.20 In simple terms, the modal shift needed to achieve even 'carbon neutrality' is impossible. For the London to Birmingham route to achieve parity, the whole 'Y' network has to be in operation, and more than 100% of flights need to be removed from the skies. Even in the unlikely situation of HS2 being the preferred mode for travel from Glasgow to London, there would still be a considerable amount of domestic flights with the intended purpose of interlining; this point is underlined by examples in Europe whereby airlines still fly regular services between cities connected by HSR (Madrid – Barcelona still has over 20 flights per day and Paris – Lyon up to 9 flights a day).

Impacts on Road Transportation

- 6.21 Rail is normally considered to be a cleaner more efficient alternative to road transportation. However, HS2 acknowledge that this multi billion pound rail scheme will have minimal impact on road. Only 6% of HS2 passengers will have left their cars at home or the Birmingham Interchange (HS2 Demand for Long Distance Travel April 2011). This has an almost negligible impact on road emissions as set out in HS2 Ltd's report.
- 6.22 Table 4 of the HS2 Ltd report states the scheme will achieve a reduction of between 0.8MtCO₂ and 2.2 MtCO₂ as a result of removing cars from the road. The report uses a reasonable best case estimate of 1MtCO₂ reduction in road emissions over 60years as a result of HS2. In 2009 the DfT reported that the UK's road transport emissions were 113MtCO₂.
- 6.23 There is no reason to doubt the figures presented by HS2 Ltd, but there is a more important issue to be considered. The single largest public transport intervention for the foreseeable future will have no noticeable impact on the UK's transport emissions. This is highly concerning given that road transportation provides a quarter of the UK's emissions which should make this a prime area for helping to meet the overall 2050 reduction goal of 80%.
- 6.24 There is a further omission within the carbon report related to the impacts on road transportation. The report fails to acknowledge any effect the opening of a new station near the Birmingham NEC would have on road trips.
- 6.25 Paragraph 3.10.1 of the Appraisal of Sustainability (Main Report 1) states:
"A new HS2 station would be constructed adjacent to the NEC and just to the east of the M42. And it is likely that some 7,000 car parking spaces also would be required and that this would be provided in multi-storey accommodation."
- 6.26 The size of this car park would suggest considerable new road journeys. It may be possible that some of these spaces are a result of reduced car journeys to London which would reduce carbon emissions; however, it is more likely that these spaces will be used by those who would otherwise have travelled to satellite stations closer to home or those not choosing to journey into the Curzon St station in Birmingham. This has not been obviously factored into the report and there is no mention of any additional road trips as a result of the new interchange at Birmingham.

Conclusions

- 6.27 The first thing to notice about the HS2 Ltd report is the amount of assumptions and incompleteness of the supporting data. The report acknowledges that:
- “During the later stages of preparing the AoS it became apparent that a full set of results from the HS2 Demand Model would not be available. Subsequently, the approach agreed with HS2 Ltd was to adapt the detailed methodology to reflect current availability of the HS2 Demand Model results.”* (para 5.1.1 of Greenhouse Gas Report)
- 6.28 This lack of a robust report makes it very difficult to fully determine the impacts on carbon. It also means that the conclusions are just as vague, which results in the claim that HS2 is ‘broadly carbon neutral’. This claim deliberately ignores some significant impacts which would otherwise overturn the statement to read ‘highly carbon negative’. The information provided on the modal shift from air to rail is not clearly presented in the report. Further studies suggest the modal shift from to rail on the proposed route would not be enough to outweigh the operational and construction emissions. The most damaging omission for the report is a failure to acknowledge that any freed up domestic slots would be used for international slots. When a proper assessment of the carbon impacts is undertaken that factors in a shift of domestic slots to international, it is impossible to conclude that HS2 would be ‘broadly carbon neutral’. Given that HS2 has little or no impact on road emissions this multi billion pound ‘green’ transport scheme fails comprehensively to meet the green rhetoric of Phillip Hammond and the only part it plays in reducing UK’s ambitious emissions targets is a highly negative one.
- 6.29 In reality HS2 will increase the UK’s carbon emissions and will have a damaging affect on the UK’s attempts to meet an 80% reduction in CO2 emissions by 2050.