HOUSE OF COMMONS LIBRARY

BRIEFING PAPER

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High Speed 2: the business case, costs and spending

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Summary

High Speed 2 (HS2) is the ambitious programme to create a new high-speed rail service from London to Manchester and Leeds, via Birmingham and the East Midlands.

The strategic case for HS2

At the heart of the strategic case for HS2 is the desire to address capacity constraints on the north-south rail links in England. In the strategic case, the Government found that even with the train improvements and enhancements that it had already budgeted for, the capacity issue – particularly on the West Coast Main Line – would unlikely improve going forward without major capacity interventions.

The Government also found that there were connectivity issues across the country, which relates to the volume and length of time for journeys between cities.

Beyond the immediate transport concerns, the gap in productivity and economic growth between the South-East and other parts of England was recognised in the strategic case. The Government were of the view that the Core Cities outside London needed to be better connected to thrive and achieve higher levels of growth and to close the gap with the South-East.

The Government looked at several rail and other transport alternatives to address these issues. It took the view that the alternatives to HS2 did not address the long-term capacity challenge, nor did it provide a step change in north-south connectivity.

Capacity constraints

No other scheme can provide the step-change in capacity of HS2, whilst delivering the journey time improvements for passengers.

However, the analysis in the paper shows that much of the capacity constraints on the network, from a passenger crowding point of view, only occur during the peak periods of the day and on confined parts of the network. During most other periods of the day, trains are travelling at less than half of their capacity.

From a passenger crowding point of view, the additional capacity provided by HS2 on the West Coast Main Line appears to be over and above what is required to meet capacity pressures for several decades.

While the strategic alternatives to Phase 1 do not provide this same step-change, the increase would have been enough to ensure that there is sufficient capacity on the network during the busiest periods of the day. They can also be delivered at a much lower cost, and in the case of the West Coast Main Line constraints, they can be addressed for between 20 and 25% of the cost of HS2.

Some have questioned whether it makes sense for such a surplus of capacity to be delivered on one part of the network when other sections remain capacity constrained, particularly the lateral connections in the North of England as observed by the House of Lords Economic Affairs Committee.

The economics of HS2

The economic appraisal for HS2 captures the costs, benefits and changes in revenues for the whole of the rail network – not just those associated with the HS2 infrastructure. The latest business case estimates net transport benefits of £74.6 billion to be delivered from the full Y-network. Most of the benefits are delivered through journey time savings.

Although most users of HS2 would be leisure passengers, around two thirds of the quantified transport benefits are forecast to accrue to business users, with 40% of all benefits accrued to passengers starting their journeys from London.

A comprehensive breakdown of the costs for the full Y-network of HS2 has not been published since 2013. The most commonly used estimate of the costs for HS2 is the £55.7 billion for the full Y-Network. It is important to note that this is not a cost estimate, but rather a funding envelope that was determined by the Government at the time of the 2015 Spending Review. The former is an estimate of how much needs to be spent, the latter relates to what is available to spend.

The Government remains committed to delivering the scheme within this envelope. It stated at the time of the 2015 Spending Review in a Written Ministerial Statement that:

> The cost of HS2 has not changed since the Spending Review 2013. The Spending Review 2015 confirmed an overall budget of £55.7bn in 2015 prices. This is consistent with the £50.1bn (in 2011 prices) set in 2013, but has been uprated to take account of inflation.

It seems the estimated costs for the full Y-network of HS2 had risen and have been estimated in this paper to be around £65 billion at the time of the 2015 Spending Review. This estimate is derived using figures published by the National Audit Office (NAO) and the Department for Transport (DfT) in 2016 and 2017 about the estimated scale of efficiency savings that would be required to keep the project within the funding envelope.

Since then, HS2 Ltd and the DfT have sought to reduce the costs of the infrastructure for Phase 2b by around 40% from the 2015 Spending Review estimate, with the total savings ambition for Phase 2 of the scheme at around £12.8 billion (in 2015 prices). As at November 2016, £7.14 billion of these savings had been embedded in the Phase 2b cost estimate.

The revised cost estimate for the full Y-network, based on efficiency targets set out in the July 2017 financial case, is therefore £52.6 billion. This assumes that all anticipate savings are delivered. It should be noted that the NAO has expressed some uncertainty as to the deliverability of these savings, although the DfT are confident of achieving at least a high proportion of them.

In terms of spending, a March 2019 letter from HS2 Ltd Chief Executive Mark Thurston to the House of Lords Economic Affairs Committee stated that £4.3 billion had been spent. This figure was based on HS2 Ltd's 2018 Annual Reports and Accounts. A report from *The Times* in February 2019 suggested that a more recent estimate of spending was around £5.5 billion, which accounted for the purchase of land and property, legal fees, staffing, consultants and other overheads.

Speculation continues around HS2's costs and its future deliverability. The House of Lords Economic Affairs Committee concluded in May 2019 "that the costs do not appear to be under control" and the scheme "needs a rethink".

HS2 going forward

The scheme still retains widespread political support and the Government remains committed to its development. The Transport Secretary Chris Grayling insisted earlier in 2019 that not completing HS2 would be a betrayal of the Midlands and the North. Nevertheless, in June 2019 the Transport Secretary asked the Chair of HS2 Ltd, Allan Cook, to undertake a review of the project to "make sure the costs and budget are right" and "that it is deliverable".

A full business case for Phase One, with an updated cost estimate is expected later in 2019, which will inform what is called a 'Notice to Proceed'. This is the formal contractual process that enables each Phase One supplier to move from design and development to construction.

1. Background

1.1 About HS2

High Speed 2 (HS2) is the ambitious programme to create a new high-speed rail service from London to Manchester and Leeds, via Birmingham and the East Midlands. The programme is split into three phases:

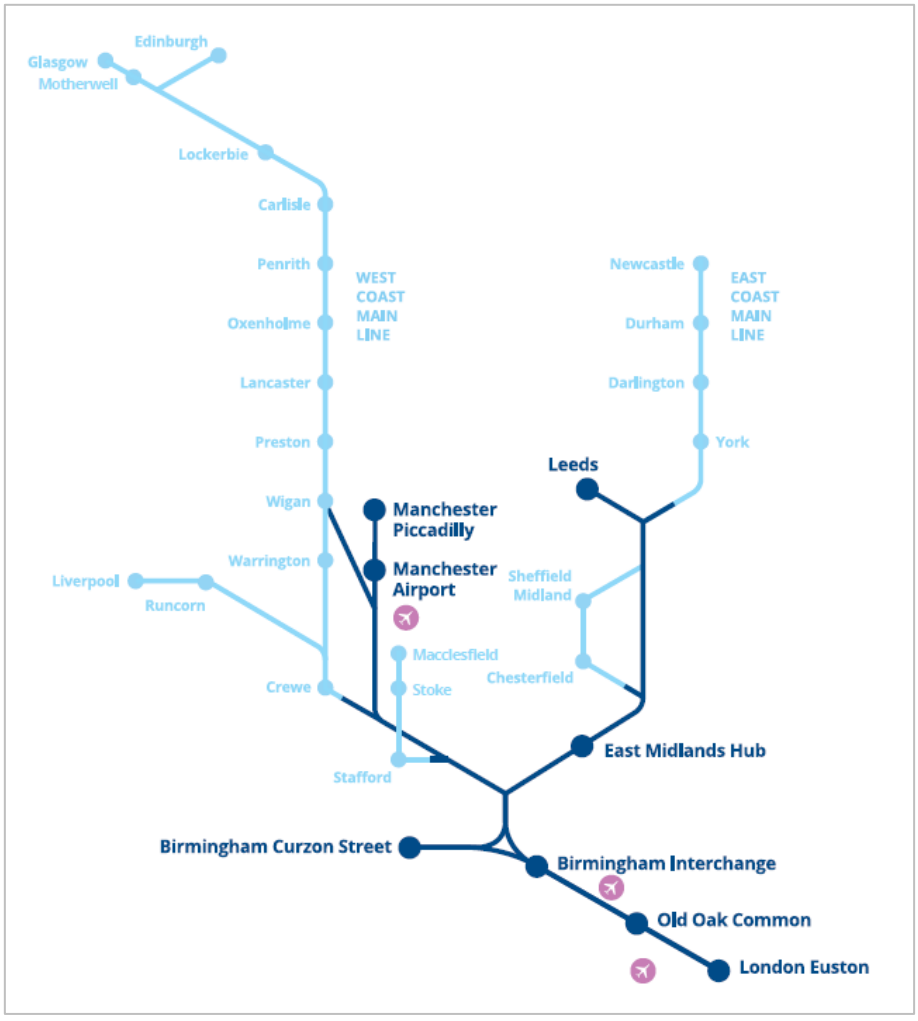
1 Phase 1, between London Euston and the West Midlands, is due to open in 2026;

2 Phase 2a, between the West Midlands and Crewe, is expected to open in 2027; and

3 Phase 2b, completing the full network to Manchester and Leeds, is due to open in 2033.

HS2 will eventually be connected to the existing rail network and "classic compatible" trains will be able to use the HS2 line to provide direct services from London to Glasgow and Edinburgh via the Western leg, and Newcastle via the Eastern Leg.

HS2 Route Map



The Department for Transport (DfT) is responsible for funding and sponsoring the programme and is ultimately accountable its successful

delivery of the benefits. In 2009, the DfT set up HS2 Ltd to deliver the programme and to maintain and manage the railway infrastructure once it opens.[1]

Phase 1 of the scheme has already been approved. The Government published the *High Speed Rail (London - West Midlands) Bill* in November 2013. It was carried over into the 2015 Parliament. It completed all its Parliamentary stages and received Royal Assent on 23 February 2017. The Government will decide on whether to issue a 'Notice to Proceed' later in 2019, which is the formal contractual process that enables each Phase One supplier to move from design and development to construction.[2] More information about Phase 1 of the scheme is available in the House of Commons library briefing paper *High Speed 2 (HS2) Phase 1*.

With respect to Phase 2a, the Government announced its preferred route in November 2015; launched compensation schemes and safeguarded the route. The hybrid bill to authorise the works for Phase 2a was published in July 2017. It received Second Reading in the House of Commons in January 2018, after which it went into a specially convened Select Committee where Petitions against the Bill are heard. The Committee published its second report on 27 July 2018. More information about Phase 2a of the scheme is available in the House of Commons library briefing paper *High Speed 2 (HS2) Phase 2a*.

With respect to Phase 2b, in July 2017 the Government issued a consultation on the eastern leg rolling stock depot and announced decisions on route refinements for that phase. This hybrid bill will include infrastructure enabling future Northern Powerhouse Rail services to use the HS2 network and vice versa. The Government launched a consultation on 11 proposed design refinements to the Phase 2b route in June 2019, including one of these pieces of infrastructure.[3] More information about Phase 2b of the scheme is available in the House of Commons library briefing paper *High Speed 2 (HS2) Phase 2b and beyond*.

1.2 About business cases

Ministers consider the evidence presented to them in a business case when making decisions on major investments. The business case is built up over time and contains all the relevant information regarding a proposed scheme investment. Each case is developed to reflect the type of proposal being considered, but will consistently set out in five cases, consistent with the HM Treasury Green Book, whether a proposal:

[1] The Department and HS2 Ltd have signed a Development Agreement which sets out their respective roles and responsibilities, sets out the sponsor's requirements, and outlines the arrangements for providing HS2 Ltd with funds to deliver the work, as well as the governance arrangements and terms under which the Department would require HS2 Ltd to improve performance.

[2] High Speed 2 Railway Line: Buckinghamshire: Written question – 246904, 24 April 2019

[3] DfT, HS2 Ltd, *HS2 Phase 2b design refinement consultation*, 6 June 2019

- is supported by a robust case for change that fits with wider public policy objectives - *strategic case*;
- demonstrates value for money - *economic case*;
- is commercially viable - *commercial case*;
- is financially affordable - *financial case*; and
- is achievable - *management case*.[4]

All five aspects of the business case are important, but the extent of their importance will depend on the nature and complexity of the proposal being considered. A major scheme's business case, such as HS2, is complemented with extensive detail and analysis across all five cases.

The idea behind having this framework is to ensure that an objective comparison can be made of investment proposals within and between projects and modes.[5]

For more background information about business cases and how they are applied for transport investments, see the Treasury and Department for Transport guidance documents, respectively.

[4] DfT, *Transport business case: assessment and process procedures*, 18 December 2017
[5] DfT, *The Transport Business Cases*, January 2013

2. Strategic case

While HS2 Ltd was set-up in 2009,[6] the case to have a high-speed railway running through the centre of Britain was first formally made in the Labour Government *High Speed Rail* White Paper in 2010.[7] The Coalition Government later published *The Strategic Case for HS2* in October 2013, which provides arguably the most detailed explanation of why the Government has decided to pursue this scheme, as compared with the alternatives available.[8] More recently, the Conservative Government published *HS2 Phase Two Strategic Case* and provides further detail on their rationale for pursuing the scheme beyond the West Midlands.[9]

This section of the paper summarises the Government's reasons for building HS2, including what the underlying problems are that need addressing (Section 2.1) and how HS2 is the only viable option to resolve those problems (Section 2.2). In short, the Government's desire to pursue HS2 is underpinned by a perceived need to: address capacity constraints on the West Coast Main Line; and to deliver improved connectivity benefits through journey time reductions. The expectation following these improvements is that it will contribute to wider economic growth. Section 2.3 analyses the extent of the capacity constraints identified in the Government's strategic case, particularly in the form of passenger crowding. Finally, the reasons for supporting HS2 have received considerably political and industry support, but they have not been without scrutiny. Section 2.4 seeks to briefly outline the focus of scrutiny around the strategic case for HS2.

2.1 What is the problem?

At the heart of the strategic case for HS2 is the desire to address **capacity constraints** on the north-south rail links in England. Rail capacity is dependent on two things:

1 train capacity (how many people each train can carry); and

2 route capacity (how many trains there are).

The Government, in its 2013 strategic case, said that the existing capacity constraints were reflected in the limited train paths available on the West Coast Main Line, despite upgrades to the line that were completed in 2008. It also identified what it described as "severe crowding" on individual trains.[10] It said that train performance and reliability on the West and East Coast Main Lines was suffering because of the capacity constraints and that the commuter and intercity services were regularly failing to meet their performance targets.[11] The

[6] DfT, *The role and funding of High Speed Two Ltd.*, 14 January 2009
[7] DfT, *High Speed Rail*, March 2010
[8] DfT, HS2 Ltd, *The strategic case for HS2*, October 2013
[9] DfT, HS2 Ltd, *HS2 Phase Two strategic case*, July 2017
[10] op cit., *The strategic case for HS2*, p12
[11] Ibid, p16

Government noted that the congestion on the routes was having a knock-on effect through reactionary train delays.[12]

The 2013 HS2 Economic Case modelled future long-distance passenger demand to increase at a rate equivalent to 2.2% per annum.[13] On this basis, the Government believed that even with the train improvements and enhancements that it had already budgeted for, the capacity issue would unlikely improve going forward without major capacity interventions.[14] It said that routes into major cities would be particularly capacity constrained in the future without the future enhancements.

The Government also believed that there were **connectivity issues** across the country, which relates to the volume and length of time for journeys between cities. The Government said that it wanted to deliver "more frequent, more reliable and faster journeys between our major economic centres."[15]

Beyond the immediate transport concerns, **the gap in productivity and economic growth between London and the South-East** was recognised in the strategic case. The Government believed that the Core Cities outside London "needed to be better connected to thrive and achieve higher levels of growth" and to close the gap with the South-East.[16]

2.2 Why HS2?

Based on the problems described above, the Government set out two overarching objectives for the HS2 programme in its 2013 strategic case:

1 provide **sufficient capacity** to meet long-term demand, and to improve resilience and reliability across the network; and

2 **improve connectivity** by delivering better journey times and making travel easier.[17]

It added that any solution proposed must: minimise disruption to the existing network; use proven technology; be affordable and represent good value to the taxpayer; and minimise impacts on local communities and the environment.[18]

The Government looked at several rail and other transport alternatives to meet the objectives above, the details which are outlined in two strategic alternatives papers produced by Atkins in February 2011 and October 2013. The main rail option considered alongside building new capacity was incremental improvements to the existing network. The Government said that this option was still expensive and would cause unacceptable disruption to existing operations:

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[12] op cit., *The strategic case for HS2*, p13
[13] Ibid, p16
[14] Ibid, p56
[15] Ibid, p81
[16] Ibid, p40
[17] Ibid, p18
[18] Ibid

> Delivering still more capacity by carrying out infrastructure works to the existing railway would require the laying of new tracks alongside existing railways and the introduction of major junction improvements. However we know from previous experience that the scale of work needed, largely alongside existing 'live' railways, would bring huge disruption to services over many years. The most extensive alternative of this kind that we have examined might take as long as HS2 to build, would cost at least £20bn and would require closures for more than 2,500 weekends to allow construction works to be carried out. This alternative would effectively be untenable because of the scale of disruption.

To summarise, the Government believed that the alternatives to HS2 do "not address the long-term capacity challenge, nor does it provide a step change in north-south connectivity."[19] It concluded that "the evidence points to building a new north-south railway as the only way to meet all" the above objectives.[20]

The choice was then between a conventional railway and a new high-speed line. In justifying a high-speed line, the Government said that:

> A new high speed line would cost 9% more than a conventional railway and, in certain respects, would have higher environmental costs, but the difference in price and the relatively higher environmental impact is more than outweighed by the economic benefits to be gained from radically reducing journey times and improving connectivity between our main cities. Given the scale of the investment, therefore, and in terms of the future wellbeing of the country as a whole, a high speed line would be preferable to a conventional one.[21]

From an economic growth point of view, the Government believed that there was a strong link between transport investment and economic growth and that this sort of investment could help "growth in the regional economies" and "create opportunities for regeneration."[22] This was emphasised further in the 2017 Strategic Case that explained that:

> HS2 will help to build an economy that works for everyone. It will support the growth of knowledge-based businesses by better connecting towns and cities. It will strengthen labour markets, creating greater competition and economies of scale, leading to higher growth and living standards.[23]

2.3 How bad are the capacity constraints?

A relatively bleak picture was painted by the Government in terms of the West Coast Main Line (WCML) and its capacity to meet future demand on the network. The decision to proceed with HS2 was therefore primarily driven by the need to alleviate capacity constraints on the WCML and later through Phase 2, on the East Coast and Midland Main Lines.

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[19] op cit., *The strategic case for HS2*, p19
[20] Ibid, p19
[21] Ibid, p21
[22] Ibid, p10
[23] DfT, *High Speed Two Phase Two -Strategic Case*, July 2017, 7

The extent of the existing capacity constraints has been brought into question by the House of Lords Economic Affairs Committee (EAC) in their two reports published on economics behind proceeding with HS2.[24] This section of the paper seeks to elaborate on that discussion by first outlining recent trends in passenger journeys, particularly on those parts of the network most impacted by HS2. It then details the location, timing and extent of current capacity constraints on the WCML and other city centres affected by an expanded HS2.

Importantly, the final section of the paper outlines how demand growth expectations have changed in recent years and examines what HS2 will deliver in terms of future capacity and how those benefits compare against the strategic alternatives considered previously to enhance capacity on the WCML.

Summary

In summary, the analysis below reveals that while there are capacity constraints, the acute pressures are limited to selected sections of the network and during small windows of the day. Further, while the strategic alternatives to Phase 1 will not provide the same step-change in capacity as HS2, the increase will be enough to ensure that there is sufficient capacity on the network during the busiest periods of the day. They can also be delivered for a much lower cost, and in the case of the WCML, the constraints can be addressed for between 20 and 25% of the cost of HS2. However, these interventions would result in closures and disruption on the network, which was considered as an unacceptable in the Government's assessment of the Strategic Case.

Overall passenger demand

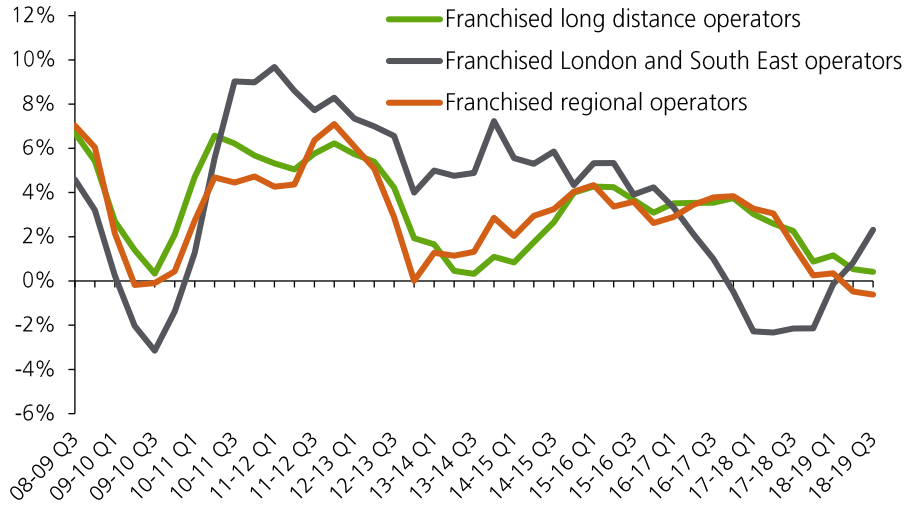
When the strategic case for HS2 was originally produced, demand growth had been relatively strong in the preceding years. It was forecast that this growth would continue at a relatively solid rate, albeit less than what was realised in the period since privatisation. Rail passenger growth has slowed in the years since the strategic case for HS2 was first presented. In the period since the recession in 2008-09, annual passenger growth peaked at around 8% in 2011. It has trended down since then and the growth in passenger numbers was negative in 2017-18.

The slowdown in passenger growth in 2017-18 was felt most acutely by franchised London and South-East operators, which saw passenger journeys decline for the first time since the Global Financial Crisis and only the second time since privatisation (figure below). Demand has recovered to positive levels since but remain below the levels of growth

[24] House of Lords Economic Affairs Committee, *The Economics of High Speed 2*, 1st Report of Session 2014–15, HL Paper 134, 25 March 2015; House of Lords Economic Affairs Committee, *Rethinking High Speed 2*, 6th Report of Session 2017–19, 16 May 2019

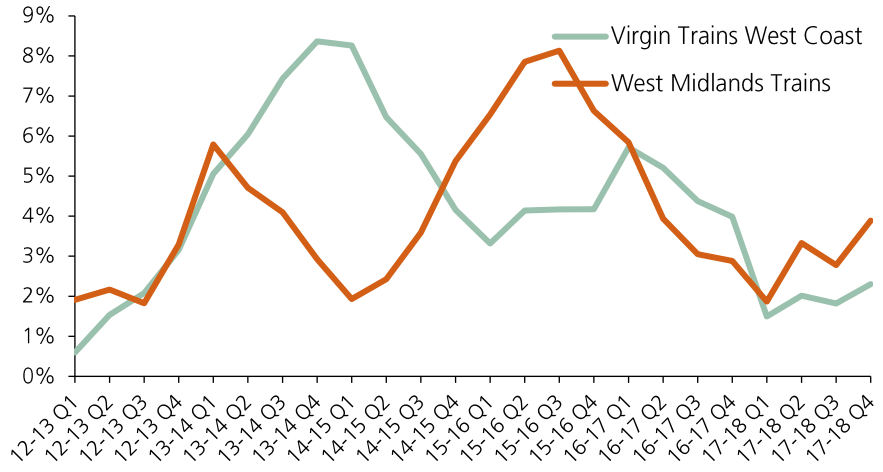
realised earlier in the decade. Importantly, and in the context of HS2, passenger growth on long-distance franchises has been slowing for the better part of the last five years.

Passenger journeys, by sector, four-quarterly moving average[25]



Those franchises that account for most passenger journeys on the WCML have also seen passenger growth slow in recent years (figure below). Growth on the West Coast franchise, operated by Virgin, has recovered somewhat over the past year but remains well below the growth of around 8% realised in 2014. The West Midlands franchise has followed a similar trend, although its growth has recovered more since the beginning of 2017-18.

Passenger journeys, by train operating company, four-quarterly moving average[26]

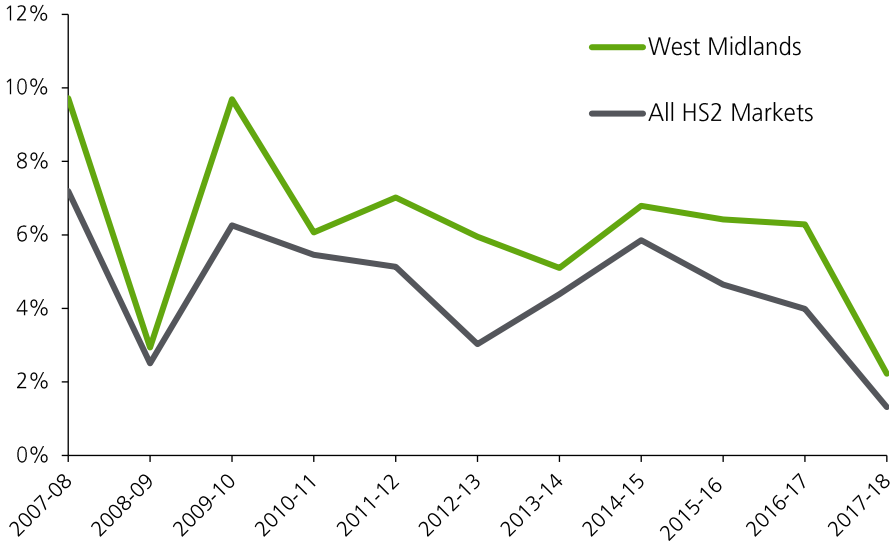


Passenger growth has also slowed between London and other HS2 markets. In 2017-18, passenger journeys between London and the West Midlands grew by 2%, below the decade average of 6%. In 2017-18,

[25] ORR, Passenger journeys by sector - Table 12.6 [accessed 6 June 2019]
[26] ORR, Passenger journeys by train operating company - Table 12.12 [accessed 6 June 2019]

passenger journeys between London and all HS2 markets[27] grew by 1%, below the decade average of 5% (figure below).

Passenger journeys by rail to and from the London regions[28]



Train path capacity

One of the key points that was made in the strategic case for HS2 was that the WCML was the busiest mixed-traffic rail corridor in Europe[29] and that it was already operating at, or close to, capacity in the peak[30] and did not have the capacity to offer the required train paths to meet future demand growth.

There is no disputing the fact that currently the WCML is capacity constrained in terms of the number of train paths available. To explain further, there are currently 15 trains operating on the WCML Fast Lines into Euston in most peak hours of the week. This is more than the 13-14tph envisaged at the time of the WCML upgrade due to the pressure to run more outer-suburban commuter services.[31]

As noted in the latest detailed analysis of the available train path capacity on the WCML, there is little if any additional capacity to run more services due to a "combination of physical constraints with the infrastructure and the complex mix of traffic that operates on this rail corridor."[32] The approaches to the main city were identified as being the most susceptible to these constraints, particularly on the approaches to London, Birmingham and Manchester, Leeds and Liverpool (see figure below).

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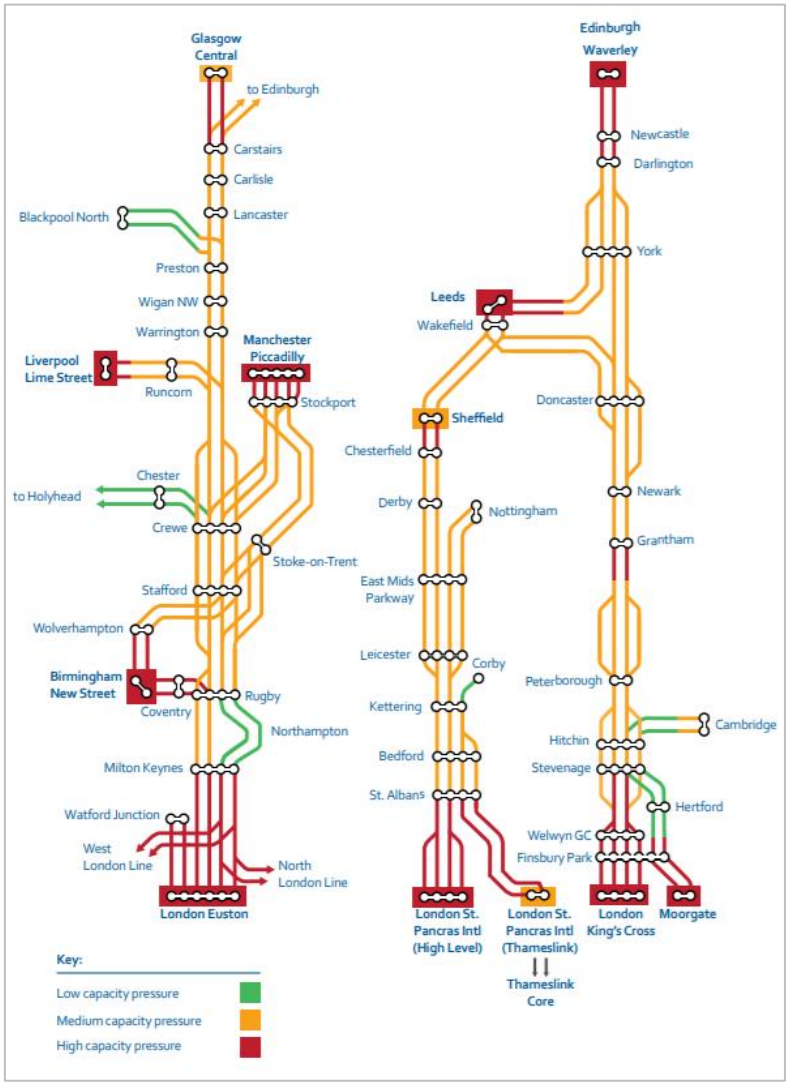
[27] HS2 markets include the East Midlands, North East, North West, West Midlands and Yorkshire and the Humber.
[28] ORR, Regional rail journeys – London – Table 15.4 [accessed 6 June 2019]
[29] op cit., *The strategic case for HS2*, p54
[30] DfT, *Technical Annex: Demand and Capacity Pressures on the West Coast Main Line*, November 2015, p41
[31] Ibid, p39
[32] Ibid

Route capacity, in terms of train paths, is only one part of the capacity equation; the other being train capacity, that is, how many people that can fit onto the trains. While the train paths are nearing capacity, what does this mean in terms of crowding on the trains? How bad it is and when and where are the worst places impacted by crowding on the WCML? These points are addressed in the following section.

Expert judgement on post-2019 capacity pressures on North-South main lines[33]



Crowding

Crowding on trains can be considered either in terms of: the number of seats available for passengers; or whether it is carrying more passengers (both seated and standing) than its stated capacity. Across both metrics, crowding on trains on the WCML, as well as on key trains arriving into HS2 cities, is limited to a selection of services and only during the peak hours of the day.

To illustrate, on all the key stations impacted by HS2 – even London Euston – the total number of seats available on services exceeds the total number of passengers carried during the peak periods of the day.

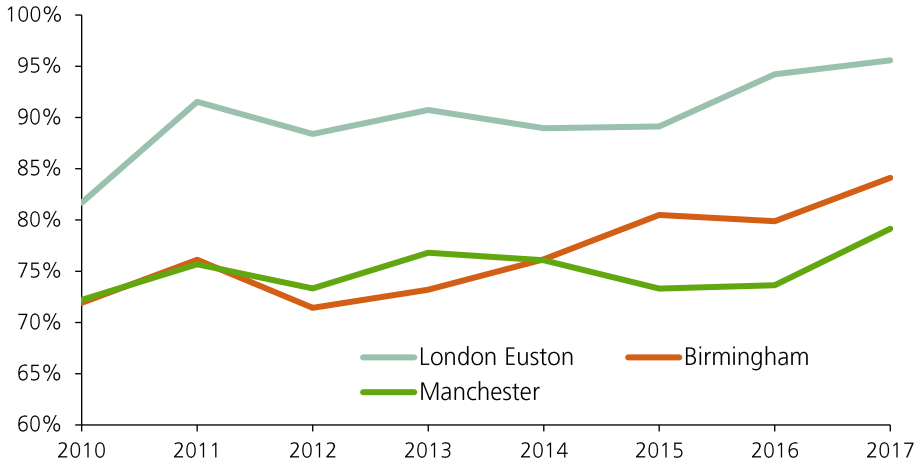
[33] op cit., *The strategic case for HS2*, p59

That is not to say that all trains have spare capacity, in fact, many are crowded and have standing passengers. Rather, en masse, there is still a surplus of capacity in terms of passenger carrying capacity during the peak. When considered across the day, all other stations, except for London Euston, are operating at less than half their passenger carrying capacity in terms of seat availability (figure below).

City centre AM peak and all-day arrivals, passengers as a % of total seats, by rail on a typical autumn weekday, by city, 2017[34]

That is not to say that the situation is improving. Seat availability during the peak has been decreasing in recent years across all three major cities along the HS2 route (figure below).

City centre peak arrivals by rail, total passengers as a % total seats, on a typical autumn weekday, 2010-2017[35]

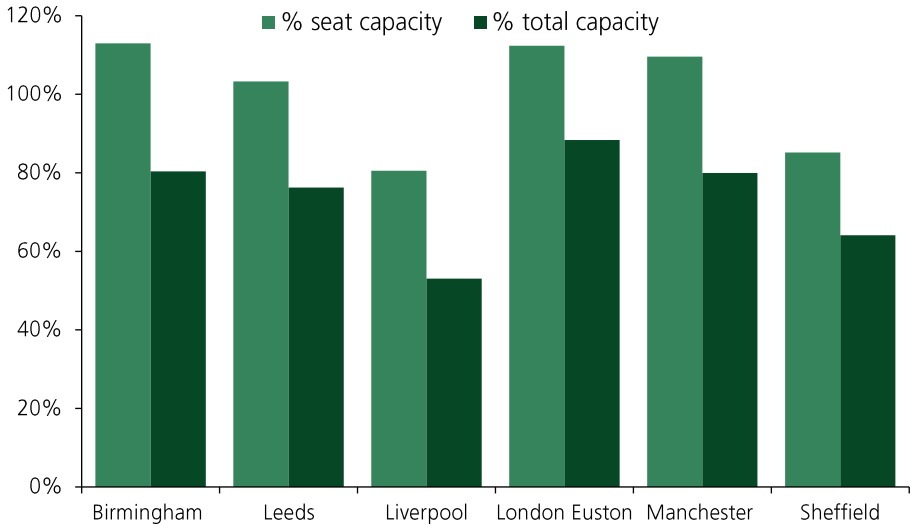


The passenger carrying capacity can also be understood in terms of the seat-availability at the point when the network is carrying the most passengers during the peak. The figure below shows that seat availability is exceeded on services at this point in London Euston,

[34] DfT, Rail passenger numbers and crowding on weekdays (RAI02) [accessed 10 June 2019]
[35] DfT, Rail passenger numbers and crowding on weekdays (RAI02) [accessed 6 June 2019]

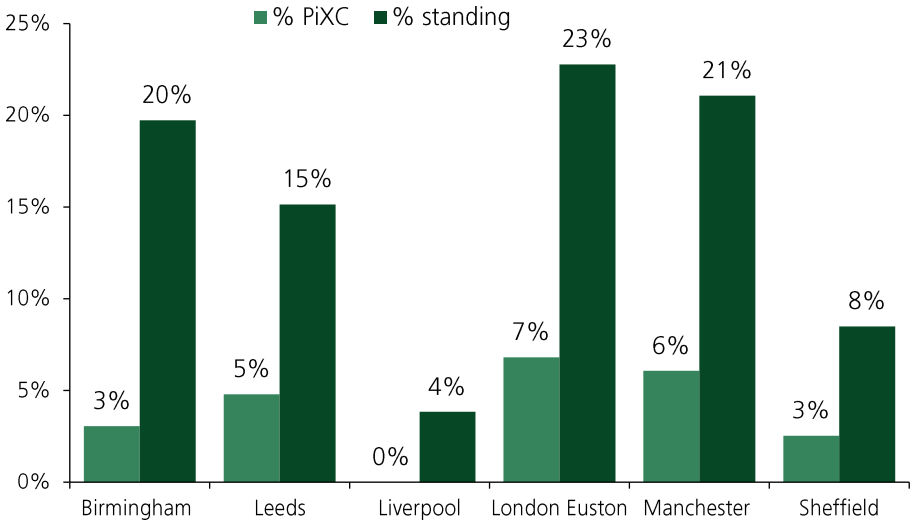
Birmingham, Manchester and Leeds, but that there is still surplus carrying capacity in terms of standing space.

Peak rail capacity, standard class critical loads as a % of seat and total capacity, on a typical autumn weekday by city: 2017[36]



The passengers in excess of capacity (PiXC) indicator provides a greater understanding of the acute crowding pressures on trains. It specifically measures the number of standard class passengers on a service that are in excess of the standard class capacity. The figure below shows that during the busiest hour of the day, 7% of all passengers on London Euston service were carried in excess of a train's stated capacity and that 23% of passengers were standing.

Proportion of PiXC and standing passengers, 1-hour peak, 2017[37]

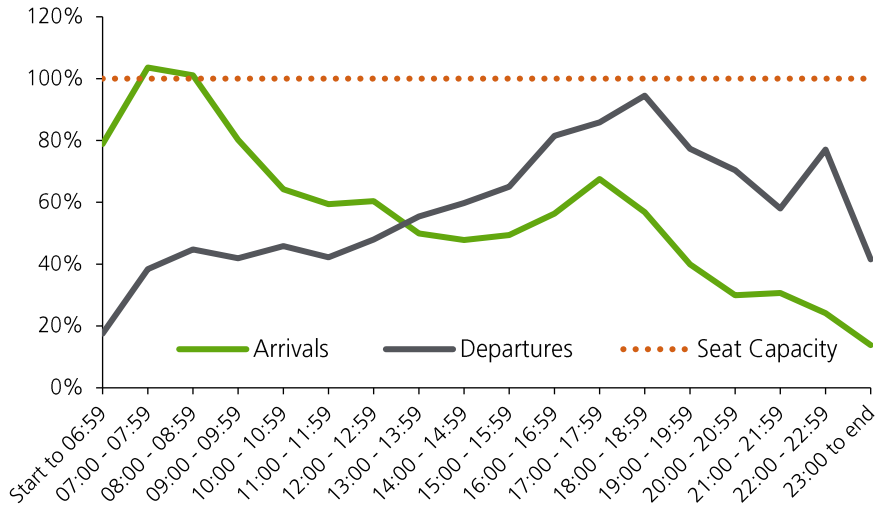


To get a greater understanding how demand is spread over the day, passenger capacity on the network by can understood in terms of the total passengers as a proportion of total seat capacity for each hour of the operating day. The figures below show that for the two busiest city

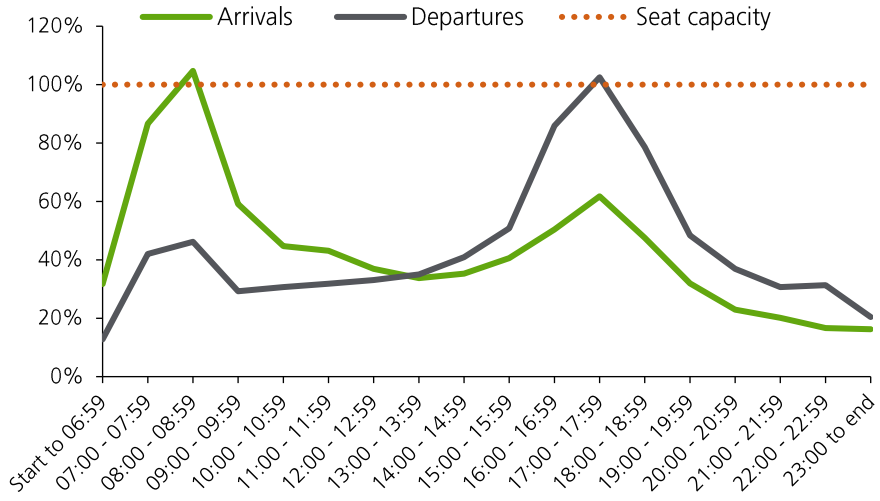
[36] DfT, Rail passenger numbers and crowding on weekdays (RAI02) [accessed 6 June 2019]
[37] Ibid

centres of the HS2 route – namely London and Birmingham – passenger demand only exceeds seat capacity during the busiest periods of the morning peak, and the evening peak in the case of Birmingham. During most other periods of the day, trains are operating at less than half of their seating capacity.

Arrivals and departures by rail on a typical autumn weekday, total passengers as a % total seats, Euston station and by time band, 2017[38]



Arrivals and departures by rail on a typical autumn weekday, total passengers as a % total seats, Birmingham and by time band, 2017[39]



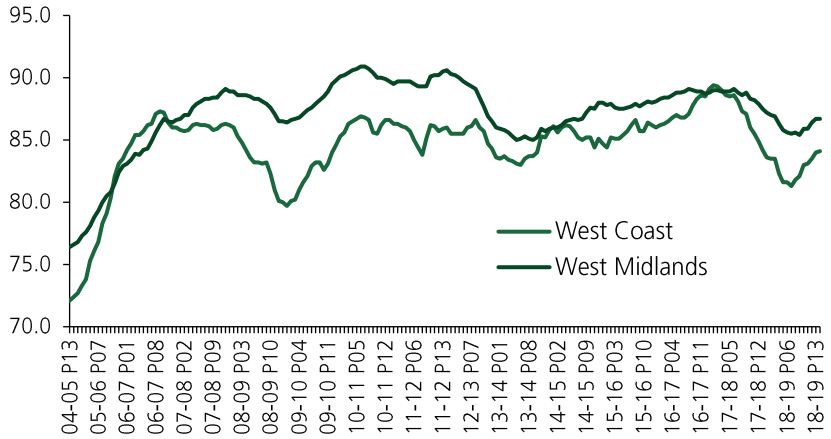
Performance of operators

The concerns expressed at the time when the HS2 strategic case was produced were that the limited train paths on the WCML would reduce the resilience of the network and potentially have knock on performance impacts on train operators. At the time, the evidence presented to suggest this was the case was the decline in punctuality of

[38] DfT, Rail passenger numbers and crowding on weekdays (RAI02) [accessed 6 June 2019]
[39] Ibid

WCML operators. Punctuality has improved for most of the period since then despite no additional train path capacity being added; although it should be noted that punctuality has dipped in the last year or so.

Public performance measure of West Coast Main Line franchises, moving annual average, 2004-05 to 2019-20[40]



The concern from the potential deterioration in performance and resilience on the WCML was that it would translate into worse journey satisfaction for passengers. Passenger satisfaction on the West Coast franchise remains relatively high at 90% and has remained at these levels for the past handful of years.[41] The West Midlands franchise is lower at 84% but has fluctuated at this level since Spring 2014.[42] It should be noted that several factors combine to determine a passenger's satisfaction with a journey. In the case of both franchises, passengers were most dissatisfied with the value for money for their journeys.

Longer term demand and capacity and crowding expectations

Passenger demand

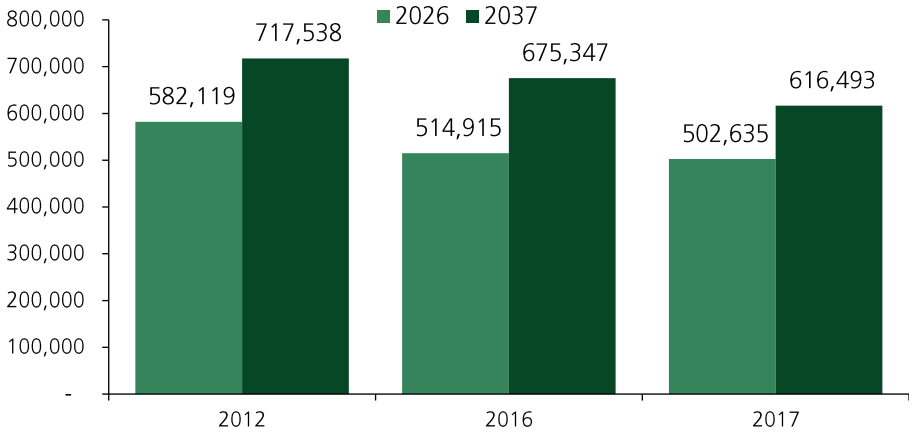
It is difficult to understand with complete confidence how passenger demand forecasts have varied since the strategic case was first published. This is largely because the demand forecasts have not been published in a readily comparable manner.

Based on the best available evidence, it appears that the longer-term forecasts for rail demand have been lowered since the strategic case was presented in 2013. The 2017 economic case reveals that long-distance rail demand is forecast to increase at 1.9% per annum to 2037,[43] compared with the 2.2% per annum growth forecasts in

[40] ORR, Public Performance Measure by TOC (periodic) - Table 3.57 [accessed 6 June 2019]
[41] Transport Focus, *Rail passenger satisfaction at a glance: Virgin Trains – Autumn 2018*, 29 January 2019
[42] Transport Focus, *Rail passenger satisfaction at a glance: West Midlands Trains – Autumn 2018*, 29 January 2019
[43] DfT, *High Speed Two Phase Two – Economic Case*, July 2017, p11

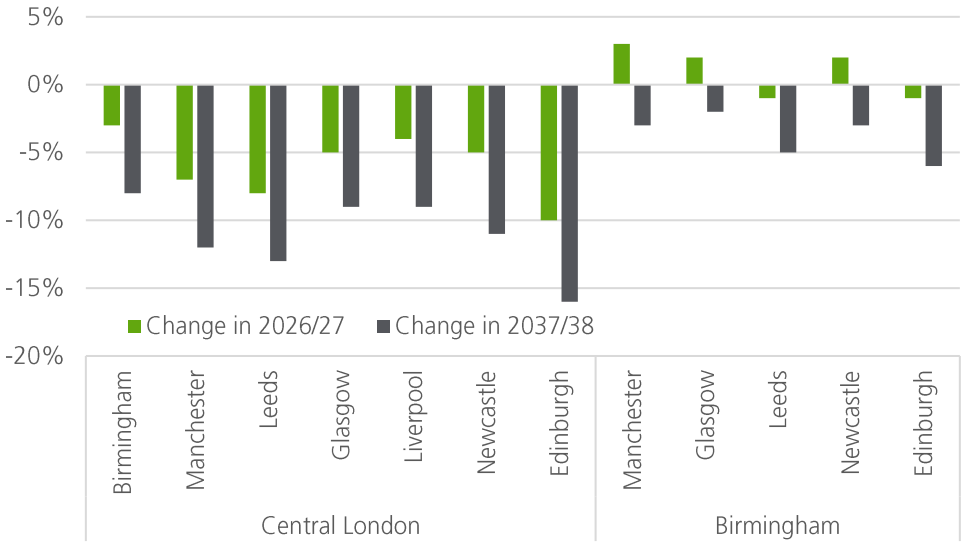
2013.[44] Further, the latest forecasts for long-distance rail demand growth in 2037 are 14% lower than when they were published in 2012.

Forecasts long-distance rail demand, total daily trips, 2026 and 2037, by forecasts year[45]



The forecasts for lower demand are much more pronounced for journeys between London and other UK centres. For example, long distance rail demand is anticipated to be 3% lower between London and Birmingham and up to 10% lower to Edinburgh (figure below).

Change in demand for key rail movements, total daily trips in both directions[46]



Capacity and crowding on the WCML

It was publicised in the strategic case that HS2 would provide a step-change in capacity on the WCML, freeing up train paths and leading to reduced levels of crowding for passengers. There is no other way of providing such a step-change than through a new rail line.

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[44] op cit.,*The strategic case for HS2*, p16
[45] DfT, HS2 Ltd, *PFM v4.3: Assumptions report*, October 2013;DfT, HS2 Ltd, *PLANET Framework Model PFM v7.1 Demand forecasting report*, July 2017
[46] HS2 Ltd, *PLANET Framework Model PFM v7.1 Demand forecasting report*, July 2017, Tables 16-17, p24-25

Yet, as we have seen from analysis earlier in this section, much of the capacity constraints on the network from a passenger crowding point of view, only occur during the peak periods of the day and on confined parts of the network. Most other periods of the day trains are travelling at less than half of their capacity. Given this, is this step-change necessary to alleviate the crowding at these most constrained parts of the network?

There are question marks as to whether a step-change in capacity is necessary to alleviate the most constrained parts of the network. One of the alternatives considered by Government before it decided to proceed with HS2, could have alleviated the capacity constraints on the WCML at a much lower cost than HS2.

To explain further, the main rail alternative assessed by Government as a substitute for HS2 was termed collectively as the 'Strategic Alternative'. The main substitute to alleviate capacity on the WCML was termed 'P1'. This involves a combination of infrastructure and rolling stock changes, priced at £2.5 and £2.4 billion respectively (in 2011 prices).[47] The total upfront cost of the P1 proposal is around £4.9 billion, this is significantly less than the £21.4 billion (in 2011 prices) estimated at the time for Phase 1 of HS2. The cost has since risen to £27.4 billion (in 2015 prices).

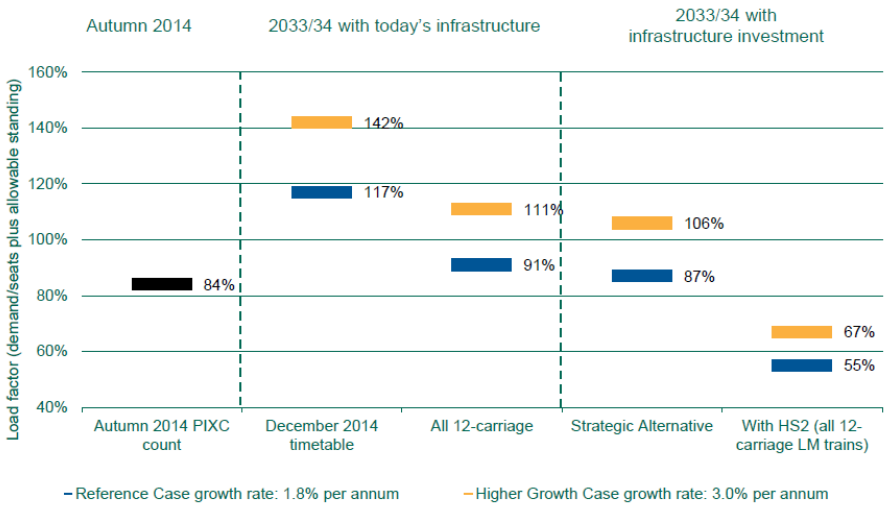
In terms of route capacity, the Strategic Alternative (i.e. the P1 proposal) will increase WCML Fast Line capacity so that 16tph into/from London Euston can be delivered consistently throughout the peak rather than in exceptional single hours.[48] This is far less than what is offered by HS2 for Phase 1, which will increase Fast Line route capacity in terms of paths/hour from 15-16tph to 23tph whilst providing an additional 2tph on the Slow Lines.

While there is a noticeable difference in route capacity offered, how does this translate into future crowding on the WCML?

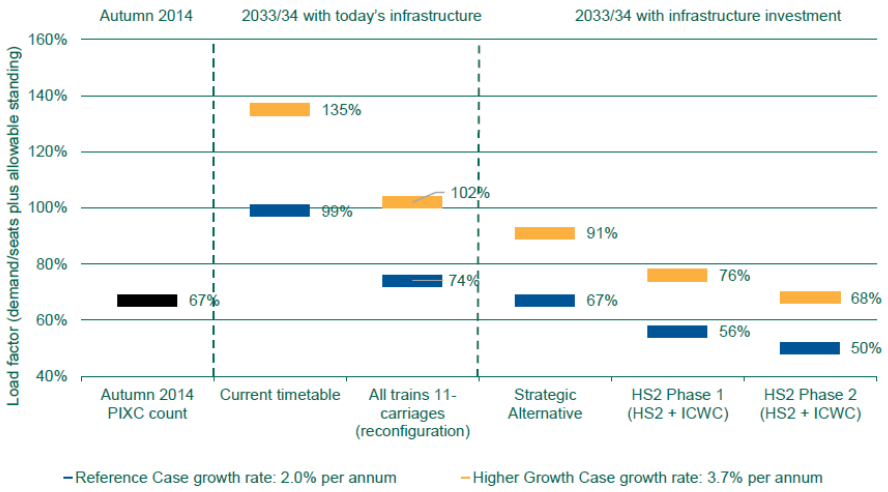
In short, the Strategic Alternative, under the central case, is forecast to meet the capacity constraints during the AM peak on West Midlands franchise services and provide some spare capacity in 2033/34 (first figure below). HS2 will provide more spare capacity than the Strategic Alternative but is arguably surplus to what is required to meet demand during the peak. In terms of the ICWC franchise services, the surplus in capacity during the peak offered by HS2 is even more pronounced. The strategic alternative can meet the capacity during the peak on these services, whilst offering 33% in spare capacity (second figure below).

[47] Comprehensive detail on the Strategic Rail Alternative is available in this 2013 Atkins report published by the DfT.
[48] op. cit., *Technical Annex: Demand and Capacity Pressures on the West Coast Main Line*, p49

Forecast WM 2033/34 AM Peak load factors on arrival at Euston (demand/seats and allowable standing)[49]



Forecast ICWC and HS2 2033/34 weekday PM Peak (16:00–19:59) load factors[50]



What the figures above show is that HS2 is not just managing capacity constraints on the network, but it is delivering a considerable surplus of passenger capacity during the peak period on this part of the network. One might question whether it makes sense for such a surplus of capacity to be delivered on one part of the network when other sections remain capacity constrained, particularly the lateral Northern connections as observed by the House of Lords Economic Affairs Committee.[51]

[49] op. cit., *Technical Annex: Demand and Capacity Pressures on the West Coast Main Line*, p84
[50] Ibid, p91
[51] House of Lords Economic Affairs Committee press notice, *HS2 needs a major rethink*, says Lords report, 16 May 2019

2.4 Scrutiny on the strategic case

The strategic case has been subject to scrutiny over the years, with the most notable Parliamentary scrutiny coming from the House of Lords Economic Affairs Committee (EAC) in the two reports they published in 2015 and 2019.

In the first report, the EAC concluded that the Government had "yet to make a convincing case for proceeding with the project."[52] On the issue of capacity, the EAC said that it had "not seen convincing evidence that the nature of the capacity problem warrants building HS2."[53] It said that while the West Coast Main Line was nearing full capacity in terms of train paths, there is not an overcrowding problem on trains. It also believed that technological innovations, such as in-cab signalling, could release capacity.

On the issue of rebalancing economic growth, the EAC said that "London was likely to be the biggest beneficiary from HS2"[54] and that "the Government has not considered whether this could be better achieved by investing in improving regional links between northern cities."[55] This point relates more generally to the arguments made by several stakeholders around the opportunity cost of HS2. That is, how else could the money have been spent and would it have offered better value for money than HS2 (see box below).

Opportunity cost of HS2

There are some that believe the benefits of HS2 could have been delivered in other ways. A group of transport academics and planners published a paper in 2016 summarising the alternative studies that had been carried out, looking at how to achieve the stated benefits of HS2 for less money, while dispersing works across the country.[56]

There are others who argue that, considering the long term under-investment in public transport in the North, money should be spent on alternative transport schemes in the region, as a substitute for HS2.[57] Supporters of HS2 argue that the Government is planning to invest in rail and roads across the North, so it is not a case of having to lose one to fund the other.[58]

Others argue that HS2 funding could be used to support housing or the NHS. In May 2018 *The Times'* Economics Editor, Philip Aldrick pointed to the 'symmetry' of a 3% increase in NHS spending for five

[52] House of Lords Economic Affairs Committee, *The Economics of High Speed 2*, 1st Report of Session 2014–15, HL Paper 134, 25 March 2015, p5
[53] Ibid
[54] Ibid, p85
[55] Ibid, p5
[56] May, Tyler et al., *HS2 and the railway network : the case for a review*, May 2016
[57] e.g. "Andrew Vine: Scrap the waste of money that is HS2 and fix the North's rail services", *Yorkshire Post*, 28 August 2018
[58] See, e.g. DfT press notice, "Northern transport investment to help create thousands of jobs", 25 June 2018

or perhaps ten years costing about £4.7 billion more a year and the fact that from 2019, the Government "has set aside almost precisely the same amount for HS2, £4.8 billion annually".[59]

The conclusions of the EAC's 2019 report largely reaffirmed the Committee's previous findings. It was critical of the Government for not carrying out the economic assessment it had requested in the first report to understand whether the economic benefits for the North of England would be greater if the money dedicated to HS2 was spent in improving East-West links between northern cities. On the issue of capacity, the Committee said that "the conclusions in our 2015 report on capacity problems remain valid", adding that:

> …overcrowding is a problem on commuter services rather than long-distance services. This is a problem that High Speed 2 addresses indirectly and in full only for London commuters using Euston, who will be the main beneficiaries of the overcrowding relief provided by the project.[60]

The Committee concluded that "Northern Powerhouse Rail is required more urgently than High Speed 2"[61] and said it regrets that "that construction of High Speed 2 started in the south rather than the north."[62] It should be noted that HS2 began in the South primarily as a means of addressing capacity constraints on the WCML.

[59] "We can stop NHS going off the rails, but who would dare make the call?", *The Times*, 26 May 2018
[60] House of Lords Economic Affairs Committee, *Rethinking High Speed 2*, 6th Report of Session 2017–19, HL Paper 359, 16 May 2019, p19
[61] Ibid, p4
[62] Ibid, p6

3. Economic case

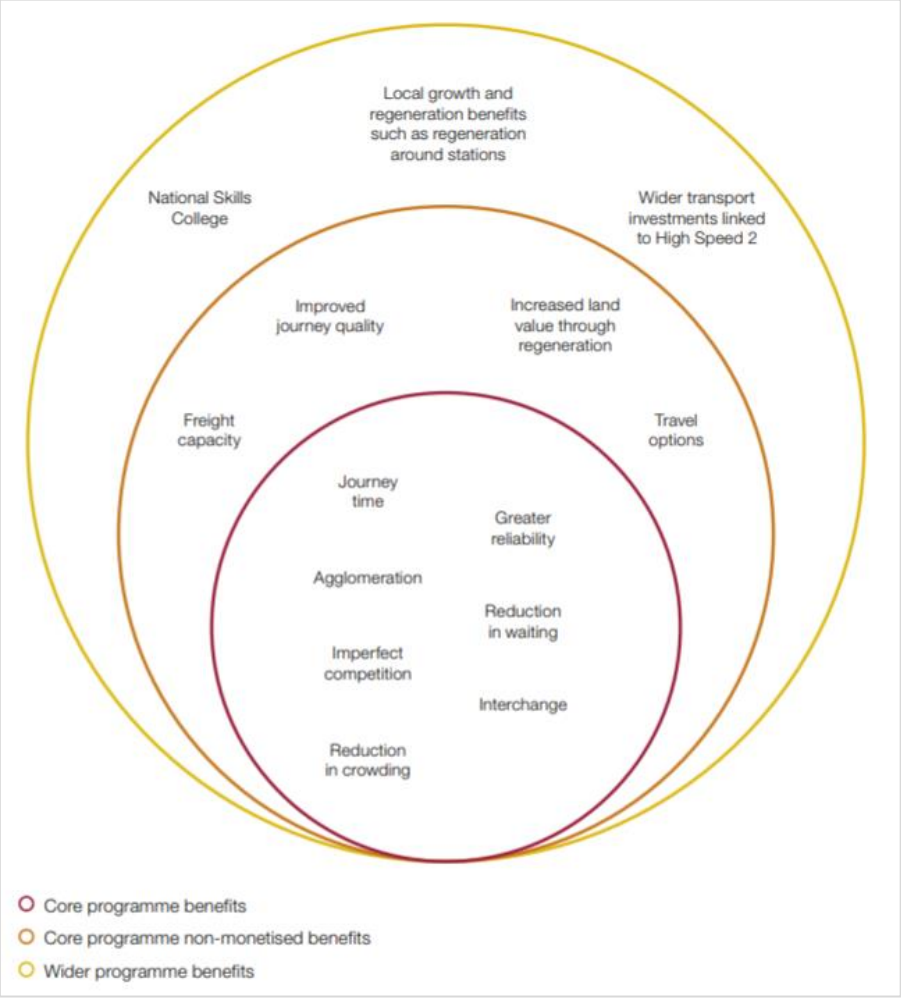
There are two main categories of benefits that are assessed as part of the economic appraisal for HS2:

1 **Transport user benefits** that travellers enjoy directly because of HS2, for example due to reductions in travel time or crowding (Section 3.1).

2 **Wider economic impacts** such as productivity gains through agglomeration, arising from the fact that businesses and workers are brought closer together through quicker travel times (Section 3.2).[63]

Other economic benefits such as regeneration around stations are not captured as part of the conventional appraisal. It is much more difficult to reliably estimate these benefits. Further, a portion of these benefits will not necessarily be delivered within the current funding envelope for the scheme (Section 3.3).

Core and wider programme benefits[64]



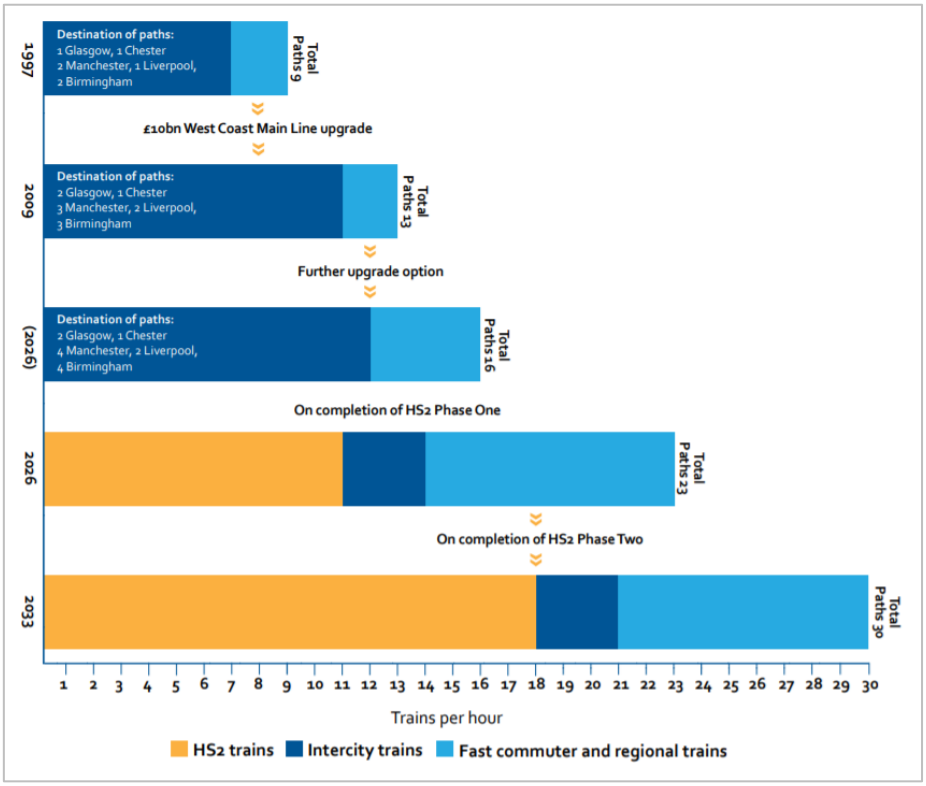
[63] House of Lords Economic Affairs Committee, *Rethinking High Speed 2*, 6th Report of Session 2017–19, HL Paper 359, 16 May 2019, p23
[64] Op cit., *Progress with preparations for High Speed 2*, p35

3.1 Transport benefits

The immediate beneficiaries from HS2 will be those travelling between London and the West Midlands and beyond using HS2, as well as those using the existing rail network. The benefits that will be delivered from this, include:

- A significant increase in intercity and commuting capacity on the rail network. HS2 will result in the delivery of 14 high-speed trains per hour capability in Phase One (with 11 used in the initial specification), rising to 18 trains per hour in Phase Two (figure below).

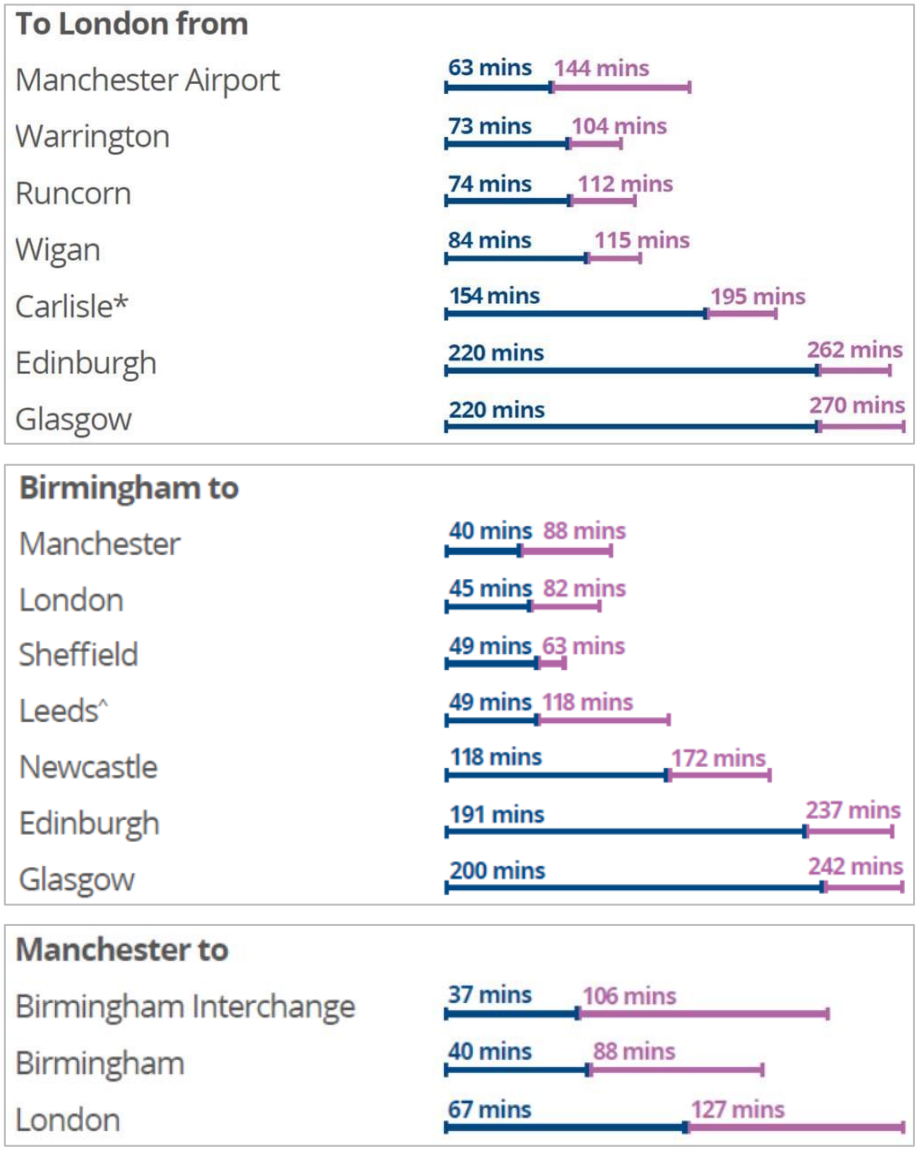
Peak period fast lines departing Euston[65]



- As long-distance services transfer onto HS2, capacity will be released on the existing network to introduce new services. Phase One of HS2 will relieve the West Coast Main Line, with Phase Two relieving the Midland and East Coast Main Lines. This released capacity will improve the frequency, reliability and resilience of commuter and regional services.
- HS2 will deliver considerable journey time reductions. Passengers will be able to travel from central London to Birmingham in 45 minutes rather than 1 hour 22 minutes today and from London to Manchester in 1 hour 7 minutes rather than the 2 hours 7 minutes it takes today (figure below).

[65] op cit., *The strategic case for HS2*, Figure 10, p24

Journey times along the HS2 route between UK cities



These improvements translate into what are called '**transport user benefits**' in the economic appraisal. They are monetised so that they can be compared with the costs to determine the overall value for money of the scheme. The main benefits monetised in the appraisal include:

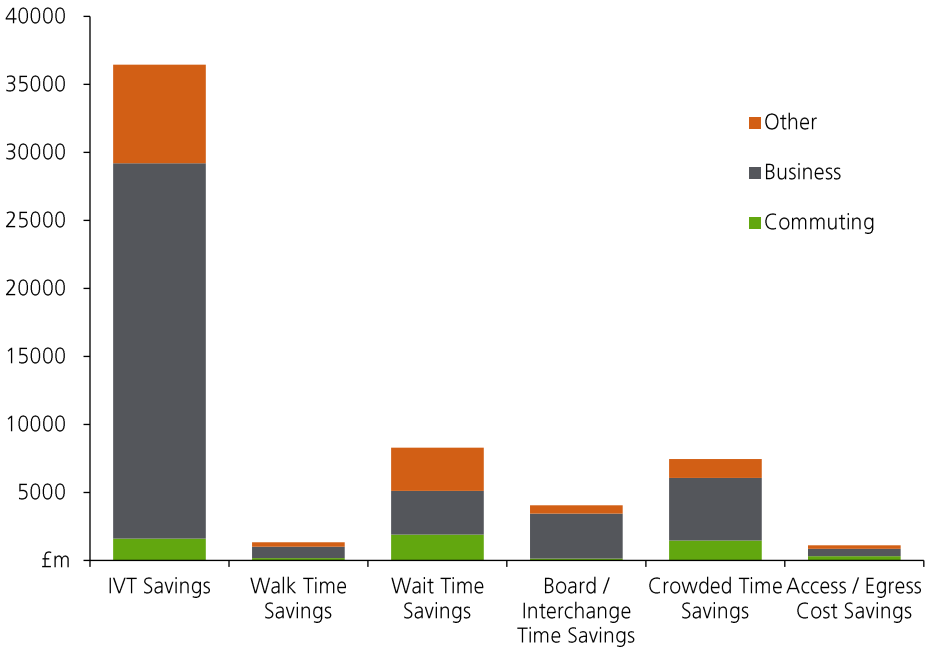
- *Journey time savings* - the ability to spend less time travelling mean that people can achieve more in any one day. This is valued in the appraisal by calculating the value of time. That is, the amount of money a person would be prepared to pay to save time or the amount they would accept as compensation for time lost.
- *Reliability improvements* - the reliability of train services is important to people because unreliability can disrupt their schedules, and if they expect poor reliability they tend to factor in additional time to travel, which reduces the time that they can spend on other activities. This is valued by translating a reliability improvement into a journey time saving, then applying a value of time.

- *Reduction in crowding* - people like to have as much comfort and space as possible when travelling. Crowding can detract from the journey experience, such as cramped conditions and reduce ability to work or read, inability to sit with travel companions or, under higher levels of crowding, having to stand. A penalty is applied to the value of time in the appraisal to reflect the value passengers place on more comfortable journeys.[66]

HS2 is also anticipated to enable mode-shift on long-distance journeys from roads to rail. It is anticipated that 7% of HS2 passengers would otherwise have travelled by car from Birmingham to London city-centre to city-centre. Removing long distance passengers from the roads delivers benefits from lower congestion, as well as reduced accidents and improved air quality and noise impacts around major roads.[67]

Collectively, the latest business case estimates net transport benefits of £74.6 billion to be delivered from the full Y-network (i.e. all phases of the scheme). The 2017 economic case does not provide a breakdown by the type of benefits delivered, but the figure below, sourced from the 2013 appraisal, reveals that the clear majority of the benefits are delivered through in-vehicle journey time (IVT) savings. The investment will also result in more frequent services and less crowding on trains, which offer the next greatest level of benefits in the appraisal.

Disaggregated user benefits from HS2, full Y-network (2011 prices)[68]



[66] DfT, *The Economic Case for HS2 – The Y Network and London – West Midlands*, February 2011, pp27-29
[67] Ibid, p30
[68] HS2 Ltd, *Economic case for HS2: October 2013 - Supporting report: Economic case appraisal - full network*, 28 October 2013

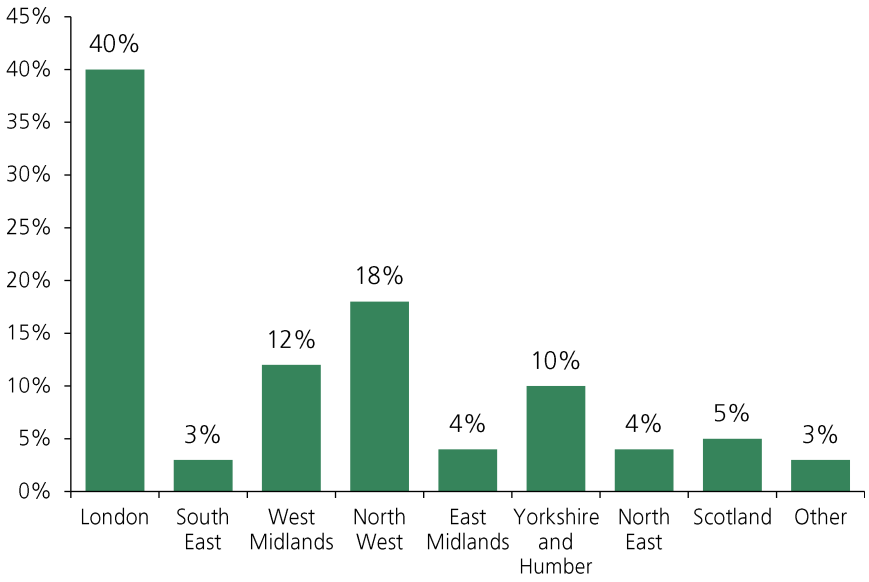
Who gains most from the transport benefits?

Although most users of HS2 would be leisure passengers, around two thirds of the quantified benefits would be to business users. This reflects the higher value that business users and their employers attach to having faster journeys.

The figure below, sourced from the Government's latest economic case for High Speed 2, shows how benefits will be distributed according to where a long-distance trip starts and finishes.[69] In short, it shows that London receives the most benefits from the full High Speed 2 network.

Based on these findings, the EAC concluded that the main beneficiaries of overcrowding relief from High Speed 2 will be London commuters who use the West Coast Main Line and "will offer limited benefits for addressing current overcrowding problems [elsewhere]."[70]

Monetised benefits to long distance passengers by origin of trip[71]



3.2 Wider economic impacts

Transport investments can have wider economic benefits. These impacts, known as 'Wider Economic Impacts' (WEIs), are additional to the Government's core method of comparing transport benefits and costs and include:

- **Agglomeration impacts** – by shortening the journey times between cities, HS2 will bring firms and markets closer together. The clustering of firms could support enhanced knowledge sharing, a greater specialisation of staff resources and enhanced competition between suppliers.
- **Labour market impacts** - transport improvements can lower the cost and time associated with travelling to work. This can increase a person's willingness to work in a similar way to how an increase

[69] HS2 Ltd, *High Speed Two (HS2) Phase Two - Economic case advice for the Department for Transport*, July 2017, Appendix 5, p75
[70] op. cit., *Rethinking High Speed 2*, p13
[71] op. cit., *Rethinking High Speed 2*, p13

in wage might. Some benefits are also captured in the moving of jobs to more productive areas.

- **Correction of imperfect competition** – companies will be able to increase their production because of lower transport costs. This benefit specifically measures the additional value consumers attach to the product or service produced, over and above the cost savings to business.[72]

Most of the benefits from HS2 are due to agglomeration benefits, with the remainder mainly the result of the increased output of imperfectly competitive markets.[73]

Wider economic impacts of full Y-network, 2015 prices[74]

Impact	PV, £m
Agglomeration	11.0
Imperfect competition	6.1
Labour market impact	0.5
Total WEIs	17.6

3.3 Alternative methods

The core economic case holds land-use patterns fixed and does not consider the impacts of changes in geographic patterns of economic activity at local and regional levels that might result from HS2. The 2013 economic case states that "HS2 has the potential to deliver productivity gains that will alter geographic distribution of economic activity."[75]

It is considered that HS2 would do this primarily through creating greater opportunity for businesses and people to connect and making the areas impacted "more attractive places for businesses and people to locate."[76] Thus, **leading to changes in future patterns of land use**.

However, the potential benefits are very much "specific to the local circumstances"[77] and will not be delivered by HS2 alone (see section below). The 2012 economic case update states that "simply building a station or link to a high-speed network is not enough. For success to be achieved, the station must be integrated into the wider strategic plans of local agencies, especially integration with the local transport network."[78] There are multiple locally-led HS2 growth plans being developed to address this point.

KPMG were commissioned to provide an indication into the potential economic benefits that may be delivered from HS2; though they were never included in the formal economic case. The results are presented in

[72] op cit., *The Economic Case for HS2 – The Y Network and London – West Midlands*, p33
[73] Ibid
[74] op cit., *High Speed Two Phase Two – Economic Case*, July 2017, p13
[75] DfT, *The Economic Case for HS2*, October 2013, p8
[76] op cit., *The Economic Case for HS2*, p15
[77] op cit., *The Economic Case for HS2 – The Y Network and London – West Midlands*, p34
[78] DfT, *Economic Case for HS2: Updated appraisal of transport user benefits and wider economic benefits*, January 2012, p29

the box below. It should be noted that methodology employed is relatively immature, compared to the traditional cost-benefit appraisal methods and the results produced by KMPG cannot be apportioned as a direct impact of the scheme.[79]

KPMG review into productivity benefits

In September 2013 the Government published a report by KPMG, which estimated that investment in HS2 could potentially generate £15 billion in productivity gains for the British economy in 2037 (2013 prices). This would represent an increase of around 0.8 per cent in the total level of GDP in 2037.[80] The other 'low' scenario modelled estimated that the potential annual productivity gain would be £8 billion.

It was caveated in the 2013 economic case that these benefits "should not be considered as additional to those estimated in the economic case."[81] As explained by the DfT:

> In theory, both approaches are attempting to measure the same thing - the economic benefits from increased economic output generated as a result of investment in transport – and should deliver the same result. However, in practice, results differ because of differences in analytical frameworks, data quality/availability, and measurement.

Further, there are several assumptions that are made in the analysis that are not proven or highly sensitive to change:

- There are difficulties in estimating the elasticities for individual connectivity measures.
- The analysis necessarily assumes direct causality between connectivity and productivity, but it has not been possible to provide evidence for this causality.
- The analysis does not consider potential supply-side constraints, such as the availability of land, and as such only demonstrates the opportunity for productivity gains.
- Impacts are dependent on other investments and decisions following the transport investment.[82]

Is more spending needed to achieve these impacts?

According to the NAO, "there is a risk that these wider benefits will not materialise if [additional] funding [for local adaptations]cannot be secured."[83] In a follow-up report, the Public Accounts Committee recommended that the Government "seek assurances from the relevant local authorities that they have plans in place to identify sources of funding and financing, to secure the local regeneration and growth benefits [of HS2]".[84]

The Chair of the National Infrastructure Commission, Sir John Armitt, affirmed the view that more spending is required to deliver the full scope of the impact from HS2. He specifically suggested that an extra

[79] op cit., *The Economic Case for HS2*, p59
[80] KPMG for HS2 Ltd., *HS2 Regional Economic Impacts*, Ref: HS2/074, September 2013, p13
[81] op cit., *The Economic Case for HS2*, p55
[82] Ibid, pp59-60
[83] op cit., *Progress with preparations for High Speed 2*, p8, see also pp39-40
[84] Ibid, p6

£43 billion should be spent to "make the most of the HS2 project" and that this spending was needed to prevent "inadequate public transport links" beyond the new line.[85]

Local authorities, in partnership with others such as Local Enterprise Partnerships, are responsible for driving regeneration and local growth benefits. They are doing this primarily through the development of growth strategies. Greater Manchester, the East and West Midlands, Leeds and Crewe have published their HS2 growth strategies.[86]

The HS2 Growth Task Force had previously been established to examine how to maximise economic growth and job opportunities from the government's plans to build a high speed rail network. The taskforce published their final report in March 2014 and concluded that HS2:

> …could catalyse far-reaching economic and social benefits, particularly to the cities of the Midlands and the North. It is clear to us that we cannot expect to get the most out of HS2 simply by following "business as usual.[87]

The Government published their response to the taskforce's recommendations in July 2014.[88]

[85] Reported in: "'We should spend billions more to make most of HS2'", *The Times*, 6 August 2018

[86] TfGM press notice, "High-speed rail provides launch pad for growth in Greater Manchester and the North", 16 March 2018; D2N2 press notice, "Thousands of jobs and almost £4billion for economy detailed in HS2 Strategy", 3 October 2017; WMCA, *Midlands HS2 Growth Strategy*, July 2015; and WYCA, *Leeds City Region HS2 Growth Strategy*, January 2018; Cheshire East Council, *Crewe – HS2 Hub, Draft Masterplan Vision*, October 2017

[87] HS2 Growth Taskforce, *High Speed 2 : Get Ready A report to the Government by the HS2 Growth Taskforce*, March 2014

[88] HM Government, *Getting set for HS2: Responding to the HS2 Growth Taskforce*, July 2014

4. Costs

A comprehensive breakdown of the costs for the full Y-network of HS2 has not been published since 2013.

Various estimates of costs get used, most notably £55.7 billion for the full Y-Network. It is important to note that this is not a cost estimate, but rather a funding envelope. The former is an estimate of how much needs to be spent, the latter relates to what is available to spend (see Section 6).

There have been three estimates published by DfT and HS2 Ltd for the cost of the full Y-network and that account for the infrastructure and rolling stock costs:

- The first estimates for the costs of HS2 were published in the February 2011 HS2 Economic Case. The Phase 1 costs were estimated to be £19.6 billion (2009 prices)[89], with the full Y-network estimated at £37.5 billion.[90]
- For the January 2012 economic case update, the cost of the full Y-network HS2 was estimated at £40.8 billion (2011 prices).[91]
- In 2013 the total cost of the cost of the full Y-network HS2 was estimated at £50.1 billion,[92] including £42.6 billion for construction and £7.5 billion for rolling stock (in 2011 prices).[93]

Full network P95 cost estimate, 2013 (2011 prices)[94]

Item	Phase 1	Phase 2	Full-Y
Contracts and delivery team	1,150	1,960	3,110
Construction			
Tunnels	2,910	1,030	3,940
Civil engineering	3,390	4,170	7,560
Stations	2,545	545	3,090
Deports and stabling	720	130	850
Railway systems	1,560	2,190	3,750
On-network works	480	inc	480
Land and Property	1,630	1,400	3,030
Corporate Overheads	1,265	1,050	2,315
Total construction cost	**15,650**	**12,475**	**28,125**
Construction risk	5,750	5,240	10,990
Additional risk provision	NA	3,485	3,485
Total	**21,400**	**21,200**	**42,600**

On 30 November 2015 the Government published a Written Ministerial Statement saying that:

[89] op cit., *Economic Case for HS2 - The Y Network and London – West Midlands*
[90] Ibid., p11
[91] DfT, *Economic Case for HS2: Updated appraisal of transport user benefits and wider economic benefits*, January 2012
[92] At P95 level of confidence and aligned with the confidence required as part of the 2013 Spending Review.
[93] DfT, *The Economic case for HS2 – Cost and risk status report*, October 2013, p6
[94] Ibid, p45

> The cost of HS2 has not changed since the Spending Review 2013. The Spending Review 2015 confirmed an overall budget of £55.7bn in 2015 prices. This is consistent with the £50.1bn (in 2011 prices) set in 2013, but has been uprated to take account of inflation.[95]

The National Audit Office (NAO) reviewed the scheme in 2016. It stated that "at the 2015 spending review, the estimated cost of phase 2 exceeded available funding by £7 billion".[96] Therefore, based on the figures contained in that report it is possible to calculate that at the time of the 2015 Spending Review the full original Y-network cost estimate had risen to £64.9 billion (2015 prices) (see box below for explanation).

To meet the funding envelope, the NAO stated that efficiencies would need to be found. It referred to work that had identified the potential to save around £9 billion on phase 2 and stated that £2 billion of these savings had already been agreed by the Government.[97]

In July 2017, the DfT published the *High Speed Two Phase Two - Financial Case*. This also confirmed the need for large efficiencies to be made to keep the project within the funding envelop. Again, based on the figures contained in that report, it is possible to calculate that the overall cost estimate before efficiencies at the time of the Spending Review 2015 had grown to over £65 billion (see box below).

Nevertheless, the DfT report also noted that if all the efficiency savings identified are made, the total cost of the full Y-network of HS2 would fall to £52.6 billion (2015 prices). This figure assumes that all efficiencies outlined by the DfT and HS2 Ltd will be realised in full. It also assumes that the cost of Phase 1 is the June 2016 estimate of £27.384 billion, as published by the NAO.[98] Phase 2 is estimated at £25.5 billion (£3.479 billion for Phase 2a, £17.584 for Phase 2b and £4.17 billion for additional rolling stock costs).

If delivered those savings would reflect a 34% reduction in Phase 2 costs from the 2015 Spending Review estimates. It should be noted that not all these savings have been formally included in the cost estimate. As at November 2016, £7.14 billon of the efficiencies had been embedded within the cost estimate.[99] The efficiencies that are assumed include:

- savings through changes to the planned route and reductions in the estimated cost of property acquisition;

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[95] HS2 and the Northern Powerhouse: Written statement - HLWS333, 30 November 2015; HS2 and the Northern Powerhouse: Written statement - HCWS339, 30 November 2015

[96] op cit., *Progress with preparations for High Speed 2*, p7

[97] op cit., *Progress with preparations for High Speed 2*, p21

[98] op cit., *Progress with preparations for High Speed 2*, p20; A more recent cost estimate is not available.

[99] A figure of £5.1 billion was published at the time by the DfT. The £7.14 billion includes 40% contingency. op cit., *High Speed Two Phase Two - Financial Case*, p13, 15

- applying revised unit cost assumptions used in the more mature phase 1 cost estimates;
- assuming higher productivity from contractors; and
- from reducing the programme management overhead of HS2 Ltd.[100]

The NAO has expressed some uncertainty as to the deliverability of these savings (see Section 4.1), although the DfT are confident of achieving at least a high proportion of them.

Formal cost estimates and derived estimates for the full Y-network of HS2

Source	Prices	Phase 1	Phase 2	Full-Y
HS2 Economic Case (February 2011)	2009	£19.6 bn	-	£37.5 bn
HS2 Updated Economic Case (January 2012)	2011	£19.3 bn	-	£40.8 bn
HS2 Economic Case (October 2013)	2011	£21.4 bn	£21.2 bn	£50.1 bn
Spending Review (November 2015)	2015	£27.2 bn	£37.8 - £38.0 bn	£64.9 - £65.2 bn
Financial Case, with all assumed savings (July 2017)	2015	£27.4 bn	£25.2 bn	£52.6 bn

Cost estimates of the scheme – 2015

On the basis of figures published by the NAO and DfT in 2016 and 2017, it is possible to derive two new estimates of the cost of the overall scheme at the time of the 2015 Spending Review.

The first estimate (£64.9 billion, 2015 prices) has been derived using Figures 6 and 7 from the NAO review of the scheme in 2016. Figure 6 (below) reveals that the estimate of the costs for Phase 1 of HS2 is £27.18 billion, which is the same as the available funding set out in the Spending Review.

Phase 1 cost estimates and available funding[101]

	2015 spending review (£m)	June 2016 (£m)
Point estimate	21,652	22,272
Planned phase 1 efficiency savings	1,495	1,470
Phase 1 post efficiency point estimate	**20,157**	**20,802**
Estimated contingency requirement	7,023	6,582
Anticipated final cost[1]	**27,180**	**27,384**
Available funding	**27,180**	27,180
Difference between anticipated final cost and available funding	**0**	**204[2]**

[100] See pages 11-15 of the *High Speed Two Phase Two - Financial Case* and p21-26 of the 2016 NAO report for full discussion.
[101] op cit., *Progress with preparations for High Speed 2*, p20

Figure 7 (below) reveals that the estimate of the cost of Phase 2 at the 2015 Spending Review was £27.668 billion. This includes the cost of infrastructure and rolling stock but does not include an allowance for contingency (which at this stage of planning is 40% on top of the point estimate). The NAO confirm that "at the time of the spending review, cost estimates [excluding contingency] for phase 2 were some £7 billion higher than available funding", adding that "the Department decided not to request additional real term funding, but instead committed to delivering the programme within agreed funding."[102] Once contingency is included in the Figure 7 estimates, the total cost of Phase 2 of HS2 is £37.8 billion. This assumes rolling stock costs to be 20% of the total costs of Phase 2 (as per the 2012 updated economic case).[103] A 23% risk provision is applied to the rolling stock cost (as per previous rolling stock estimates)[104]; a 40% contingency is applied to the infrastructure cost.[105]

The stated cost of Phase 1 (£27.18 billion), plus the derived cost of Phase 2 (£37.8 billion), takes the total estimated cost of HS2 to £64.9 billion.

Phase 2 cost estimates and proposed savings[106]

	£ million
Phase 2 agreed funding (infrastructure and rolling stock, excluding contingency)	20,694
Cost estimate at 2015 spending review (infrastructure and rolling stock, excluding contingency)	27,668
Total required savings 2015 spending review	**6,974**
Secured savings	
Agreed route changes and value engineering	1,760
Land and property acquisition	370
Total secured savings	**2,130**
Proposed savings	
Proposed route change (Sheffield)	768
Updated unit costs for viaducts, embankments and stations	2,440
Supply chain efficiencies	1,680
Income opportunities	260
Additional efficiency savings	320
Other (including HS2 Ltd programme management overhead)	1,190
Rolling stock savings	360
Total proposed savings	**7,018**
Total savings	**9,148**

The second estimate (£65.2 billion, 2015 prices) has been derived from figures published in the Department for Transport's (DfT) July 2017 Phase

[102] Ibid, p21
[103] Op cit., *Economic Case for HS2: Updated appraisal of transport user benefits and wider economic benefits*, p33-35
[104] Three estimates of rolling stocks available are two from the January 2012 economic case and one published by the Government in response to a written question in December 2016. Those from the January 2012 include contingencies of 26.3% and 23.2% for Phase 1 and the full Y-network respectively. The December 2016 estimate includes contingency of 22.9% for the full Y-network.
[105] As outlined on *page 7 of the Phase Two financial case*, the infrastructure elements of the SR15 settlement profiles for Phases 2a and 2b include 40% optimism bias, which has been applied in line with HM Treasury Green Book guidelines.
[106] op cit., *Progress with preparations for High Speed 2*, p23

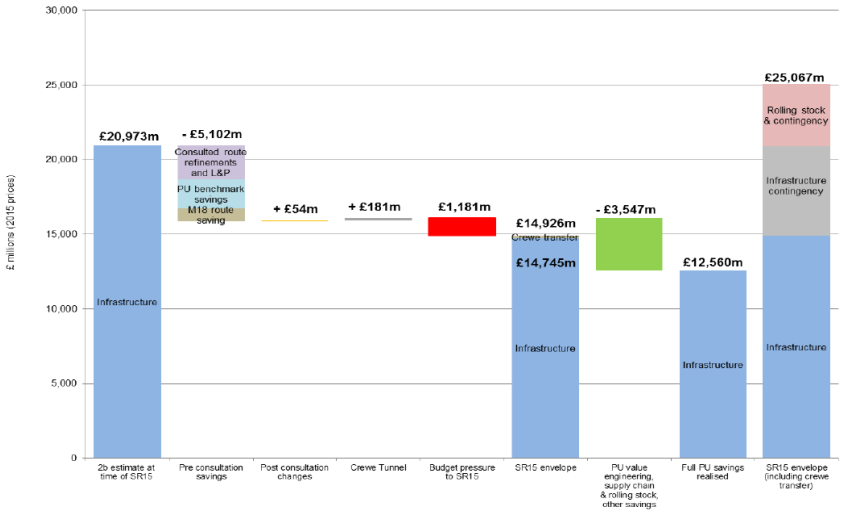
Two Financial Case. The estimate for Phase 1 is not published in that paper but for the purposes of this estimate is assumed to be consistent with the available funding of £27.18 billion at the time of the 2015 Spending Review.

Paragraph 4.2 of the financial case states that "at SR15 Phase 2a required £745m (2015 prices) worth of efficiency savings to be delivered to meet the funding envelope of £3.72bn (2015 prices)." This implies that the estimated cost of Phase 2a was £4.465 billion at the 2015 Spending Review.[107]

Chart 2 in the July 2017 financial case reveals that the cost of infrastructure for Phase 2b, excluding contingency and rolling stock, at the time of the 2015 Spending Review was £20.973 billion. Once contingency is included, the infrastructure cost of Phase 2b rises to £29.362 billion.[108]

The additional rolling stock costs for Phase 2 are £4.17 billion and are derived from the figure below.[109]

Phase 2b 2015 Spending Review cost estimates and efficiencies since[110]



Thus, using the July 2017 financial case, it is possible to estimate that the cost of the full Y-network of HS2 was £65.17 billion in 2015 (including rolling stock and contingency), including £27.18 billion for Phase 1 and £37.997 billion for Phase 2 (including £4.465 billion for Phase 2a, £29.362 billion for Phase 2b and £4.17 billion for additional Phase 2 rolling stock).

As outline above, the July 2017 financial case set out efficiencies that had been incorporated and were anticipated for Phase 2 of the scheme. If all these savings are delivered, the overall cost of the full Y-network falls to £52.6 billion (in 2015 prices).

What is the net cost to Government?

It is important to note that while the Government will have to cover the full cost of HS2, it will recoup some of the costs through future revenues from the line. According to the 2017 Phase Two Economic

[107] DfT, *High Speed Two Phase Two - Financial Case*, July 2017, p11
[108] op cit., *High Speed Two Phase Two - Financial Case*, p14
[109] The SR15 funding envelope is stated as £25.067 billion, including contingency and rolling stock. The SR15 envelope for infrastructure only is stated as £14.926 billion excluding contingency. Once contingency is applied the total cost of Phase 2b infrastructure is £20.8964 billion. The difference between the SR15 envelope of £25.067 and the Phase 2b infrastructure of £20.8964 gives the rolling stock estimate of £4.17 billion.
[110] op cit., *High Speed Two Phase Two - Financial Case*, p14

Case, the net cost, in present value (NPV) terms, to Government is £39.8 billion (2015 prices). This figure is derived by adding the capital costs (£55.8 billion) to the operating cost (£27.6 billion) and subtracting the expected revenue income (£43.6 billion).

It is important to note that this net cost published in the economic case will not necessarily align with what it will cost the Government in terms of actual outgoings in practice. This is because this estimate is published in NPV terms. This discounts future spending, which essentially means that money spent now is worth more than money spent later.

4.1 Scrutiny on costs

The Government has said on several occasions that it intends for the costs of HS2 to remain within the funding envelope agreed at the 2015 Spending Review. It reaffirmed this position in February 2019, saying that the "Spending Review 2015 confirmed a funding envelope for the whole of HS2 of £55.7bn at 2015 prices. DfT remains determined that the project will be delivered within the £55.7bn funding envelope."[111]

Several stakeholders have indicated that the final cost of HS2 may be much higher than currently projected. One of those most frequently cited on this is infrastructure consultant Michael Byng, who created the method used by Network Rail to cost its projects. He has estimated that the costs of HS2 are likely to be almost double the existing figure. The Government does not agree with this assessment.[112] In addition, there were reports in July 2018 of a 'secret' report by Paul Mansell, one of several reviewers used by the Infrastructure Projects Authority, which stated that HS2 was "highly likely" to go as much as 60% over budget and cost "more than £80bn".[113]

The most notable Parliamentary scrutiny on the costs of HS2 has come from the NAO and Public Accounts Committee, as well as the House of Lords Economic Affairs Committee (see below). There have been a number of other Parliamentary debates on the costs of HS2, see for example Second Reading of Christopher Chope's *HS2 Funding Referendum Bill* on 23 January 2015.

National Audit Office and Public Accounts Committee

The NAO conducted some early scrutiny around the costs of the HS2 in 2013, stating at the time that the "the programme estimates are understandably uncertain". It also warned of costs risks to HS2 based on the susceptibility of large infrastructure projects to cost overruns because of a perverse incentive to underestimate costs to secure funding (see box below).

Optimism bias on mega-infrastructure projects

[111] High Speed 2 Railway Line: Written question – 227137, 6 March 2019
[112] "Labour peer suggests HS2 costs double what public is told", *Transport Network*, 19 March 2018
[113] "HS2 budget 'will balloon to £80bn', says secret report", *The Times*, 22 July 2018

The NAO published its 'Guide to initiating successful projects' in 2011, following an examination of the experience of some 40 major government projects.

It found that two-thirds of public sector projects are completed late, over budget or do not deliver the outcomes expected.

Further, the NAO said that the delivery of public sector projects can be adversely affected by optimism bias. That is, project appraisers have the tendency to be over optimistic. The NAO identified two main explanations for this:

1. Technical causes comprise imperfect forecasting techniques, mistakes, inadequate data, and the obvious problems in predicting the future.
2. A lack of objectivity and rigour in rational thinking can result in the over-estimation of benefits and under-estimation of costs

In terms of the latter, the NAO said that such biases are strategically motivated to increase the likelihood that a project gains funding.

The NAO completed more detailed cost analysis on the HS2 programme in 2016. As mentioned, it highlighted that the costs for Phase 2 of the programme, as estimated for the 2015 Spending Review, were significantly over the agreed funding envelope. It highlighted the anticipated savings HS2 Ltd and the DfT were seeking to achieve to bring the costs within the funding envelope. The DfT said that it had a high level of confidence in achieving around £4.5 billion of the £7 billion of potential savings identified.[114] The NAO had a more cautious position, suggesting that it would "be challenging to achieve some of the proposed savings."[115] The NAO also noted that, given the early stage of planning for Phase 2, the costs would be subject to variation. Specifically, the current estimate for phase 2 contains "significant assumptions" and "excludes scope that may be required to meet the programme's objectives."[116] The NAO highlighted the fact that the major hub station at Crewe and the proposed station at Manchester Airport were still unfunded. If the savings prove difficult to deliver, or if other cost estimates increase without savings elsewhere on the programme, the NAO said that the Department and HS2 Ltd may have to either:

- use contingency to cover increases in costs or new scope other than the management of identified and quantified risks, which could reduce HS2 Ltd's ability to manage risk;
- seek additional sources of funding, including from HM Treasury; or
- make further changes to the scope of the programme, which could reduce benefits.[117]

The Public Accounts Committee published a follow-up report to the NAO's work in September 2016. It concluded that the DfT did "not have a clear enough picture of the estimated costs for phase 2" and

[114] op cit., *Progress with preparations for High Speed 2*, p25
[115] Ibid
[116] op cit., *Progress with preparations for High Speed 2*, p24
[117] Ibid, p25

said that the "cost estimates for phase 2 are still volatile". It also expressed some scepticism toward the projected savings for Phase 2, saying that "it remains to be seen whether these planned savings on phase 2 can be delivered without adversely affecting the expected benefits of the programme."[118]

Based on a report by the Comptroller and Auditor General, the PAC published a report in December 2017 to scrutinise HS2's £1.76 million in unauthorised payments to staff.[119] The PAC described this as "a shocking waste of taxpayers' money". It found that the "unauthorised schemes were able to proceed because weak internal processes at HS2 Ltd prevented key decision-making and scrutiny bodies from receiving accurate information." It added that "HS2 Ltd lacks basic financial controls in other important areas, heightening the risk of fraud and financial errors such as duplicate payments."[120] Importantly on the issue of costs, the HS2 Ltd told the PAC that the forecast cost of Phase 2 of the programme still exceeded the available funding by £1.8 billion:

> HS2 Ltd told us that although progress was being made in reducing costs, the forecast cost of phase 2 of the HS2 programme still exceeded funding by a significant amount. It stated that it intends to bring the scope of phase 2a back within the funding envelope by October 2022 and has identified £3.5 billion of savings on phase 2b, although forecast costs still exceed available funding.[121]

Finally, the NAO published a further report into land and property acquisition for Phase One in September 2013, highlighting that "estimated cost to acquire land and property for Phase One has increased" and that "risks remain" for the total costs of land and acquisition to remain within the £3,664 million budget.[122]

NAO investigation into land and property acquisition

To build Phase One of the railway, the government will need to acquire approximately 70 square kilometres (more than 17,000 acres) of land along the route of the railway. The NAO said it had received correspondence from individuals concerned that:

- HS2 Ltd had understated the property cost estimate, including in information provided to Parliament with deposit of the hybrid Bill for Phase One;
- governance and assurance around the estimate and the land and property function was weak and that HS2 Ltd did not have the capability or capacity to deliver the land and property acquisition programme; and
- HS2 Ltd was failing to make payments to landowners on time.

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[118] Public Accounts Committee, *Progress with preparations for High Speed 2*, Fourteenth Report of Session 2016–17, HC 486, 14 September 2016, p5
[119] NAO, *Report of the Comptroller and Audit General on the 2016-17 Accounts of High Speed Two (HS2) Limited*, 11 July 2017
[120] Public Accounts Committee, *High Speed 2 Annual Report and Accounts*, Tenth Report of Session 2017–19, HC 454, 15 December 2017, p3
[121] op cit., *High Speed 2 Annual Report and Accounts*, p6
[122] NAO, *Investigation into land and property acquisition for Phase One (London – West Midlands) of the High Speed 2 programme*, Session 2017-2019, HC 1531, 13 September 2018, p

In response to this the NAO commenced an investigation into these complaints. The NAO's main conclusions from its investigation were that:

- The estimated cost to acquire land and property for Phase One has increased significantly since the start of the programme.
- The estimate has increased for a range of reasons, such as scope increases and the introduction of additional compensation schemes.
- HS2 Ltd's estimate of the cost to acquire land and property has improved, and now provides a reasonable basis for monitoring the cost of the property acquisition programme.
- HS2 Ltd forecasts that costs will remain within available funding, but it is still very early in the property acquisition programme.
- Only half of advance payments to claimants have been completed within the required three-month period from HS2 Ltd receiving a claim request and there is work to be done to support claimants to receive timely compensation where they are due an advance payment.

For more information, see the NAO's September 2018 report Investigation into land and property acquisition for Phase One (London – West Midlands) of the High Speed 2 programme.

House of Lords Economic Affairs Committee

The House of Lords EAC has published two reports on HS2, both of which had a strong focus finding alternative ways of managing the costs of the scheme.

In 2015, the EAC report recommended that the Government review the opportunities to reduce the cost of HS2 by lowering its maximum speed.[123] It again identified speed a potential for cost saving in its 2019 report, saying that a lower speed would of 300 kilometres per hour would have minimal impact on journey times but "provide the opportunity for a less expensive route alignment, reducing the need for tunnelling."[124]

Both reports also identified the possible role of Euston as the London terminus for HS2 as a source of savings. The Committee suggested in its 2019 report that Old Oak Common should be used as the terminus, at least for Phase One, as per former Chair Sir Terry Morgan's recommendation.[125] It justified this based on the potential cost savings; though there has been no formal estimate published on what the cost savings from terminating at Old Oak Common would be. It also added that most onward destinations in London were just as accessible with the terminus in Old Oak Common as they were in Euston.[126]

Overall, on the costs point, the Committee concluded in its 2019 report that it was "far from convinced that [HS2] will be built within the £55.7 billion budget". It expressed further concern that "if costs overrun on the first phase of the project, there will be insufficient funding for the second phase and the northern sections of the new railway will not be built".[127]

[123] Economic Affairs Committee, The Economic Case for High Speed 2, p 23
[124] op cit., *Rethinking High Speed 2*, p4
[125] Ibid, p45
[126] Ibid, p42
[127] Ibid, p3

5. Value for money

The economic appraisal for HS2 captures the costs, benefits and changes in revenues for the whole of the rail network – not just those associated with the HS2 infrastructure. This includes the costs of both constructing and operating the railway. The benefits include future revenues, lower levels of overcrowding, on both HS2 and existing services, and quicker, more frequent and more reliable journeys for passengers. These costs and benefits are appraised over a 67-year period for the full network from 2026 (the opening of Phase One) to 2092 (60 years after the opening of Phase Two).[128]

The costs and benefits are compared against each other to generate a 'benefit-cost ratio' (i.e. the value of benefits that would result from every £1 that the scheme costs). The Value for Money (VfM) category is derived from this BCR and are as follows:

- Benefits less than £1 indicate poor VfM;
- Benefits between £1 and £1.50 indicate low VfM;
- Benefits between £1.50 and £2 indicate medium VfM;
- Benefits between £2 and £4 indicate high VfM;
- Benefits greater than £4 indicate very high VfM.

When Phase 1 of the scheme was first presented in February 2011, it was determined to have a BCR of 2.0, when the wider economic impacts were included. The 2013 estimate for the value for money of Phase 1 is that it will generate a BCR of 1.7. An estimate of the value for money of Phase 1 has not been published since.

Benefit-cost ratios of HS2 over time (including wider economic benefits in brackets)

	February 2011[129]	October 2013[130]	November 2016[131]	July 2017[132]
Phase 1	1.6 (2.0)	1.4 (1.7)	n/c	n/c
Phase 2	-	-	2.5 (3.1)	-
Phase 2a	-	-	-	1.6 (1.9)
Phase 2b	-	-	-	2.1 (2.6)
Full Y network	2.2 (2.6)	1.8 (2.3)	2.1 (2.7)	1.9 (2.3)

[128] op. cit., *The Economic Case for HS2*, p8
[129] HS2 Ltd., *Economic case for HS2: The Y network and London-West Midlands*, February 2011, p12&p43
[130] op. cit., *The Economic Case for HS2*, p85
[131] DfT, *High Speed Two Phase 2b: Strategic Outline Business Case - Economic Case*, 15 November 2016, p15
[132] op cit., *High Speed Two: Phase Two Economic Case*, 17 July 2017, pp13, 16 & 26

It should be noted that during the NAO's audit of the HS2 programme in 2016, it observed that "the Department and HS2 Ltd's economic appraisal assumes that they will deliver the programme for significantly less than its available funding."[133] No specific estimates of the appraisal were provided, but the NAO added that if phase 1 were to be delivered for close to its available funding – which it is currently estimated to exceed – the benefit–cost ratio for phase 1, including economic impacts, would reduce to 1.5 from 1.7.[134] This would represent low to medium value for money in the Department's classifications.

The latest BCR estimate for the whole Y-network, sourced from the July 2017 Phase Two economic case, is 2.3 and includes the wider economic impacts (see below).

Benefit Cost Ratio (BCR) components of full Y Network[135]

	Category	PV, £bn (2015 prices)
1	Net transport benefits	74.6
2	Wider Economic Impacts (WEIs)	17.6
3	**Net benefits = (1) + (2)**	**92.2**
4	Capital costs	55.8
5	Operating costs	27.6
6	**Total costs = (4) + (5)**	**83.4**
7	Revenues	43.6
8	Net costs to Government = (6) - (7)	39.8
9	BCR without WEIs = (1)/(8)	1.9
10	**BCR with WEIs = (3)/(8)**	**2.3**

It is important to note that the BCR reflects the benefits and costs over the entire appraisal life of the scheme (i.e. over a 67-year period from 2026). However, most of the costs of the scheme will be incurred up-front, while the benefits will be recouped gradually over several decades. It is not possible, with the data available, to tell when the threshold of benefits will eventually exceed that of costs, but it is unlikely to occur until at least midway through the life of the scheme.

5.1 Limitations of value for money estimates

It should be noted that there are limitations to these value for money appraisals. In addition to natural uncertainties around estimating transport user benefits and scheme costs over a 67-year period, the appraisal does not account for all the scheme's possible impacts. Most notably, it does not reflect all the environmental and community costs, which can only be assessed qualitatively (see table below). These are discussed at a qualitative level in Section 7 of this paper.

[133] op cit., *Progress with preparations for High Speed 2*, p26
[134] Ibid
[135] op. cit., *The Economic Case for HS2*, p13

Monetised and non-monetised impacts of HS2[136]

Initial BCR: robust, monetised impacts	Adjusted BCR: less robust, monetised impacts	Monetised impacts not included in the BCR	Non-monetised, qualitative impacts
Travel Time Savings Crowding Benefits Noise Carbon Impact Accidents Indirect Tax Revenue Reliability Air Quality	Wider Economic Impacts (WEIs) - Agglomeration - Labour Supply Impacts - Imperfect competition	Landscape	Townscape and Landscape Heritage Biodiversity Water Environment Severance Physical Activity Accessibility Journey Ambience Option Values

The value for money framework of HS2 is also limited in that it is difficult to understand what the opportunity cost of going ahead with the scheme is. What is presented above, is an evaluation against a baseline scenario of doing nothing. In previous analysis there was some comparison made between other strategic rail alternatives that would deliver the same or similar objectives as HS2.[137] But there has been no value for money comparison between HS2 scheme and other forms of rail investment, or even investment across other sectors of transport.

Where does HS2 rank alongside other transport schemes in terms of value for money?

The DfT publishes an annual value for money statement indicator that reports the proportion of project spending that is assessed to be high or very high value for money, for projects that receive final ministerial approval in a given year. The table below reveals the distribution of spending across the different value for money categories between 2015 and 2017. It shows that across all three years, most schemes offer high and very high value for money. Overall, the full Y-network of HS2 would fall in the lower end of the 'High' value for money category of spending, while phase 1 (London to West Midlands) lies towards the lower end of the medium value for money category.

Total PVC and proportion of spending per VfM category for projects approved 2015-2017[138]

	Proportion of Approved Spending			PVC (£m)		
VfM Category	2015	2016	2017	2015	2016	2017
Poor	0%	0%	1%	0	1	5
Low	17%	0%	2%	196	0	15
Medium	3%	5%	19%	36	65	129
High	20%	86%	28%	233	1038	191
Very High	59%	9%	49%	681	103	332
High & Very High	80%	95%	78%	914	1,141	523
Total	100%	100%	100%	1,146	1,207	672

[136] op cit., *High Speed Two Phase Two – Economic Case*, p6
[137] Research was published by DfT alongside the 2013 strategic case for HS2 on Rail alternatives to HS2.
[138] DfT, *Value for Money Indicator 2017*, September 2018, p9

6. Funding and spending

6.1 Who is paying for HS2?

The cost of the scheme will largely fall on the taxpayer. Governments have previously argued that 'some' funding could come from the private sector and from the EU: "… further contributions will be sought from certain businesses and developers directly benefitting from the project".[139] However, the Coalition Government acknowledged that "third party contributions could only ever deliver a small percentage of the core costs for HS2".[140]

The 2013 Spending Review set a funding envelope of £42.6 billion (in 2011 prices) for construction costs and £7.5 billion for rolling stock. In addition, "in order to ensure the project can start construction in the next Parliament," the Government set a detailed budget for HS2 from 2015-16 to 2020-21 worth over £16 billion.[141] This included a budget of £980m for 2015/16 and a capital budget from 2016-17 to 2020-21 of £15.2bn.[142]

In the 2015 Spending Review the Government restated the long-term funding envelope for delivery of the full HS2 scheme of £55.7bn (Quarter 1 2015 prices). The table below indicates the funding allowances for each Phase of the programme established at SR15.

Project phase	Budget
Phase 1: London-West Midlands	£27.18 billion
Phase 2a: West Midlands-Crewe	£3.48 billion
Phase 2b: West Midlands-Leeds/Manchester	£25.07 billion
Source: Department for Transport, 'High Speed Two Phase Two Financial Case', July 2017, p 7	

6.2 How much has been spent?

Expenditure on HS2 to date is set out in the annual report and accounts of HS2 Ltd and the Department for Transport (DfT).[143] The last annual reports for HS2 Ltd and the DfT were published in July 2018 [144]and September 2018[145] respectively.

The Financial Times completed analysis on HS2 Ltd's accounts in July 2018 showing that when the costs of requisitioning land and property were included, the total amount spent on HS2 was £4.1bn.[146]

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[139] Bill 132 2013-14 - EN, para 505
[140] op. cit., *HS2: Outline Business Case - Section 4: Financial Case*, para 62
[141] HM Treasury, *Investing in Britain's future*, June 2013, p25
[142] op. cit., *HS2: Outline Business Case - Section 4: Financial Case*, para 2
[143] High Speed 2 Railway Line:Written question - HL15000, 2 April 2019
[144] HS2 Ltd, *Annual Report & Accounts 2017 – 2018*, July 2018
[145] DfT, *Annual report and accounts 2017 to 2018*, September 2018
[146] 'HS2 costs taxpayers £4.1bn before work even begins', *Financial Times*, 27 July 2018

In February 2019, The Times suggested that some £5.5 billion had already been spent on the purchase of land and property, legal fees, staffing, consultants and other overheads. It accounts for spending by both the DfT and HS2 Ltd.[147]

HS2 Ltd Chief Executive Mark Thurston wrote to the House of Lords Economic Affairs Committee in March 2019 stating that **spending to date on the project was £4.3 billion**. This was based on HS2 Ltd's 2018 Annual Reports and Accounts. The main costs have been £1.8 billion on land and property purchases and £1.3 billion on 'indirect cost' such as consultation, design and workforce.[148] The June 2018 HS2 Business Plan shows anticipated future spending of £12 billion out to 2020/21:

- £3.06 billion in 2018/19;
- £4.2 billion in 2019/20; and
- £4.82 billion in 2020/21.[149]

This appears to be the latest publicly available information on the amount spent on the scheme to date. The next update it likely to occur once the HS2 Ltd accounts are published. The Government have also stated that they will publish an updated business case, including estimated scheme costs, as part of the spending review and ahead of issuing a Notice to Proceed later this year.

[147] 'Tenth of HS2 budget has gone before a piece of track is laid', *The Times*, 16 February 2019
[148] op cit., *Rethinking High Speed 2*, p21
[149] HS2 Ltd., *Corporate Plan 2018 – 2021*, 19 June 2018, pp46-7 [nominal prices]

7. Environmental and community impacts

There will be both positive and negative environmental impacts from the HS2 scheme that will occur during the construction and operational phases of the project.

The construction phase of the project will largely result in negative environmental and community impacts, including property demolitions (see box below), temporary noise and air quality impacts, as well as impacts on historic buildings, conservation areas, sensitive habitats and areas of natural beauty. A summary of the likely environmental impacts is presented in the table below.

Environmental impacts of HS2[150]

	Phase One	Phase Two Manchester	Phase Two Leeds
Route characteristics (km)			
Total	220.5	150.4	184.8
Tunnel	54.3	17.6	9.7
Cutting	74.9	55.8	78.1
Property and settlements			
Residential demolitions	338	139	139
Noise			
People affected by noise (mitigated scheme)	~900	~250	~1,400
People affected by noise (mitigated scheme) per km	~4.1	~1.7	~7.6
Landscape			
Areas of Outstanding Natural Beauty crossed at surface (km)	8.9	0	0
Cultural heritage			
Listed buildings and scheduled monuments directly affected	20	3	5
Biodiversity and wildlife			
Sites of Special Scientific Interest affected	3	0	1
Ancient woodlands directly affected	18	5	9

It should be noted that HS2 Ltd has stated that "as much as reasonably possible [is being done] to avoid or reduce environmental impacts, particularly those that might affect residential areas, historic buildings, conservation areas, sensitive habitats and areas of natural beauty."[151] Some of the mitigations proposed by HS2 Ltd include:

- During construction the building works will be controlled by applying and practising the requirements of a comprehensive Code of Construction Practice.
- Local Environmental Management Plans will be prepared for each section of the route to ensure relevant environmental issues are

[150] op cit., *The Strategic Case for HS2*, p87
[151] Ibid., p86

accounted for during construction and the means to reduce effects or avoid them entirely are put in place.

- Air quality will be maintained by using modern efficient equipment and dust will be suppressed. In a few locations air quality along roads affected by construction movements or redirected traffic could elevate NOx emissions however these effects are predicted to be limited and temporary in nature.
- Construction noise will be consented through Section 61 of the Control of Pollution Act and best practicable means will be applied to the construction activities to keep the temporary effects of construction noise to an acceptable level.
- Traffic management plans will be agreed with relevant highway authorities to ensure the local road network is able to operate effectively for all users including the necessary lorry movements that will be required to enable the railway to be built.[152]

There are also likely to be positive environmental impacts from the scheme once it is in operation. As explained in the Strategic Case:

> At scheme opening HS2 will have lower carbon emissions per passenger kilometre that most other modes of transport. HS2 has published carbon assessments for Phases One and Two, which show that while carbon emissions will occur, over the full lifespan of the project (i.e. 120 years) HS2 is expected to be carbon beneficial.
>
> Most of the emissions associated with both the construction and operation of HS2 will fall within the EU Emissions Trading System – a 'cap and trade' system with a decreasing cap over time. This means that, overall, most of HS2's carbon emissions should not contribute to an increase in Europe-wide carbon emissions. Furthermore, HS2 Ltd's Sustainability Policy, which seeks to minimise the carbon footprint of HS2 and deliver low carbon long distance journeys supported by low carbon energy, will encourage carbon reduction in both the traded and non-traded sectors.[153]

HS2 has also launched plans for what it describes as a 'green corridor' consisting of "new wildlife habitats, native woodlands and community spaces to help integrate the new line into its surrounding landscape and environment."[154]

Property acquisition and compensation

Arguably, the most significant impact on individual lives will be for those who will have their homes compulsorily acquired to make way for the HS2 route. Around 338 properties will be acquired for the Phase One, with another 139 for both branches of the Phase 2 route.

HS2 Ltd has stated that "everything reasonably possible is being done to mitigate the impact of HS2…on individuals [and] communities."[155] It elaborates that "the proposed line of route has been carefully designed to avoid or reduce local effects wherever possible by seeking to avoid the

[152] op cit., *The Strategic Case for HS2*, p86-87
[153] Ibid, p88
[154] HS2 Ltd press notice, *HS2 launches plans for unprecedented 'green corridor' stretching alongside the railway*, 25 June 2018
[155] Ibid, p86

most significant impacts on centres of population and by using tunnels, deep cuttings and, where feasible, existing transport corridors."

In addition to the mitigations proposed above, individuals who will have their homes compulsorily acquired or who have their property significantly affected will be entitled to a compensation. The exact compensation entitlement depends on a property's exact location. Guidance on this has been provided on the Government's website.

8. The outlook

There is increasing uncertainty around the costs and deliverability of HS2, contributed in part by the lack of reliable recent estimates for the scheme. There have been no formal estimates of the cost of the full Y-network of HS2 published by the DfT or HS2 since 2013. HS2 Ltd Chief Executive Mark Thurston acknowledged that the final cost could not be established until all the contractors had been appointed.[156]

This has resulted in recent speculation as to whether the Government will reduce the scope of HS2[157] or whether it will be cancelled altogether. The former chair of HS2, Sir Terry Morgan, has said "something will have to give" on the triangle of time, cost and scope of the proposed high-speed rail network.[158] Further debate has been catalysed following the publication of the House of Lords Economic Affairs Committee report, which concluded "that the costs do not appear to be under control" and the scheme "needs a rethink".[159]

Added to the uncertainty of the proposal is the disagreement within The Conservative Party. This was reflected in the divided positions of candidates in the 2019 leadership elections. Former candidate Esther McVey described the scheme as a "white elephant" and believed that the money should be spent on other regional infrastructure.[160] Most of the candidates, including Jeremy Hunt and Sajid Javid, were in favour of it; [161] although lead candidate Boris Johnson suggested at the time he would likely review the scheme amid his "anxieties about the business case for HS2."[162]

More generally, there is still considerable support for the scheme, particularly from leaders in the North of England, who said that failure to build HS2 would be a "disaster" for the economy in the Midlands and north of England.[163] Labour also remains behind the proposal, with shadow transport secretary Andy McDonald repledging his support for the scheme in March 2019.[164]

The Government officially remains committed to its development. The Transport Secretary Chris Grayling has insisted not completing HS2 would be a betrayal of the Midlands and the North and failure to deliver

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156 'True cost of HS2 not known, boss of controversial rail scheme admits', *The Telegraph*, 16 February 2019
157 'HS2 may run fewer, slower trains to stay on budget and schedule', *The Guardian*, 13 January 2019
158 'Nobody knows what final HS2 cost will be, Sir Terry Morgan says', *Rail Technology Magazine*, 23 January 2019
159 House of Lords Economic Affairs Committee press notice, *HS2 needs a major rethink*, says Lords report, 16 May 2019
160 'Esther McVey: HS2 should be scrapped and the money spent on other regional infrastructure', *Politics Home*, 10 June 2019
161 'Two Conservative leadership candidates pledge they will build the HS2 high speed rail line', *BirminghamLive*, 11 June 2019
162 'Boris Johnson: HS2 decision in December - and it could be stopped for good', *BirminghamLive*, 22 June 2019
163 'North fights to keep HS2 on the rails', *The Times*, 19 May 2019
164 Labour Party, *Andy McDonald speech at the Institute for Government*, 20 March 2019

beyond Birmingham would be a "dereliction of our duties".[165] Rail Minister Andrew Jones also said the Government's commitment to HS2 was "undiminished".[166]

However, Transport Secretary Chris Grayling revealed in June 2019 that the Chair of HS2 Ltd, Allan Cook, is undertaking a review of the project "to make sure the costs and budget are right and that it is deliverable".[167] Further, Chief Secretary to the Treasury Liz Truss, speaking in front of the Lords Economic Affairs Committee in June 2019, also raised doubts about the Government's commitment to the scheme suggesting that, in her view, the greater need was for boosting cross-city transport in the UK rather than travel between cities.[168]

A full business case for Phase One, with an updated cost estimate, was expected to be published by the Government in June 2019 alongside an authorisation of notice to proceed with Phase One.[169] The Government however said in April 2019 that this would now "take place later in 2019",[170] possibly in December.[171] It will be based on the latest available cost estimate for Phase 1 and will be informed by:

> …supplier feedback where contracts have been awarded and will reflect expenditure to date and projected income and maintenance costs. Where contracts have not yet been awarded (e.g. railway systems, rolling stock) HS2 Ltd estimates will be used.[172]

This will inform what is called a 'Notice to Proceed', which is the formal contractual process that enables each Phase One supplier to move from design and development to construction.[173]

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[165] DfT, *Securing HS2 for the Midlands and north*, 24 January 2019
[166] DfT press notice, Rail Minister reiterates northern benefits of HS2, 11 February 2019
[167] 'HS2 faces test to see if it can be built on budget', *The Times*, 6 June 2019
[168] 'UK spending review delayed by Tory leadership contest', *Financial Times*, 4 June 2019
[169] HL Deb, 24 July 2018, col 1593
[170] High Speed 2 Railway Line: Written question - HL15000, 2 April 2019
[171] 'Ministers delay signing off first half of spending for HS2 by six months', *The Telegraph*, 31 March 2019
[172] High Speed 2 Railway Line: Written question - HL8961, 10 July 2018
[173] High Speed 2 Railway Line: Buckinghamshire: Written question – 246904, 29 April 2019

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