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High Speed 2: One track mind?

Considering the alternatives to HS2

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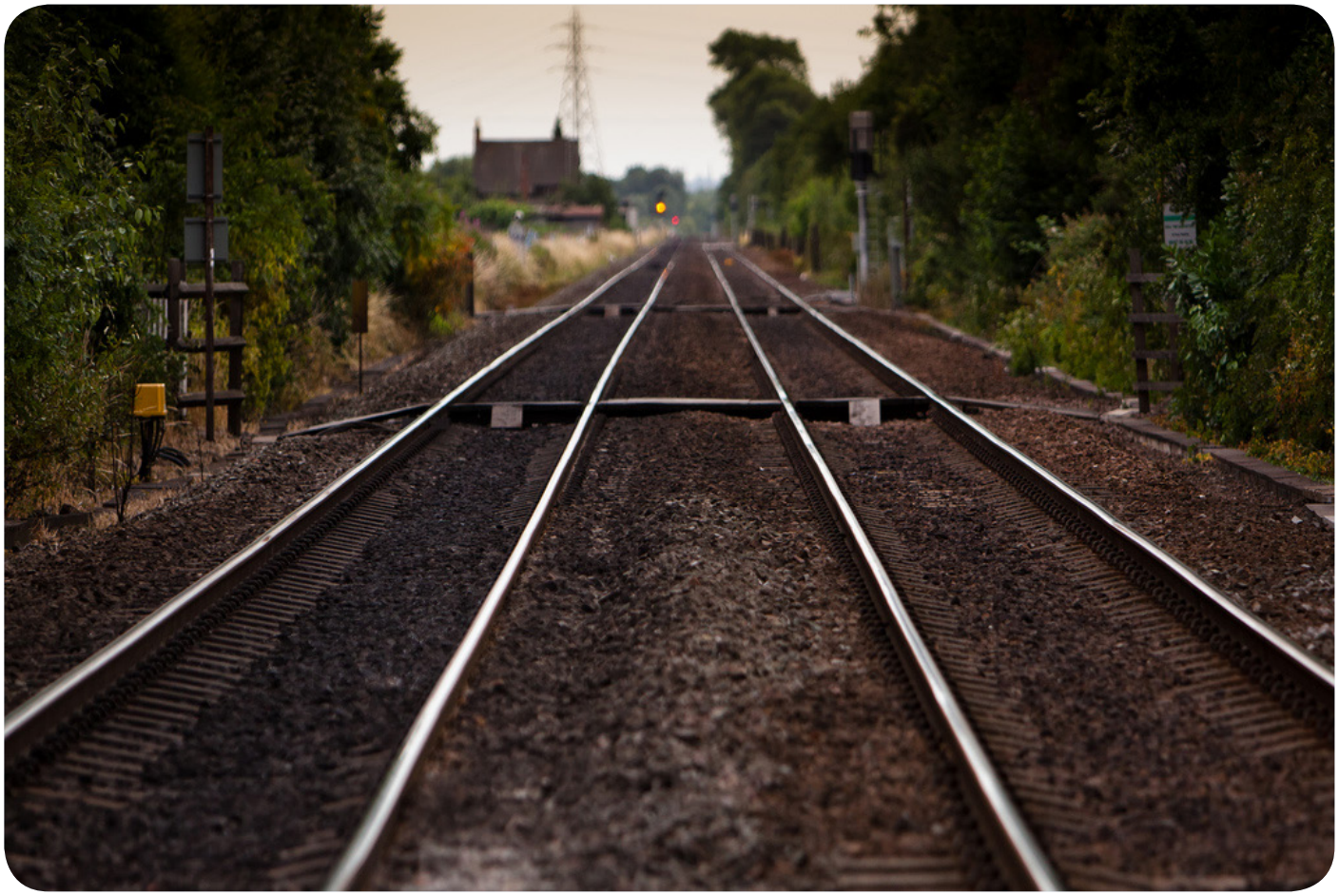
nef (the new economics foundation) is a registered charity founded in 1986 by the leaders of The Other Economic Summit (TOES), which forced issues such as international debt onto the agenda of the G8 summit meetings. It has taken a lead in helping establish new coalitions and organisations such as the Jubilee 2000 debt campaign; the Ethical Trading Initiative; the UK Social Investment Forum; and new ways to measure social and economic well-being.



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Introduction

One year on from the Government's decision to proceed with the HS2 project, the question remains whether the £33 billion scheme is the best investment for achieving the Government's strategic objectives. At a time of serious economic difficulty the role of infrastructure investment is clear and the time is ripe for heroic approaches, but not by being cavalier with society's scarce resources. With the first phase of the project not due to begin construction until 2016, the Government has time to get this right.

A year has passed since the Government decided to proceed with High Speed 2 (HS2), the prospective trans-national high speed rail scheme. During that time public attention may have drifted away from the merits and shortcomings of the Department for Transport's (DfT) landmark project, but its significance as the single largest publicly funded transport project in UK history is undiminished.

Government documents on HS2 do not set out clearly defined objectives for the £33 billion investment. Proponents of the HS2 project, including ministers, state, however, that it will be a catalyst for economic growth, job creation, rebalancing the nation's economic geography, providing necessary rail capacity and helping to achieve reductions in greenhouse gas emissions.[1]

nef is conducting an independent and impartial research programme on the HS2 investment proposal and the extent to which it will deliver these anticipated benefits. Our aim is to examine the overall value that HS2 will produce for UK society compared to relevant alternative investment options. This work builds on our application of Social Return on Investment (SROI) methodology to public policy-making, including infrastructure decisions.[2]

While we fully recognise the possibility that HS2 could help transform Britain's rail network serious questions remain around the wisdom of a single investment of this magnitude, the ability of the project to meet important objectives for the UK, and the process for making the decision.

nef believes that alongside extreme polarisation of the debate around HS2 the Government has missed a vital element in the appraisal. What is needed is a more thorough appraisal of different alternative investment options that can achieve the strategic goals outlined above. Only then can we know if HS2 offers the best return for the investment.

As a result the next phase of **nef**'s research will be to develop alternative investment packages of like scale and ambition for appraisal alongside HS2 and in this way test the best way of achieving objectives. These investment packages will be developed in consultation with key stakeholder groups to reflect both available evidence and experience from the ground. This short briefing paper provides background to explain and support the work we are doing. It covers some of the issues most critical to the questions we are striving to answer within this research programme.

How should HS2 be evaluated against alternative investments?

The DfT has only considered limited, smaller-scale classic rail alternatives to HS2, not investment packages of like size and ambition that could deliver trans-national benefits against the strategic objectives.

From the official documentation and ministerial statements we understand the primary objectives to be to:

- Provide essential future rail capacity
- Catalyse economic growth and job creation in Britain
- Rebalance the nation's economic geography and tackling the North-South economic divide
- Contribute to Britain's low-carbon future

Such varied and bold objectives call for consideration of investment alternatives alongside the HS2 proposal that are potentially capable of meeting them. The danger of assessing HS2 against only much more limited alternatives in terms of geographic coverage or total investment value is that this leads to a bias towards HS2.

At this stage the alternatives to HS2 have been poorly evaluated. Each alternative scheme included in the DfT's January 2012 Value for Money Statement was found to deliver a higher benefit-cost ratio (BCR) than HS2, as shown in the table below.[3]

The first three packages listed are alternatives to the London to West Midlands section of HS2 and the fourth is an alternative to the full Y network. Package 2, Package 2A, and 51M all denote specific packages of proposals for upgrades to the West Coast Main Line between London and Birmingham. Scenario B is an investment alternative considered by the DfT that included enhanced capacity and service quality on all three of the major north south train lines. Readily implementable upgrades are, for example, platform lengthening to accommodate longer trains and signalling technology improvements to increase service frequency.

The DfT noted that the value of the benefits from these schemes was substantially lower than from HS2. However, it should also be highlighted that total capital costs for the alternatives are in each case a fraction of those for HS2. For example, the DfT

Table I: Benefits and costs for alternatives to HS2[5]

Economic Summary Statistic	*Present value of benefits (£bn)*	*Present value of costs (£bn)*	*BCR*
Package 2	7.9	2.0	4.0
Package 2A	7.0	2.6	2.7
51M	6.1	1.2	5.2
Scenario B	13.9	9.3	1.5

projected that the capital costs of Package 2 would be approximately £3.6 billion, less than one-quarter of the cost of phase 1 (London–West Midlands) and one-tenth of the total the cost of HS2.[4] Scenario B, the phase 1 and 2 comparator, would cost only 28 per cent of the £33bn high speed option. Cheaper alternatives provide decision-makers and tax payers with more cash to devote to other interventions which can contribute to strategic objectives. This helps to reduce the opportunity costs from pursuing a single expensive scheme.

Beyond alternatives like those shown in the table above, the DfT has not published any trans-national investment alternatives that attempt to meet the multifaceted stated objectives for HS2. These investment options provide for greater rail capacity – part of one of the central stated objectives of the scheme – but have little interaction with the others. It would be highly instructive, for comparative value for money purposes, to consider an alternative £33 billion investment package that could both increase rail capacity and boost regional economic growth while delivering a national low carbon transport infrastructure.

The method of DfT's comparison of HS2 and its primary alternatives creates a large bias towards HS2. The Government's current emphasis on classic rail alternatives to meet HS2's objectives, rather than a package of possible interventions, only serves to superficially inflate the relative value of the HS2 option.

How well does HS2 perform against its other objectives?

Aside from delivering more capacity, the ability of the HS2 scheme to deliver broad economic benefits, including vital regional rebalancing, remains highly uncertain.

Catalysing Economic Growth

Ministers have suggested that Britain cannot afford not to invest in HS2[6] due to its strategic importance in developing the national economy. There are few figures in the DfT documents that attempt to quantify the catalytic effect of HS2. The value of travel time savings is sometimes used as a proxy for positive economic outcomes, but it is important to note that in the HS2 assessments, travel time savings are classified as benefiting passengers specifically, not the economy more broadly.

The DfT's standard terminology for expressing positive economic effects of transport interventions are Wider Economic Impacts (WEIs). The DfT's January 2012 Value for Money Statement postulated that HS2 will deliver £4.1 billion of WEIs for the first phase of HS2 from London to Birmingham, and between £5.7 billion and £12.3 billion for the full network on to Leeds and Manchester.[7] Setting aside the fact that these WEIs are modest, they also come at a significant premium given the required investment of £16.3 billion for London to Birmingham and £33 billion in total for the full network.

But how robust is the measure for quantifying WEIs? The true ability of a high speed rail intervention to generate these wider returns varies in many ways based on geographic, social and technological factors. This is difficult to measure and the DfT's recent track record raises questions about how reliable such projected WEIs are as evidence for the future success of a scheme. For example, the National Audit Office 2012 review of High Speed 1 found that the DfT was still unable to sufficiently assess the wider economic and regeneration benefits of that project.[8]

Rebalancing the UK's Economic Geography

The ability of HS2 to deliver against this primary objective has received relatively little attention. Studies have found that high speed rail links tend to benefit more prosperous regions above other areas,[9,10] especially if this is not accompanied by economic and skills strategies that provide connected cities with an economic specialism. The table below displays evidence from international evaluations.

Table II: High Speed Rail Studies – international examples

Japan Sasaki et al. 1997	HSR lines targeted cities already performing well economically. Faster growth happened where it was already expected, even before the HSR line was built
France Albalate & Bell, 2010	Paris has gained the most economically from the creation of the HSR network. Despite some business creation, there is no evidence that HSR led to overall economic decentralisation from Paris. It did reduce numbers of overnight stays in satellite areas, negatively impacting tourism.
Germany Albalate & Bell, 2010	HSR development has had no impact on economic geography – partly because there is no central city dominating the economy and rail passenger demand remains as it did before HSR – less than in other countries like France and Japan.
Spain Gourvish 2010	Ridership remains low – prices high relative to conventional rail. Also, there is some evidence that Madrid has benefited the most, contributing to a greater centralisation of businesses and population in the capital.

There are three considerations of note:

1 A net increase in economic prosperity and employment in one area could be the result of displacing activity and employment elsewhere. This means that some towns and cities might experience a decline in their prosperity, offsetting any potential increases in Birmingham, Manchester and Leeds. For example, Greengauge 21 and KPMG found that HS2 could actually have a negative impact on the Cardiff economy.[11]

2 Other drivers of activity could mean HS2 makes little difference. For instance, the HSR links in Japan were accompanied by an increase in economic prosperity in cities which were growing anyway, making it difficult to untangle the difference the HSR link made in practice.[12] In the case of the UK, where cities such as Manchester and Leeds have seen substantial improvements in their Gross Value Added (GVA) in the past fifteen years, it is possible that HS2 will not contribute much more to the economic prosperity of these areas.

3 Even if HS2 did contribute to greater regional economic prosperity through a net increase in jobs and economic activity in cities outside London, it might not be enough to rebalance the economy as London might still gain more allowing these imbalances to persist. The case of the HSR link from Paris to Lille is often used to highlight the potential benefits for regional development. While Lille did benefit, studies show that Paris benefitted more.[13] This suggests that HSR can have the effect of unbalancing the economy even further.

nef's research programme will pay particular attention to the objective of rebalancing Britain's economy because this is such a highly recognised imperative. We will be exploring international evidence in greater depth and discussing with stakeholders alternative transport and infrastructure options for achieving positive gains against this objective that should therefore be considered in assessing the best way to invest.

Carbon Impact of HS2

High speed rail is more carbon intensive than conventional rail. Any contribution to carbon savings comes primarily through reducing air travel. For HS2 to help reduce air travel it needs to connect to the most northerly cities, especially Glasgow and Edinburgh. But it is only the London to West Midlands section of HS2 that has been approved so far and exactly how HS2 will interact with other domestic aviation markets is uncertain.

Critically, CO_2 reductions from travellers switching from domestic flights to HS2 can only be realized if the airport slots that were used for domestic flights are closed. This seems unlikely in the context of calls for expanded aviation capacity.[14] In reality, the slots are likely to be filled with more carbon intensive international flights, significantly increasing net carbon emissions.

In addition, a further concern arises from Government commissioned information suggesting that more CO_2 will be emitted during construction of HS2 than will be saved over 60 years of operation,[15] even if HS2 captures 100 per cent of all travel between London and Manchester.

The methods matter

Once valid investment alternatives along with HS2 have been identified, robust value for money appraisal is an essential step in the decision-making process. This is a key tool for deciphering outcomes from each option and provides a basis for comparison of returns.

There are inevitable uncertainties in the valuation of particular costs and benefits, but nevertheless, value for money appraisal helps provide a burden of proof about potential returns to society. This is achieved by assessing alternative schemes on a like-for-like basis, applying consistent assumptions and analysis, and revealing how much room for manoeuvre there is in underlying factors, such as oil prices, or growth rates, before value for money can no longer be assured.

It is important that the value for money appraisal is carried out in as robust a way as possible and according to best possible practice.A number of experts and commentators have paid close attention to the DfT's appraisal of HS2 and raised concerns. We look at two particular issues.

The Value of Time: How reliable is this as the core benefit in appraising HS2?
The DfT's economic case rests heavily on the benefits of time savings to passengers. While time saving is likely to be a meaningful benefit to stakeholders, it may not be more meaningful than other impacts, such as ticket pricing or train reliability. The premise is that time spent on a train is not productive and has a value of zero. In addition, the calculation of aggregate time saving is made using a very high value of time which likely over-estimates the benefits.

For the appraisal of HS2, the DfT's value of time for rail passengers is based on passenger earnings of approximately £70,000 per annum or above, in 2010 values.[16] Mean annual pay for workers in the UK in 2010 was £26,510, with even the 90th percentile only earning a mean salary of £46,428.[17] If the average of £46,428 were used to estimate the value of time savings from HS2, still arguably a high value, the BCR would fall to the bottom of the "low" value for money category.

In April 2012 the DfT published analyses, originally conducted in 2009 and not then publicly released, which cast significant doubt about the legitimacy of using the travel time savings metric as a basis for appraising the value of schemes like HS2. Each report undertook:

> *a stated preference study of rail business travellers to obtain direct evidence on the productive use of travel time during the course of work and to assess its impact on the work value of marginal travel time*[18]

Both studies recommended a change in standard DfT methodology and called for:

1. A 'downward revision of…travel time savings, to somewhere between 65 per cent and 50 per cent of current values;'[19] stating also that

2. There are, 'major implications for current appraisal methodology, with base level business travellers' benefits from travel time savings halved compared to current'[20] government standards.

Put simply, without a high value for time saved, the economic case for HS2 is seriously degraded. 55 per cent of the benefits of HS2 according to the DfT's analysis are based on the value of travel time savings. In addition, if the travel time saving metric is flawed and purely a proxy for other positive economic outcomes, the validity of this proxy needs to be verified, or alternatively, more technically robust, measures deployed.

The Capacity Issue: How certain are the government's demand figures?

Demand forecasting methodology for new rail markets is highly uncertain. The official demand forecasts for High Speed 1 (HS1) overestimated demand for the new train line by 30 per cent.[21]

Forecasting methodology has improved between analyses for HS1 and HS2 but still the two major factors influencing demand growth are annual GDP growth and past demand trends.[22] At the time of the decision to proceed with HS2 in January 2012, the DfT demand model forecast economic growth to continue at 2 per cent GDP annually, or above, in perpetuity – an achievement we may not realise for quite some time given current economic difficulties and growing environmental constraints. Given this, along with other limitations and core assumptions within the DfT's forecasting methodology such as no premium fares on HS2, there is a high chance that the general level of demand for journeys in transport markets served by HS2 will be less than DfT projections.

Moving beyond background forecast drivers, the projected modal breakdown of predicted transport demand is also questionable. The table below displays the projected sources of passenger demand for HS2.

Table III: Modal Breakdown of Passenger Demand (from HS2 Economic Cases)

Traveller	*DfT 2011 (Feb)*	*DfT 2012 (Jan)*
Switch from classic rail	65%	65%
New trips	22%	24%
From air	6%	3%
From car	7%	8%

Switch from classic rail

Even if demand for rail travel increases according to DfT projections, switching from classic rail to high speed rail (HSR) depends on highly uncertain factors such as HS2 pricing and the development of capacity on other lines. In terms of pricing, the DfT insist that HS2 will not be a premium service, thus offering no cost-penalty for switching rail consumers. This does not reflect pricing schemes on current HSR lines in the UK (HS1, WCML, ECML) and experience from abroad in Europe and elsewhere. HSR projects, once in operation, run as a premium service. Volume of classic rail switches could decline if the price is prohibitive and there is other capacity on classic commuter lines.

From air

When looking at the domestic aviation market, flights from London to other population centres in England represent a miniscule proportion of total UK flight shares. In terms of evaluating time savings potential the only flight market that HS2 will impact will be flights from London to Scotland. Even if these trips are captured by HS2, any projections concerning the London to Scotland aviation market in the mid 2030's are extremely uncertain at best.

From car

It is reasonable to assume that HS2 will impact the car market – but it is worth emphasising that 93 per cent of all UK car journeys are less than 25 miles and 57 per cent are less than five miles.[23] HS2, because it will travel long distances with few stops, will likely have no impact on nearly all of the UK's car journeys.

New Trips

The two big issues to consider here are generated demand and the DfT's desire to move away from the 'predict and provide' approach to planning transport interventions. The landmark Eddington and McNulty transport studies have called for an end to 'predict and provide' because evidence shows that it does not work in reducing congestion and efficiently managing infrastructure.

The shortcomings of 'predict and provide' are due in large part to the reality of generated demand – a trip that would not have otherwise been made – when a new transport pathway becomes available. The true drivers of demand growth for a new transport intervention are complex and difficult to apply across different investments. Coupling this fact with the DfT demand forecasting methodology's bias toward past performance, the task of establishing a clear picture of future demand is, at best, difficult.

There are many fundamental questions surrounding individual travel and national transport developments that are not addressed in the DfT's case for HS2 but yet are implicit in the underlying assumptions behind the forecasting methodology. Is there a causal relationship between economic growth and rail travel? Can we expect economic performance in the future to mirror past trends? Just because rail travel has increased during the last decade will it continue to do so in the future? Do we want it to? These first order questions are not considered by the DfT.

Public Confidence: What is the return on investment?

The value calculated in the DfT's cost-benefit analysis for the first phase of the HS2 project, the London to West Midlands section, has steadily declined over the last two years[24] and the BCR currently stands at 1.4.[25] This represents low value for money according to HM Treasury and is substantially lower than the average BCR for UK rail investments of 2.83.

Excluding uncertain wider economic impacts, according to HM Treasury guidance, this puts the HS2 scheme in the 'low' value for money category. Table 1 shows how the BCR excluding wider economic impacts has fallen over time.

Table IV: HS2 Benefit Cost Ratios* 2010-2012

	Mar 2010[26]	*Feb 2011*[27]	*Jan 2012*[28]	*Apr 2012*[29]	*Aug 2012*[30]
Phase 1 BCR	2.4	1.6	1.4	1.2	1.4
Full Y BCR	4.0	2.2	1.6/1.9	1.3/1.5	1.6/1.9

* These BCRs exclude Wider Economic Impacts

The downward trend in the prospective return on investment is troubling, especially as the project start date draws nearer and as more project details are finalised.

It is interesting to note that The Eddington Transport Review found that the average BCR for UK rail investments was 2.83,[31] offering 'high' value for money according to the Treasury categories shown in the table below. This is reproduced from the latest DfT documents.

Table V: BCR Category Levels[32]

Value for Money Category	*Benefit Cost Ratio*
Poor	Less than 1.0
Low	Between 1.0 and 1.5
Medium	Between 1.5 and 2.0
High	Between 2.0 and 4.0
Very High	Greater than 4.0

The trends and the relatively low relative performance of HS2 further emphasises the need to re-examine alternative strategic investments capable of delivering against the Government's ambitious objectives because we might be able to meet those objectives better and secure higher returns. We can only know that if we examine HS2 and alternative schemes of similar scale on a like-for-like basis. Only a re-examination along these lines can provide confidence that as far as possible the best investment has been secured, and value optimised for this largest of public investments.

Conclusions

As it stands, the Government's case for the HS2 link between London and northern cities is incomplete and therefore cannot be used as a reliable basis for a decision on whether it should go ahead.

Too many factors have been omitted from the analysis for it to be robust and persuasive. There is positive bias towards the scheme which does not give confidence that HS2 will deliver against its objectives and create more value for society than it will absorb in resources.

Most importantly, it is unclear whether or not HS2 is the best bet for delivering on the DfT's ambitious and diverse goals. To properly assess HS2 we must take one step back and ask whether or not this scheme is the best investment possible. Given the bold objectives, austere economic and environmental context and sheer size of the impact on the public purse it is not enough that it passes a minimum threshold of return. None of this is to say that making decisions on costly, long-term infrastructure investments can be an exact science. But a burden of proof must be reasonably established when a large commitment of resources is at stake and the opportunity costs, in terms of other investment options foregone, are high.

A bold approach to tackling major economic issues is to be welcomed and it is clear that investments are inherently risky, with long-term plans and projects carrying inevitable uncertainties. But a well-evidenced appraisal process is still essential. Overall, there is little evidence that constructing another train line, even one accommodating very fast trains, will have transformative economic or environmental benefits. HS2 will certainly generate some benefits but, the central question remains unanswered by all: Is HS2 the best way to spend £33 billion of our scarce resources?

Endnotes

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