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High Speed 2: The best we can do?

Creating more value from £33 billion

nef is an independent think-and-do tank that inspires and demonstrates real economic well-being.

We aim to improve quality of life by promoting innovative solutions that challenge mainstream thinking on economic, environmental and social issues. We work in partnership and put people and the planet first.

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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The Government is about to commit £33 billion to a single high speed rail project – the largest transport investment in UK history. But is this the best use of taxpayers' money? Other transport investments could outstrip High Speed 2 on value for money and perform better against the scheme's objectives, but as yet they are unexplored.

The Department for Transport (DfT) has omitted a vital step in what should be a fair, transparent and prudent appraisal of the proposed High Speed 2 (HS2) rail line: **it has failed to explore alternative options**. At no point in the process have alternative ways of spending the £33 billion HS2 budget even been considered, let alone properly appraised against the scheme's objectives. We understand these to be:

- Provide future rail capacity;
- Catalyse economic growth and job creation in Britain;
- Rebalance the nation's economic geography to tackle the 'North–South divide'; and,
- Contribute to Britain's low-carbon future.

Uncertainty around whether HS2 will actually meet its objectives is growing; it is vital that we have an open, informed debate on the scheme. That is why **nef** has developed an example of an ambitious, alternative transport investment package that, for £33 billion, could bring as many or more benefits as the new high-speed rail link. Compiled through interviews with transport experts, as well as a detailed review of government and academic literature, our package contains a total of 88 individual investments, falling into the following categories.

- **Major upgrades to the East Coast and West Coast Mainlines.** Upgrading the UK's two major North–South railways would cost-effectively increase the speed, reliability and capacity of long-distance, inter-regional journeys. Plus, it would avoid the need to build an energy intensive, ecologically damaging new link.
- **Regional rail enhancements.** Investing in the rail connections between towns and cities in the Midlands and the North would give a lift to regional employment centres, and address the North-South economic divide more effectively than focusing solely on long-distance, inter-regional travel.
- **Mass transit projects and bus network funding.** Improving bus and tram networks in four core cities in the Midlands and the North, and introducing smart integrated ticketing systems (similar to the Oyster Card system in London), would help boost regional economies and reduce pressure on railways and roads.
- **Cycling and walking infrastructure.** Substantial financial support from central government for active transport – on a par with the spending in the capital – could transform the cycling and walking landscape across the Midlands and North of England. Not only would this boost individual health and well-being, it would encourage low-carbon travel and help regional towns and cities become places where people want to live, and businesses want to locate.

- **Super-fast broadband rollout.** Upgrading nearly-outdated broadband infrastructure in ten core cities would deliver faster, more reliable internet access to homes and businesses throughout the country. As well as boosting growth, this would reduce the demand for business travel – releasing pressure on roads, railways and air.

As our alternative package demonstrates, we don't necessarily have to spend the entire £33 billion currently earmarked for HS2 on one make-or-break scheme. It's possible that spreading the capital across many diverse projects, in a way that is responsive to local as well as national needs, could reap much wider economic, social and environmental dividends.

Something fundamental has been lost in the HS2 debate. The point of any investment is to meet needs or goals; these are what determine why and how we invest scarce funds. The concern with HS2 – the biggest transport investment in in UK history – is that the means (HS2) have overshadowed the ends (economy, environment and rail capacity), with no assurance that the two are truly connected. There could be better ways to meet our national goals, and as custodian of our public funds the government must step back from unsubstantiated rhetoric on HS2 in order to explore and assess these opportunities properly.

Introduction

Decisions about long-term public investments like High Speed 2 (HS2) are inherently uncertain and risky. Because of the scale, complexity, and time span of such projects, it is hard to predict just how effectively they will meet their objectives. The only way to mitigate this uncertainty is to (a) fully explore all other options first, and (b) appraise them in a fair, rigorous, and transparent way.

But in the case of its HS2 proposal, the UK Government has failed to take both key steps. Building HS2 is one way to spend £33 billion towards increasing rail capacity, boosting and rebalancing the economy, and contributing to a low-carbon future. But it is not the only way – and may not be the best way.

As yet no real alternatives to HS2 have been investigated, let alone evaluated. The question – 'What is the best way to spend £33 billion?' – has not been asked.

What do we mean by real alternatives?

Stepping back from technical appraisal, this report illustrates the kind of alternative investment that should reasonably be considered against HS2. In it, we sketch out an example of an ambitious investment package that, for a comparable sum of money, could bring as many or more benefits as the new high-speed rail link. Our aim is to urge the Government to assess the overall relative value that this spending – on HS2 or feasible alternative options – will produce for the UK.

Of course, one option may be to consider a smaller alternative investment altogether, saving public funds at a time of resource constraints. There are benefits to smaller projects that increase their relative value. Investing less money decreases opportunity costs and increases the option value provided by the scheme in question.

Nonetheless, a smaller investment would require a narrowing of the range of ambitious and laudable objectives for HS2. Time is ripe for significant targeted investment in the UK's infrastructure. The International Monetary Fund (IMF) and the Organisation for Economic Co-operation and Development (OECD) suggest that more capital spending on UK infrastructure in the near term will catalyse more economic opportunities in the future.[1,2] This report therefore focuses on an alternative investment package that is equivalent to HS2 in terms of commitment of funds.

As well as backing measures to enhance and expand existing inter-city and regional rail networks and infrastructure, our alternative package includes investment in multi-modal local transport solutions, such as mass transit (buses and light railway), and active transport, such as cycling and walking infrastructure. In addition, the package includes investments in fibre optic broadband and video conferencing hubs that could reduce demand for travel while increasing digital connectivity.

Box 1. Our approach to appraisal and decision-making

Using large-scale infrastructure projects as case studies[3], **nef**'s longstanding research programme on appraisal and decision-making strives to provide insight into how to make better public investment decisions in the face of risk and uncertainty.

Economic appraisal is not just about whether a scheme will deliver a financial return or economic benefits for a particular group. It is much broader; it is about understanding how it will meet robust objectives; how it will affect different people; how it will absorb society's social, economic, and environmental resources; and how it will create additional societal value. It requires bringing into the balance not just direct costs and benefits, but indirect, often unintended ones as well. This is recognised in economic theory and in the Government's own guidance on appraisal set out in HM Treasury's *Green Book*.[4]

What is HS2 trying to achieve?

HS2 is the single largest publicly funded transport project in UK history. Proponents of the £33 billion line believe that HS2 will create substantial benefits for the country, and that we need to invest in these types of transport projects to remain internationally competitive.

From the official documentation and ministerial statements we understand the primary objectives of the HS2 project to be:

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

How far does HS2 meet its own objectives?

Assessing a scheme against its objectives is a vital element of proper appraisal. There are a growing number of commentators questioning HS2's ability to meet its stated objectives. For example, in May 2013, the National Audit Office (NAO) published a review of HS2. This audit determined that the ability of HS2 to meet its own stated objectives is actually unclear.

Specifically, the report concluded that there was little evidence to prove that HS2 will catalyse economic growth or rebalance the economy by supporting regional growth. It also questioned whether it was a necessary scheme for meeting capacity demand on existing North–South rail lines.[5,6,7] The report did not evaluate how HS2 supports carbon-reduction goals.

Previous **nef** reports, including *High Speed 2: One track mind?*, also critiqued the Government's existing appraisals of the HS2 proposal, and highlighted the uncertainty over whether HS2 will actually meet its objectives. Our findings are summarised in Appendix 1.

What alternatives has the Government looked at so far?

To date, the Department for Transport (DfT) has only considered limited, smaller-scale classic rail alternatives to HS2 rather than investments of a similar size and ambition that could deliver country-wide benefits and meet the same strategic objectives.

In the DfT's most recent strategic alternatives study, published after the HS2 consultation, four alternatives were considered – three partial alternatives to the London to West Midlands section of HS2, and a single alternative to the full HS2 scheme.[8] The alternative to the full Y network, called 'Scenario B', includes capacity and service quality enhancements on all three of the major North–South train lines.

The three partial alternatives would each cost only 7 per cent of what HS2 will cost to implement. Likewise, the total capital cost of Scenario B is only 34 per cent of the HS2 price tag.[9,10]

How do they stand up to HS2?

In its January 2012 *Value for Money Statement*, the DfT assessed these cheaper alternatives using the same methods as those applied to the HS2 scheme. It found that all four delivered a higher benefit-to-cost ratio (BCR) than HS2.[11]

Despite their better BCR performance, however, they were rejected on the basis that each would deliver a lower *total* value of benefits than HS2. This finding was unsurprising of course, given the schemes' lower total capital costs: if you spend less, you generally get less.

But what the DfT's evaluation of these alternatives failed to acknowledge was that the remaining funds available within the HS2 envelope could be

strategically invested in additional transport schemes and projects, with a view to addressing any outstanding objectives and generating further benefits. Taking this approach could potentially deliver a comparable or greater total amount of benefit as is expected from HS2. From this perspective the alternative enhanced programmes could be just as viable and should certainly be considered.

Incomplete comparisons

Even from this cursory review of the early HS2 appraisal and decision-making process, we can see the fundamental flaws in the way alternatives to HS2 were developed and assessed.

Comparing HS2 to a set of smaller, less ambitious alternatives is not a like-for-like evaluation. Appraising HS2 against incomplete comparators creates a positive bias towards the scheme and obscures whether the primary investment is really the best available option.

Is HS2 the best way to achieve its stated transport objectives? Unfortunately, the UK taxpayers and even ministers themselves do not know. No equivalent project has been considered or assessed by the Government and there is no way to know whether HS2 is the best way to spend £33 billion of our scarce resources.

nef's alternative investment package

As we have seen, the DfT urgently needs to develop and assess a genuine alternative to HS2: one of similar scope and cost that will allow us to put the project's costs and benefits in proportion.

To illustrate what is required, **nef** has developed a detailed investment package that mirrors the cost and geographic coverage of HS2. It includes 88 individual schemes compiled from official government documents, academic literature, stakeholder interviews, and conversations with transport experts. We have used indicative cost information provided by the Government where possible and consulted with transport experts for the remaining schemes.

Since HS2 has disparate and ambitious goals, we looked beyond inter-city rail projects and surveyed multi-modal transport schemes at the local and regional level. **nef**'s illustrative alternative to HS2 includes substantial investment in:

- **Upgrades to the UKs two major North–South mainlines** that increase capacity and reliability of services while reducing travel times;
- **Enhancements of key regional rail links** to boost intra-regional connectivity and travel between non-London population centres;
- **Mass transit projects and bus network funding** to augment the local transport environment outside the capital and improve socio-economic transport conditions and local economic performance;
- **Cycling and walking infrastructure** to increase the resilience of local transport networks and boost individual health and well-being; and
- **Fibre optic broadband roll-out and video conferencing hubs** to enable ultra-fast to-the-door digital connectivity.

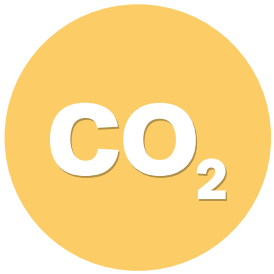
A detailed list and cost breakdown of all components making up nef's alternative investment package is available in Appendix 2.

The following sections present the different parts of this illustrative alternative in greater detail. Constructing a real alternative to HS2 means pursuing the same objectives. Each time an element of our proposal satisfies one or more of HS2's primary objectives you will see the following icons:

Capacity

Economic rebalancing

Growth



Low-carbon future

The point of developing this alternative is to extend the comparison of HS2. Based on detailed interviews and research, we have constructed an outline of what a 'real' alternative might look like. Clearly the Government would want to conduct its own significant further research, testing, and stakeholder engagement if settling the details of an official alternative to be evaluated alongside HS2. We call on the Government to undertake this work urgently.

HS2: HOW ELSE COULD WE SPEND £33 BILLION?

Invest in regional rail

- Works to increase connectivity within and between key non-London cities
- Ambitious station redevelopments around the UK
- New railway tunnels to ease congestion
- BENEFIT: Enhance regional trade and employment

£10 BILLION

Upgrade mainline rail

- Upgrade works to the UK's major North–South mainlines
- BENEFIT: Improve speed, capacity and reliability of travel across the country

£10 BILLION

Cycling and walking infrastructure

- Funding for walking and cycle paths, bike parking, rental schemes and more
- BENEFIT: Increase the resilience of local transport networks, improve well-being and air-quality

£2 BILLION

Future connectivity infrastructure

- Rollout of to-the-door fibre optic broadband infrastructure
- Video conferencing hubs for SMEs and NGOs
- BENEFIT: Reduce transport demand, boost business

£5.5 BILLION

Better mass transit

- Funding for light rail schemes (e.g. trams) and bus networks
- Smart ticketing systems (like Oyster card in London)
- BENEFIT: Invest in regional economies, reduce congestion and encourage low-carbon travel

£6 BILLION

1. Investments in mainline rail
£10 billion

The first part of our alternative investment package focuses on upgrading the UK's two major North–South inter-city rail lines – the West Coast Mainline (WCML) and the East Coast Main Line (ECML). Enhancing these existing lines would cost-effectively create rail capacity and make inter-regional rail travel faster and more reliable while avoiding the need to construct an energy intensive, ecologically damaging new link.

What could we buy?

The WCML and ECML investment included in our alternative investment package encompasses line infrastructure improvements, station developments, and the purchase of new trains – as shown in Figure 1.

These components are compiled from elements in two of the alternative packages already considered as part of the HS2 appraisal process: 'Scenario B' – a package of upgrades put forward by the DfT as an alternative to HS2's full Y-network; and '51M' – a partial alternative to HS2, proposed by the local authority HS2 challenge group. The latter focuses solely on WCML improvements.[12]

So far, these smaller-scale packages have only been considered in isolation. But with the budget afforded by a real alternative to HS2, it is possible to combine the best parts of both.

Please note we have excluded the investments in the Midland Mainline (MML) that are included within Scenario B because the Government has since decided to make significant improvements on this line anyway.[13]

What would it cost?

Using cost figures provided by the DfT, this large-scale rail improvement will cost in the vicinity of £10 billion (2011 prices). See Appendix 2 for a full break-down.

Why invest in mainline rail?

Increasing services within and between regions

These ECML/WCML rail improvements would achieve one of the core objective of HS2 – boosting the speed, capacity, and reliability of the UK's core North–South train network – for a fraction of the cost. And, because these mature lines cater for shorter commuter journeys between neighbouring cities as well as long-distance routes between the North and the South, the benefits of enhancing them will be two-fold.

Boosting business

Enhancing inter-regional, as well as much-needed *intra*-regional rail services will provide the following economic benefits:

- Positive wider economic effects through improved connectivity and reduced travel times.[14]
- A rise in agglomeration economies – allowing an increased density of firms and workers – as more workers and firms gain access to key employment and trading centres.[15]

Objectives met

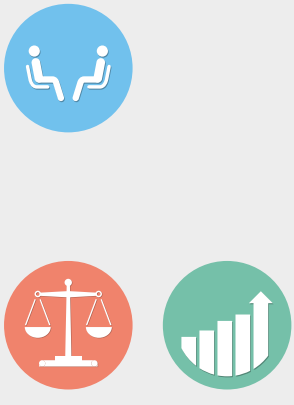


Figure 1. Investments in mainline rail

Key

- Infrastructure works to enhance track capacity, speed, and reliability (such as bypass works, 4-tracking, and grade separation)
- Station infrastructure additions at Euston, Kings Cross, Leeds, Peterborough, York, and Doncaster
- Electrification of currently diesel-powered railways to improve speed, reliability, and air-quality
- Reinstatement of unused line
- Signalling works
- Line speed improvements

Other mainline investments not shown on map

- Purchase of new rolling stock (e.g. carriages) to improve suburban commuting services
- Improvements to power supply and distribution

- Lower user travel costs, increasing the economic efficiency of rail travel.[16]
- More accessible railway jobs – because compared to new-build, repair and improvement activities create more jobs and generate more employment impact, on a per-£ basis.[17]

Environmental gains

Improving our existing North–South lines would encourage low-carbon long-distance travel by encouraging a modal shift away from cars and planes, while avoiding the construction of an ecologically disruptive new rail line. Furthermore, classic rail is less energy-intensive to operate than high-speed rail.

Potential return on investment

Excluding wider economic impacts (WEIs), this mainline rail investment package would have an approximate BCR of around 2.1. Including WEIs, the BCR could increase to the 2.3–2.4 level.

We arrived at these indicative BCR levels by extrapolating data from the economic appraisal within the DfT's *High Speed Alternatives* study. The per-£ return on investment of this strategic alternative mix eclipses the most recent BCR estimates for the full Y-Network HS2 of 1.6–1.9.[18]

2. Investments in regional rail and station redevelopment

£10 billion

Investing in regional rail projects is a readily achievable, cost-effective way to increase connectivity between existing centres of commerce. We suggest a basket of targeted investments – ranging from electrification schemes between mid-size northern cities to the construction of a new trans-Pennine tunnel – to upgrade substandard commuter links and help boost lagging regional rail networks.

What could we buy?

A fraction of the total HS2 bill could help transform existing infrastructure in the Midlands and the North – and in doing so improve the competitiveness of regional economies as a counterweight to London and the South-East.

Track works and upgrades

- **New sections of track to connect the WCML to the MML.** These track works would provide access to new cross-country routes such as Bristol to Norwich and Oxford to Nottingham.
- **Electrification schemes** to improve travel times, increase reliability, and reduce pollution on smaller inter-regional rail routes and northern commuter lines.
- **Enhancements to under-developed commuter rail links** – such as speed improvements on key commuter lines and purchases of additional rolling stock (e.g. train carriages).

New tunnels in the North and West-Midlands areas

Over the next five years, the DfTs *Northern Hub* programme aims to improve routes between West Yorkshire and the North-East. While these initial works will already enhance northern connectivity and trans-Pennine rail travel, additional investment will maximise their overall value. For instance, developing new infrastructure – such as a trans-Pennine tunnel specifically for 125-mph trains – would facilitate much faster East–West services in the North.

The development of a cross-Birmingham tunnel on the Litchfield–Redditch route would allow trains to bypass a highly congested section of the network, creating major additional capacity at Birmingham New Street Station and improving the reliability of all associated services.

Station redevelopments

Network Rail is currently investing £3.25 billion in upgrading stations around the country.[19] While it has planned some more substantial works for non-London cities, the majority of expensive station redevelopments will be located in London.[20]

Improving stations drives investment in and around them. The areas surrounding those stations that will be upgraded as part of the HS2 scheme, for example, have already attracted substantial interest from potential developers.

Recognising this value, our alternative investment package suggests undertaking major redevelopment works in and around key non-London rail

Figure 2. Investments in regional rail and station redevelopment

Key

- New trans-Pennine tunnel specifically for 125-mph trains to maximise benefits from Northern Hub investment
- Cross-Birmingham tunnel to release capacity on urban lines and at Birmingham New Street Station
- Routes benefitting from electrification
- New sections of track to connect the WCML to the MML allowing for access to new cross-country routes
- Electrification schemes to improve travel times, increase reliability and reduce pollution on smaller inter-regional rail routes and northern commuter lines
- Enhancements to under-developed commuter rail links – such as speed improvements on key commuter lines and purchases of additional rolling stock (e.g. train carriages)
- Large-scale city centre station redevelopment.

stations in 10 cities outside London. We propose using the current £500 million redevelopment of Kings Cross Station and its immediate surroundings as a benchmark for the scale and type of project required in these cities.

What would it cost?

We estimate that this set of projects would have a total capital cost in the range of £10 billion.

Why invest in regional rail and station redevelopment?

Addressing the regional growth imperative

If we are serious about boosting lagging regional economies and bridging the UK's North–South economic divide, pouring all our resources into a single inter-regional route (with few stop-off points along the way) may not be the best plan of action. Regional transport connections have a large impact on regional economies.[21]

Evidence suggests that investing in transport links within and between less prosperous cities and towns that are already significant trading partners actually does *more* to stimulate growth than investing in long-distance transport between regions.[22] There is a range of reasons for this. For example, creating better urban commuter links helps nurture agglomeration economies, and gives firms access to a larger labour market pool. [23]

Finally, improving major station facilities and associated services yields various multi-levelled benefits. Through improving the physical environment of stations and making them easier and more popular to use, it increases private sector economic development around them and boosts land values.[24]

Increasing capacity and sustainability in the North

The investments outlined would enhance intra-regional rail connections, streamline services, increase capacity, and reduce journey times across large swathes of the country. In doing so, they would fulfil the future capacity objective of HS2.

In addition, focusing on improving shorter, commuter rail journeys would increase the appeal of rail as an everyday transport option, and encourage a modal shift away from environmentally damaging car use.

Objectives met

Potential return on investment

It is unrealistic to attempt to estimate BCRs for individual projects, or the basket of projects, without conducting significant modelling. According to the *Eddington Transport Study*, the most recent value for money study of the UK transport system, the average return on 'classic' rail investments was 2.83. Therefore, the overall BCR of the package outlined here is almost certainly well above 2, outperforming the return on investment of HS2.

3. Investments in mass transit and buses

£6 billion

Railways are just one part of a holistic transport deal for the UK. Measures such as improving bus, tram, and light railway networks and introducing regional smart integrated ticketing systems (similar to the Oyster Card system in London) in four core cities would help nurture regional economies and encourage low-carbon travel.

What could we buy?

Our alternative investment package includes funding for mass transit projects in four of the largest cities in the North of England: Manchester, Leeds, Birmingham, and Liverpool.

Direct capital funding for light rail (e.g. trams)

Providing local government in Manchester and Birmingham with direct capital funding for mass transit schemes would help reduce the prohibitive up-front funding burden they currently face when investing in mass transit expansions.

As it stands, funding mass transit improvements in regional cities means scraping together capital from multiple suboptimal sources. Transport for Greater Manchester, for instance, is currently paying for an extension to its metro system with a fund that is partly council-tax-receipts backed, in order to make up the £1 billion shortfall between the costs of the scheme and what was provided through the DfT's Regional Funding Allocation.[25]

Using scarce local funds for transit upgrades in this way has significant opportunity costs. So in order to allow cash-strapped local governments the flexibility to invest without fear of detracting from other pressing needs, we suggest increasing the level of central government support for strategic mass transit upgrade works.

We also suggest earmarking part of the direct capital funding for resurrecting two light-rail schemes in Liverpool and Leeds. These have currently been shelved or significantly modified due to the level of upfront capital spend necessary to maximise returns on investment.

Regional smart ticket systems

Our illustrative investment includes £150 million for development, testing and operation of 'smart' regional integrated ticketing systems, similar to the Oyster Card system in London. These systems help integrate transport services across modes and help simplify the transport system for consumers where there are multiple operating companies.[26] Smart-card functionality allows passengers to plan 'end-to-end journeys' on public transport for a consistent price, stimulating multiple direct and indirect benefits.[27]

Buses

Buses have a vital role in the urban transport mix:

- They generate wider economic impacts through agglomeration benefits.
- They help decongest roads and reduce negative environmental externalities.[28]

Research by the Institute for Transport Studies concluded that 10 per cent of all bus commuters would lose their jobs or leave work due to the lack of affordable or available transport options if their bus route were to shut down.[29]

Yet despite carrying a staggering 4.7 billion people annually in the UK,[30] the six main sources of public funding for non-London bus services are in decline.[31]

Counteracting this, our alternative investment package includes significant capital for establishing a revolving fund for targeted investment in bus networks. Administered in collaboration with local governance, this would provide much-needed bus funding based on the specific mass transit needs of local areas.

What would it cost?

The total estimated indicative cost for this these improvements would be £6.1 billion.

Why invest in mass transit?

The UK needs to join the dots in its transport system. Better, more integrated forms of mass transit can improve travel safety and boost the resilience of the transport network by capturing passengers from crowded roads and commuter rail. Plus, it provides cities and regions with lower-carbon transport options that enhance the air quality.

Creating the conditions for generating employment

Good mass transit networks help create and maintain agglomeration economies[32] by allowing a larger population to access a higher density of employment options. In contrast, road and motorway schemes hinder this process by increasing the physical space between people and employment opportunities.[33]

A landmark study in the USA also found that mass transit development generates more employment impacts than any other type of large-scale infrastructure investment (energy, school buildings, water, roads, etc.). Mass transit investment creates 31 per cent more jobs than the new construction of roads and bridges and approximately 50 per cent more than new-build rail.[34]

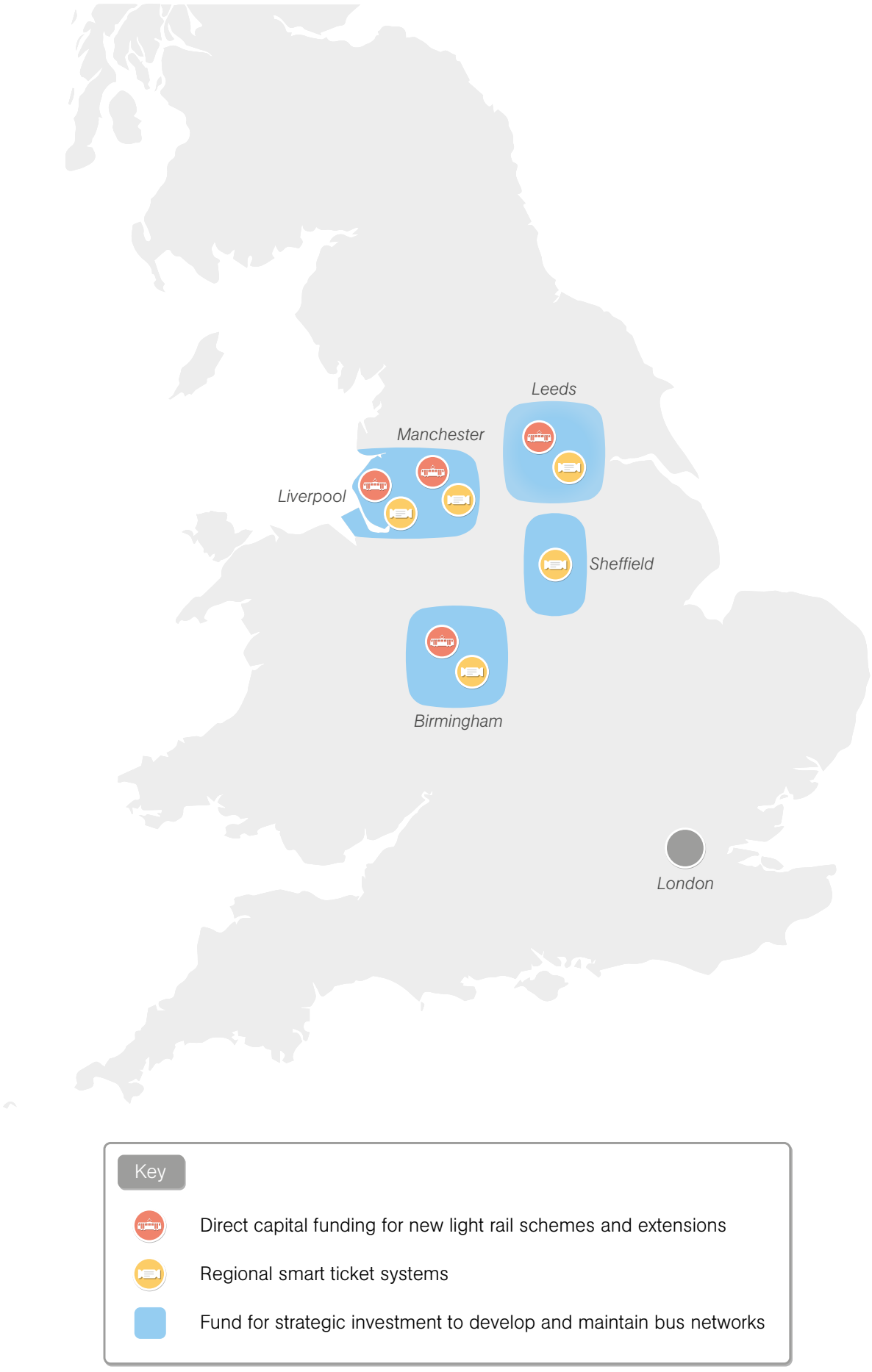
Objectives met

Potential return on investment

Again, drawing on the *Eddington Transport Study*, the average BCR for light-rail projects assessed by the DfT was over 2 to 1. Most of the specific light-rail schemes highlighted, like the Leeds SuperTram, have indicative BCR in excess of 3 to 1 if funded with higher upfront support.[35]

Considering bus investments, research by the Passenger Transport Executives group (pteg) found that for every £1 of public funding spent, the total economic return of PTE bus networks was over five times that amount.[36] The combination of the huge number of annual bus journeys and the high economic return on investment, underscores the practicality of strategically funding bus networks.

Figure 3. Investments in mass transit and buses



4. Investments in active transport
£2 billion

Substantial financial support from central government – on a par with the spend in the capital – could transform the cycling and walking landscape across the Midlands and North of England. Our package includes funding for major active transport projects in seven core cities.

The cycling divide

When it comes to budgets for supporting cycling and other forms of active transport, there is a huge disparity between London and all other major cities in the UK. While, through a number of streams, the DfT has agreed to commit £36 million annually between 2013 and 2015 in grant funding for rural and urban cycling programmes throughout the UK,[37] the 2013 reduced cycling budget in London alone is £104 million.[38]

Having small budgets means slow progress and limited project scope for active transport schemes outside London. In 2009, for example, Leeds City Council planned to create a 17-route cycle network starting in Leeds city centre.[39] The entire cost of the project was estimated to be only £9 million.[40] But four years after the original core cycle network proposal, the Council has only recently secured the funding necessary to get the modest programme up and running.

What could we buy?

Some regions already have existing plans for active transport expansion at varying levels of development. Nevertheless, more substantial financial support from central government – on a par with the spend in the capital city – would allow cities across the Midlands and the North of England to build not just cycle lanes, but separated cycle paths, secure and substantial cycle parking, cycle purchase programmes, and rental schemes.

Our alternative investment package includes active transport funding for the three major urban areas in the West Midlands and North of England that HS2 would link to. On top of this, it includes additional funding for active transport investments in other large northern urban areas, like Sheffield, Bradford, Nottingham, and Liverpool.

What would it cost?

We anticipate the total active transport package will total approximately £1.75–£2 billion: providing over £250 million each for the Birmingham, Manchester, and Leeds urban areas, a total of £500 million for four other northern population centres, and £500 million to fund walking programmes in ten locations.

Why invest in active transport?

Increasing the provision of active transport not only makes sense in terms of value for money and social value, it provides a foundation for long-term, low-carbon, sustainable, and healthy urban metropolitan transport. Investments in cycling and walking infrastructure across the nation will help the HS2 alternative scheme add to the UK's low-carbon transport network and increase the economic performance of local economies.

Expanding cycling infrastructure can also cultivate cycling-oriented local economic opportunities, in addition to providing a more attractive location for firms and workers to locate.

Objectives met

Within the urban context, providing other viable modes of transport beyond train, bus, and car can reduce the pressure on local transport networks allowing for greater transport flexibility.

Potential return on investment

Of the 184 transport projects assessed in the *Eddington Report*, cycling and walking schemes achieved an average BCR of 13.5.[41] It is likely that these schemes are even more valuable than stated in Eddington's study because other positive non-market health and life-style effects were not considered material within the appraisal frameworks. Cycling supports being active and boosts individual well-being and physical health.[42, 43]

Figure 4. Investments in active transport

5. Investments in future connectivity

£5.5 billion

Alongside traditional rail investment, a landmark infrastructure project should include investment in superfast fibre optic broadband and next-generation video-conferencing capabilities. All this would help boost business and reduce demand for carbon-intensive travel.

In the 2012 Budget, the Chancellor announced that the ten major cities in the UK would share £100 million in funding for broadband improvements.[44] When broken-down, the £100 million award will benefit cities like Birmingham and Newcastle to the tune of £10 million and £6 million, respectively.[45] This modest funding will help homes connect to the Internet via current limited broadband speeds.

Important as expanding current level broadband coverage is, however, the problem looming large around the UK's future connectivity is the lack of development in 'to-the-door' ultrafast Internet access. This involves upgrading the copper wire broadband infrastructure to run on fibre optic cables, which can deliver connections ten times faster.

What could we buy?

Future-proofed infrastructure

The need for increased digital connectivity will only increase in the coming decades. Meanwhile, current broadband investment plans do little to alleviate the data pinch-points created by soon-to-be outdated Internet connections. So to pave the way for future-proofed Internet connectivity for all, our HS2 investment alternative includes £4.5 billion of capital to create a coherent up-front funding mechanism for the provision of a to-the-door fibre-optic broadband infrastructure.

The cost of providing fibre-optic connectivity to every house in the UK has been estimated to be at least £15 billion,[46] however. So while our alternative investment package would clearly not contain the full amount necessary to reach every UK home, it could connect most homes in the core cities shown below.

Video-conferencing hubs

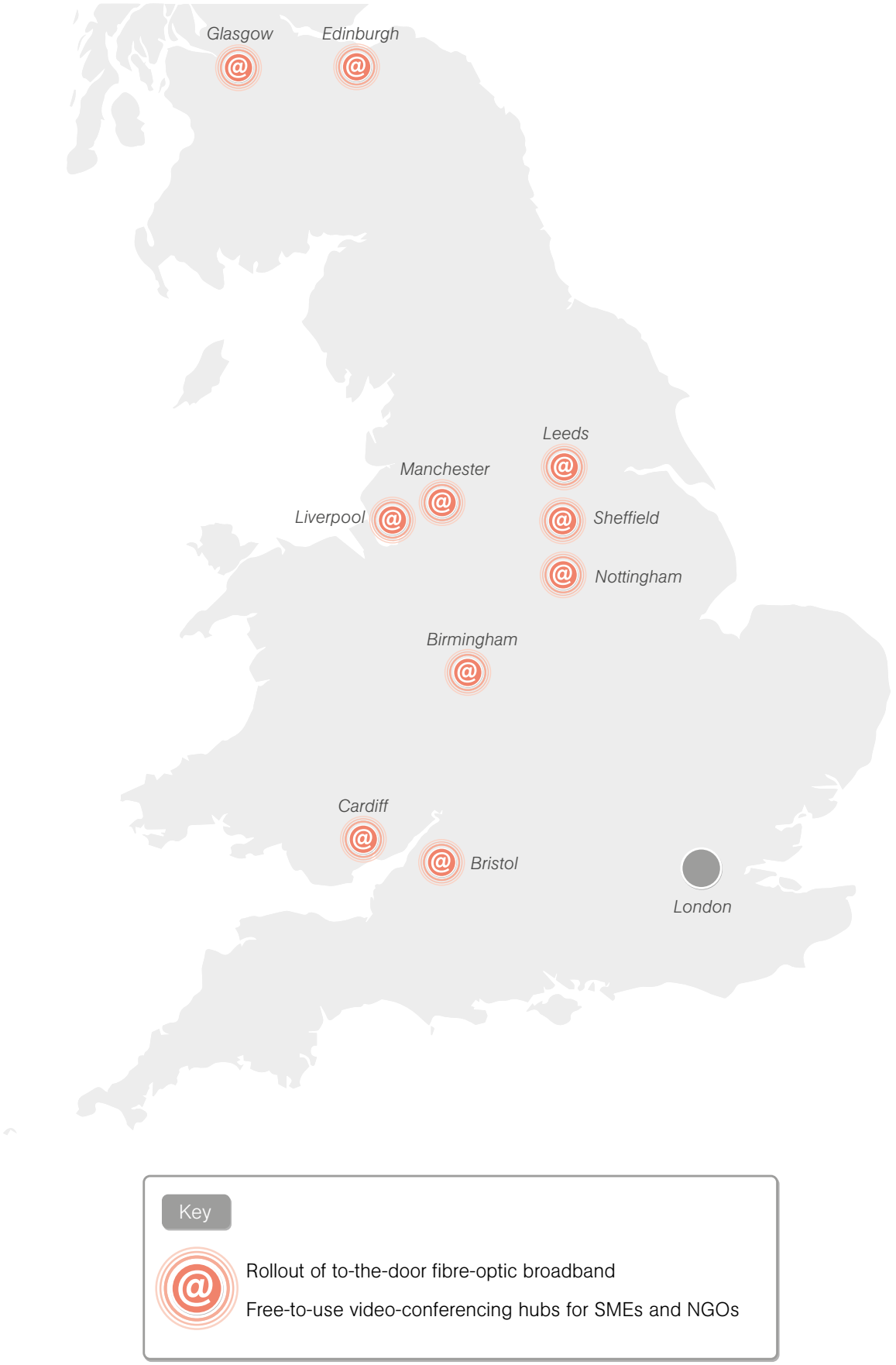
Beyond to-the-door fibre-optic connections, there is another way our budget could be used to bring future-proofed Internet connectivity to individuals in core urban areas and beyond. Buying, setting up, and maintaining cutting-edge video-conferencing equipment and capacity is an expensive proposition for many new businesses, small and medium enterprises (SMEs), and non-governmental organisations (NGOs). Therefore, to further encourage the uptake of digital connectivity in the place of traditional business travel, the investment alternative includes £1 billion to invest in free-to-use video-conferencing hubs for the UK's ten largest core urban areas outside London.

Much of the exact costs and feasibility around these investments will need to be done at a later juncture, but this illustrative investment opportunity highlights the potential breadth of any HS2-sized alternative.

What would it cost?

The total estimated indicative cost for this these improvements would be £5.5 billion.

Figure 5. Investments in future connectivity



Why invest in future connectivity?

Boosting business

Broadband investments improve economic performance and expand life opportunities. Academic research and research from the OECD and the World Bank has concluded that a 10 per cent increase in 'broadband penetration' corresponds with a 1 per cent national economic performance in OECD and high-income countries.[47,48]

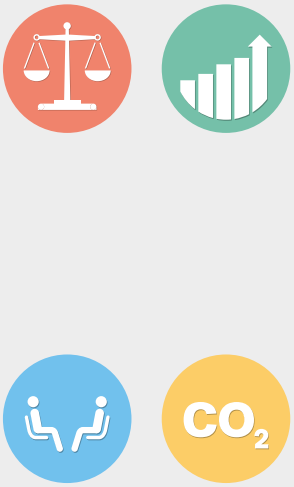
Upgrading broadband and video-conferencing technologies would permit more individuals to work from home and allow businesses to develop relationships instantly without having to travel – saving both time and money.

Releasing pressure on transport and environment

Investing in future connectivity would ease stress on the transport network by reducing the need for business travel. Plus, unlike traditional transport improvements, increased digital connectivity does not trigger the problem of 'generated demand' – that is, journeys that would not have otherwise been made.

Improvements in future connectivity will also reduce the negative environmental impact of large amounts of unnecessary business travel.

Objectives met



Potential return on investment

It is very difficult to develop an illustrative per-£ return on investment for broadband investments, but the academic research on the economic impacts of broadband investment suggests that returns are substantial and low-risk. Alongside the non-market impacts of greater digital connectivity for a large percentage of the UK population, the economic effects of this magnitude would create returns significantly higher than the HS2 investment.

Conclusion

The DfT urgently needs to develop and assess a genuine alternative to HS2: one of similar scope and cost that will allow us to put the project's costs and benefits in proportion. In absence of this, it is nearly impossible to know whether HS2 will deliver against its objectives and create more value for society that it will absorb in resources.

In this paper we have attempted to illustrate what is required. Our detailed investment package, mirroring the cost and geographic coverage of HS2, is an example of the kind of comparator that the Government's £33bn high speed train line should be assessed against.

The 88 individual schemes compiled in the **nef** alternative are concerned with transforming not just our railways, but the wider transport landscape of the West Midlands and the North. Compared to HS2, we believe that implementing a holistic transport investment package like this could be

- **More inclusive:** The **nef** alternative includes transport improvements for everyone: those taking long-distance rail journeys across the country, as well as those needing to travel short distances between regional cities; those who want to get out of the car and onto a bike or bus; and those who want to cut down their travel time – preferring to connect to services, businesses and people over the internet instead. HS2, in contrast, will be a premium service catering to a small segment of the population, and a small geographic area.

- **Faster to achieve:** We have over 20 years at least to wait until HS2 will be fully operational. At that point, the strategic case for the scheme itself may have long-since degraded. **nef**'s package of schemes include projects that are 'shovel-ready', and could be orchestrated in a fraction of the time needed to construct HS2.

- **More balanced:** Regional transport is of vital strategic importance to the nation's economy. Most of the budget in the **nef** alternative is therefore targeted towards bringing the infrastructure relied on by businesses and people outside the capital city up to scratch.

- **Better for the economy:** Evidence suggests that making a catalogue of localised investments will enhance the economic prospects of non-London cities, boosting regional economic performance and thus the performance of the UK at large.

- **Less risky:** Having a wide spread of schemes diversifies the risks associated with the large capital spend and avoids betting it all on a single project.

Plus, it would generate a higher return on investment. Each investment type included in our alternative package generates a higher indicative return on investment – represented in benefit-cost ratio (BCR) – than HS2 is expected to provide.

The concern with HS2, the biggest investment in transport in UK history, is that the preferred means (a prestigious high speed rail project) have taken precedence over the desired ends (boosting growth and rail capacity while saving carbon) – with no assurance that the two are sufficiently connected.

There could be better ways to meet these national goals, and as custodian of our public funds the Government must step back from unsubstantiated rhetoric on HS2 in order to explore and evaluate these opportunities properly.

Appendix 1

Will HS2 fulfil its objectives?

Previous **nef** reports, such as *High Speed 2: One track mind?,* have shown that the ability of HS2 to meet its stated objectives is actually unclear. Here we summarise some of the main shortcomings in the current case for HS2.[49,50]

Objective 1: catalysing economic growth and job creation in Britain

It is unclear how far HS2 will achieve its objective of catalysing economic growth and job creation.[51]

First, the DfT's economic case for HS2 relies heavily on using the value of travel-time savings as a proxy for positive economic outcomes, on the premise that time spent on a train is not productive and has a value of zero.

However, the connection between time savings and economic growth is nebulous.[52] In April 2012, the DfT published analyses, originally conducted in 2009 and not then publicly released, which cast significant doubt on the legitimacy of using the travel-time-savings metric as a basis for appraising the value of schemes like HS2. Both studies recommended a change in standard DfT methodology and called for a downward revision of the value of travel-time savings to between 65 and 50 per cent of the current levels.[53,54]

Without a high value for time saved, the economic case for HS2 degrades significantly. 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.

Second, the DfT has a poor track record for accurately assessing the WEIs of high-speed rail – adding to the uncertainty of its verdict. WEIs are the metric used as part of the DfT's standard appraisal process to express the positive economic effects generated by a transport intervention.[55] Despite the existence of the WEI assessment methodology, in 2012 the NAO concluded that after five years of full operation, the DfT had yet to demonstrate the WEI of HS1.[56]

Moreover, even if the DfT's WEIs *were* considered reliable, the value of the WEIs it predicts HS2 will generate is pathetic: only 37p of benefits for every £1 spent; a maximum of £12.3 billion in total.[57]

Last, the DfT estimates that HS2 will create 100 000 jobs.[58] Aside from there being only limited evidence to support this claim,[59] many of the new jobs will be short-term construction opportunities and low-pay service-level positions.

Objective 2: providing essential future rail capacity

Only limited evidence exists to support the strategic case for increasing rail capacity in the areas in which HS2 will operate.[60]

The DfT forecasts that demand for rail travel will increase, but this is highly uncertain. Its initial forecasts for HS1 (the Channel Tunnel Rail Link) overestimated demand for the service by 30 per cent.[61] Although forecasting methodology has since improved, it still relies on two major factors: GDP growth and past demand trends.[62] Slower economic growth will mean significantly less demand for HS2. And if technological or social factors exogenous to the rail network or the economy reduce the level of demand, it is likely that all the necessary rail capacity could be provided by other kinds of rail improvements.[63]

The DfT assumes that 65 per cent of HS2 passenger demand will come from individuals switching away from 'classic rail'.[64] The modelling used for this calculation, however, does not consider the effect of premium pricing on modal shifts or generated demand.[65] Premium pricing on HS2 will certainly suppress

demand and likely necessitate a change in the forecasting methodology applied by the DfT.

Objective 3: rebalancing the UK's economic geography

Studies have found that high-speed rail links tend to benefit more prosperous regions above other areas,[66,67] and could even exacerbate the existing imbalances – especially if the high-speed links are not accompanied by economic and skills development strategies.[68,69,70] In addition to this potentially detrimental effect, we note two further considerations:

1. A study of the potential impact of HS2 in the UK found that a net increase in economic prosperity and employment in one area could be the result of displacing activity and employment elsewhere.[71]

2. Other drivers of activity could mean that HS2 makes little difference. For instance, the high-speed rail 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 link made in practice.[72] 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 15 years, it is possible that HS2 will not contribute much more to the economic prosperity of these areas.

Objective 4: contributing to Britain's low-carbon future

High-speed rail is actually more carbon intensive than conventional rail; any contribution to carbon savings comes 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 by the Government (it has yet to be approved by Parliament), 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 realised if the airport slots that were used for domestic flights are closed – which is unlikely.[73] In reality, the slots are likely to be filled with more carbon-intensive international flights, significantly increasing net carbon emissions.

HS2 is projected to generate nearly 24 per cent of its passengers from individuals that would have previously chosen not to travel. Putting these individuals in the transport system will actually *contribute* to the UK's carbon problem, not improve it. Highly concerning is Government-commissioned information suggesting that more CO_2 will be emitted during construction of HS2 than will be saved over 60 years,[74] even if HS2 captures 100 per cent of all travel between London and Manchester.

Sliding value for money

As well as the uncertainty surrounding the ability of HS2 to meet it objectives, there is another issue calling the reliability of current HS2 appraisals into question.

Over the last two years, the value calculated in the DfT's CBA for the first phase of the project (the London to West Midlands section) has steadily declined. The Department acknowledged modelling errors in its previous HS2 analyses[75] – and for a time the BCR dropped down to 1.2 – but the DfT has since remodelled the London–Birmingham leg and re-established a BCR of 1.4.[76] Excluding uncertain wider economic impacts, according to HM Treasury guidance, this puts the HS2 scheme in the 'low' value for money category. 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.

Appendix 2

List of components included in nef's alternative investment package, with cost breakdown.

Investment	Cost (£bn)	
Stafford area bypass	£	1.29
Cheddington / Leighton Buzzard grade separated junction	£	0.25
3 new platforms at Euston station	£	0.07
4-tracking from Attleborough to Brinklow	£	0.20
Northampton line speed improvements	£	0.003
Beechwood / Stechord 4-track	£	0.94
WCML power improvements	£	0.20
Other WCML improvements	£	0.20
WCML disruption cost	£	0.09
Carlisle to Scotland works	£	0.08
Kings X - platform lengthening, tunnel/throat works, tracks	£	0.41
Digswell to Woolmer Green - 4-tracking	£	0.44
Huntingdon to Peterborough - 4-tracking	£	0.38
Peterborough - remodelling, Werrington flyover	£	0.25
Stoke junction to Doncaster - 4-tracking	£	1.46
Newark flyover	£	0.19
Doncaster - new platform and track works	£	0.05
Hambledon Junction to Leeds - electrification and track works	£	0.24
Leeds - Platform remodelling and track works	£	0.07
York - remodelling, Skelton bridge flyover	£	0.37
Darlington - signalling and track works	£	0.03
Darlington to Newcastle - reinstate & electrify Leamside line	£	0.81
Depots & stabling modifications	£	0.02
ECML power improvements	£	0.54
Other ECML improvements	£	0.54
ECML disruption costs	£	0.32
Electrification: Leeds – Bradford – Manchester/Preston	£	0.30
Northern Hub +: new Pennine tunnel (for 125 mph+ trains)	£	2.00
West Midlands+: Cross Birmingham tunnel for the Lichfield – Redditch route	£	1.40
Leeds – Sheffield – Birmingham – Bristol – Plymouth electrification	£	1.50
Bedford – Cambridge, Northampton – Market Harborough	£	1.50
Electrification of commuter links programme for northern cities	£	0.50
New/additional rolling stock programme for commuter links	£	0.20
Speed improvements on commuter links	£	0.10
Station improvements (Birmingham)	£	0.50
Station improvements (Manchester)	£	0.50
Station improvements (Leeds)	£	0.50
Station improvements (7 other cities)	£	1.00
Mass transit improvements (Manchester)	£	0.60

Key
Mainline upgrades (WCML)
Mainline upgrades (ECML)
Regional rail
Station improvements
Mass transit / busses
Active transport
Future connectivity

Mass transit improvements (Birmingham)	£	0.60
Mass transit - light rail construction (Leeds)	£	1.00
Mass transit - light rail construction (Liverpool)	£	1.00
Mass transit – buffer fund	£	0.65
Strategic bus fund	£	2.00
Integrated ticketing systems (4 areas)	£	0.20
Cycling - lanes/routes/parking (Birmingham)	£	0.25
Cycling - lanes/routes/parking (Manchester)	£	0.25
Cycling - lanes/routes/parking (Leeds)	£	0.25
Cycling - lanes/routes/parking (4 other cities)	£	0.50
Walking programme (7 cities)	£	0.70
Fibre optic broadband improvement - to the door (10 cities)	£	4.50
Video conferencing hubs (100MM x 10 cities)	£	1.00
Total Cost nef Alternative	**£**	**33**

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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

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