

# *HS2 – why the critics are wrong*



**GREENGAUGE21**

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## Executive Summary

A prime argument used by the opponents of HS2 is that 'the business case doesn't stack up'. This report looks at the arguments as articulated by one of those who takes this view.

He argues that:

- (i) Growth is being over-estimated, so the benefits of HS2 will not be so great as supposed;
- (ii) Economic regeneration in provincial cities served by HS2 won't happen;
- (iii) The environmental case is overstated, because domestic aviation is in decline and plainly, fast trains consume more energy and therefore have more carbon emissions;
- (iv) Our railways are fast already, unlike other countries where a step change in journey time can be achieved;
- (v) The same capacity can be provided by upgrading existing lines;
- (vi) The business case has some critical assumptions that overstate the value of the investment;
- (vii) There is an opportunity cost which means that the existing railway will suffer as funds will be diverted to the new railway.

We found that none of these arguments survived scrutiny.

### Growth Forecasts

The travel market (across all modes) continues to grow, although at a lower rate than it did in earlier decades. When measured on a *per capita* basis there are signs of levelling off, but population growth (with increasing life expectancy and other factors) continues. Demand for travel by *rail* has risen sharply (by over 40% in the last 15 years) and growth has continued (at a lower rate) through the period of recession. There is no sign that this trend, in which rail is increasing its market share will not continue – unless of course, its capacity is capped.

### Economic Regeneration

There is a worry that the better connectivity HS2 brings will benefit the capital at the expense of the rest of the country. But the evidence is that this hasn't happened in France with its TGV network, and the evidence published so far suggests this won't happen in Britain either.

### Environmental Benefits

High-speed trains do *not* consume vastly more energy than conventional intercity trains. Analysis of existing high-speed (300km/h) trains shows energy consumption levels similar or just 10% higher than the best performing of today's 200km/h intercity trains. The carbon advantage that rail has over air and private car travel will continue as high-speed rail is introduced.

### Existing Speeds

With the exception of the Pendolino service on the West Coast Main Line, journey times are generally getting worse as the network gets more congested. Eventually, high-speed rail will cut journey times by an hour and a half; the first stage of HS2 between London and Birmingham can cut 30 minutes off a very wide range of journeys.

### Capacity

Upgrading existing lines – objectors to HS2 tend to favour 'Rail Package 2' as assessed by DfT – increase capacity by only about four train paths/hour, a quarter of the path capacity of a new high-speed line. HS2 will also be able to take longer trains *and* allow existing lines to be used more efficiently as the 'speed mix' is made more manageable. Other measures favoured by objectors such as putting more seats on existing trains are not the

answer either. None of the alternatives examined to date offers value for money compared with HS2.

### **Business Case**

All of the business case assumptions have all been clearly set out. The idea that the risks are all 'downside' is wrong: with a 60-year asset life assumption, DfT assume that all demand growth stops just eight years after opening: a balanced, but certainly conservative assumption.

### **Opportunity Cost**

The objection that investment in existing lines must suffer as scarce funds go into HS2 has not been borne out by the recent spending review which found money for both. The ability to sell a concession once HS2 is built has been proven by the case of HS1 (the Channel Tunnel Rail Link), recently let with a 30-year concession for £2.1bn. HS2 offers even bigger concession values for the Exchequer in future.

## HS2 – why the critics are wrong

*Writing in Modern Railways in October 2010, Chris Stokes – a former BR senior manager and Director at the rail franchising authority (OPRAF) – called into question the case for high-speed rail. So are his arguments correct and has he fairly summarised the large amount of evidence that is now available on the subject? Here we go through his points, one by one.*

### Growth Forecasts

An inescapable feature of any attempt at a balanced assessment of the impact of a project that is not expected to open until 15 years hence is the need to try, however hard it may be, to form a view on future travel demand levels.

Stokes observes a levelling off in the annual total of miles travelled per person by all modes since the mid 1990s. Indeed, he describes the average miles per person which was 6,923 in 2008 but 6,981 in 1995-7 as being evidence of a saturated market. Yes, *rail* is growing strongly within the overall travel total, he notes, but he attributes the levelling off in *overall* demand to the idea that the internet and mobile technology is substituting for personal travel.

There are two problems with his assessment, of which the first is fundamental. The size of the market that he believes is 'saturated' is the product of two factors, only one of which he has considered. Market size is the product of the volume of travel activity by each individual (for which Stokes quotes the average annual statistics) *and* the number of people (which he simply ignores). Between 1995 and 2008, for example, the UK population rose by 5.8%. Stokes talks of a slight decrease in travel over this period, when, in fact there was annual growth that is forecast to continue: the market is *not* saturated, as he claims.

Expectations are for a further 10 million people in Britain by 2033 as a result of, amongst other important trends, extended life expectancy. Let's be generous and presume this was a simple oversight, but it's one that those responsible for making decisions on national infrastructure needs cannot afford to make.

The second problem with Stokes' assessment is the attribution of reasoning behind what is undoubtedly a much slower level of growth in car use since the mid 1990s. Stokes says that while 'the academics are yet to research this', he at least is clear that the substitution of IT for travel and the greater propensity for British people to travel abroad than at home "is now a sustained trend and needs to be understood before the country commits to ... high-speed rail".

Well, certainly before anyone concludes that Stokes is right on this matter, thought should be given to two other factors that might explain the trend shift he observes. In July 2008, fuel prices reached a record level and have remained very high by historic standards since. The cost of motoring *in terms of visible out of pocket expenditure* has risen dramatically in recent years. And there is plenty of academic evidence to show through elasticities what effect this will have had on demand levels. Fuel prices alone would probably be enough to explain why per person travel by car is down in 2008 (and the period since, not quoted by Stokes) compared with a few years' earlier.

The other reason why car travel has levelled off is that road building in general and the national motorway programme in particular came to an end in the early 1990s after 35 years. Through nearly all the second half of the last century, investment in the road network, with expanding capacity, allowed car travel speeds to rise steadily, year on year. This is no longer the case.

Nowadays, the demand for travel still exists at high levels, but the combination of high fuel prices and ever increasing congestion has suppressed a significant part of the demand. This is why new roads or additional motorway lanes fill up with traffic so rapidly.

But it is also an important characteristic that affects the demand response to rail improvements too. The existence of substantial levels of suppressed travel demand is one

of the important factors affecting rail demand growth too, and relevant when it comes to the implications of an increase in rail capacity. It reduces the risk around the level of demand response and the scale of the benefits to HS2.

There is evidence, in any event, that IT/mobile telecommunications is *not* substituting for travel, but changing its nature.<sup>1</sup> At the IBM Start Summit<sup>2</sup> in September 2010, for example, delegates heard from IBM that greater electronic communications tends to stimulate the need for more face-to-face contact. We might expect less five day/week commuting in future, but so too can we expect more business travel as it becomes feasible to work remotely and more flexibly.

On this first important matter, then, we would say that Stokes has reached the wrong conclusion: the scale of the travel market in overall terms is not shrinking and he is wrong to be dogmatic on the trend shifts that have occurred.

He moves on to take a swipe at HS1, saying that both Eurostar and domestic high-speed services have under-performed against demand expectations. He bemoans the empty car park spaces at Ebbsfleet (where, certainly, the planned development is yet to break surface) and the “grotesquely expensive white elephant at Stratford International”.

There’s an element of truth here, of course, but it hasn’t stopped HM Government garnering a very welcome £2.1bn from selling the 30-year concession for HS1 in October 2010. This is a direct financial return to the Exchequer for its investment that Greengauge 21 estimates will be bettered from a future sale of HS2 (research to be published). The purchasers of HS1 saw an asset with a reliable income stream from track access charges and with significant upside prospects from expanded Eurostar services and new entrants such as Deutsche Bahn, who announced in October 2010 their intention to introduce services between Amsterdam/Frankfurt and London. Domestic high-speed demand will take time to grow – as has been the case every time there has been a transformation in south eastern commuter services over the last 30-40 years, such as the Bedford – Moorgate electrification or the total modernisation plan for the Chiltern route – and the new domestic high-speed services are just one year old. In the meantime, in Ashford at least, the local economy is showing signs already of an upturn<sup>3</sup>, and the Southeastern high-speed services are voted the most popular in Britain, despite the fares premium.

As for Stratford International, the Transport Secretary of State’s announcement of a proper link between HS1 and HS2<sup>4</sup> will ensure that the purpose for which the station was built – for direct services between the continent and the north – can now come to fruition. It will be a white elephant no more.

## Economic Regeneration

Here Stokes raises an important question: will the better connectivity from HS2 benefit the economies of the Midlands and the North or the London economy? The evidence to date is: both.

The spatial distributional impacts of HSR depend not just on the improved transport service on offer, but also on how the economies of the cities and city regions it links respond in practice to the connectivity gains. In practice, there are two important factors: the ambition and drive of the city planning authorities to embrace and stimulate regeneration and development to capitalise on HSR’s benefits and the private sector response to the choices available, once the national ‘accessibility map’ has been re-profiled.

What we know on this score already is that city and business leaders across the regions are very excited by the prospect of HSR, with Birmingham unsurprisingly in the vanguard.

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<sup>1</sup> IBM Start Conference September 2010, for example

<sup>2</sup> <http://www-05.ibm.com/uk/start-sustainable-future/transport-planning.html>

<sup>3</sup> See “Ashford Celebrates Boom as HS1 Reaches Anniversary” <http://www.insidermedia.com/insider/south-east/43368/>

<sup>4</sup> Secretary of State for Transport, December 20<sup>th</sup>, 2010

And we know that while there will be benefits to London too (HSR features positively in the revised Mayor's plan for London), the evidence from the French experience with the TGV network is that there has *not* been a trend for office re-centralisation to the capital as Stokes perhaps fears. So relocation of businesses from, for instance Lyon, to Paris has not occurred since the journey times between the two were cut. There is no *a priori* reason to suppose that the distributive effect will favour the larger (capital) city.

On the analytical front, Stokes describes the estimated wider economic impacts of HS2 as being modest (at £3.6bn out of £32bn). Readers of his piece would be forgiven for thinking that this means the effect of HS2 on the 'wider economy' was equally modest. This isn't the case. Wider Economic Benefits (now called Wider Impacts) are only measured because of imperfections in the standard economic benefit measure (in this case, over £28bn). It is the total sum (£32bn) that represents the overall economic benefit.

Stokes, however perseveres and says that most of the £3.6bn comes from increases in conventional rail line capacity anyway and not from the new capacity and other benefits offered by the HSR services themselves. The truth is that capacity gains on the conventional network *arise as a direct result* of HS2: how else is the extra path capacity to be generated? They are an inseparable beneficial consequences of the investment in a new line. While Stokes claims that there are limited benefits from this quarter for Birmingham and Manchester, he is simply wrong. Centro (the Passenger Transport Authority for the West Midlands) has already published plans for a substantial re-use of the relinquished capacity on the problematic Coventry Corridor as result of HS2, offering much better local commuter services once they no longer have to compete for scarce capacity over this congested route in the West Midlands.

There is more to mislead the unwary. Stokes quotes the work from Imperial College commissioned and published by DfT which suggests a very low wider economic benefit figure from HS2. Well so it does, but as the authors of the research report makes clear: "It should certainly not be taken as a definitive or exact statement on the possible wider benefits of high speed rail."<sup>5</sup>

Next Stokes ponders whether 'a better result for the north [might] be delivered at much less cost by electrifying and upgrading the existing network'. Well take a look at the recent evidence given to the Transport Select Committee which probed this issue in depth. As John Jarvis, Transport Director at the Northern Way pointed out, their research shows the importance of improving connections *between* cities and this includes, just as the Eddington transport report showed, better links from the North to London and the international gateways.<sup>6</sup>

It isn't *either/or* when it comes to rail network investment– and we have evidence that Government seems to realise this. The existing network in the North West for example is – at long last – going to be electrified. This investment in the local/regional network is complementary to that in HSR. Indeed, it allows the benefits of HSR to be spread around the regions as well as to the principal cities. To those who argued futilely back in the 1970s for Manchester – Blackpool electrification, recent commitments must seem like a somewhat surreal leap forward: there is a very real prospect of trains using HS2 to reach the North West at Preston continuing on to Blackpool.

### Environmental Benefits

Here Stokes concentrates on the question of whether HS2 can replace domestic aviation and whether this is worthwhile. Domestic air traffic at Heathrow Airport has been declining – as he points out. But this is because of the slot constraints at the airport, not because the underlying demand has gone away. It is no guide to the existence of a growing level of air use that is highly carbon intensive. Instead of using Heathrow, people from the north increasingly use Schiphol and Charles de Gaulle as an alternative hub if they are travelling long haul, or other London airports (London City in particular) if their destination is in London. So when looking at the carbon impact of introducing HSR in Britain, it's necessary

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<http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/hs2ltd/appraisalmaterial/pdf/widereconomicreport.pdf>

<sup>6</sup> Transport Select Committee, 30<sup>th</sup> November 2010

to look – as the Committee on Climate Change did<sup>7</sup> – at short haul flights to near-European destinations as well as to the range of London airports.

The December 20<sup>th</sup> announcement provides that junctions for future connections into Heathrow Airport are to be built into HS2 for future direct services. With direct HSR services into the airport itself, it will be possible to compete for the feeder-hub market and win market share from the airlines. The limited runway capacity will be able to be used on more valuable long haul flights. This has widespread national connectivity advantages as well as allowing the least carbon efficient short-haul flights to be removed. This applies to HSR services competing against short-haul flights to Europe as well as domestically. Both segments will yield the benefit of reducing carbon from aviation.

Next Stokes makes the claim that 'faster trains sharply increase carbon emissions'. Again, not true. The published evidence from the Association of Train Operating Companies has been ignored. Their work compared the actual energy consumption of 200km/h trains (the existing Intercity line speed that will be superseded by HSR) with that incurred by typical 300km/h+ high-speed services<sup>8</sup>. What this research showed was that 300km/h+ trains running on HSR lines consume similar amounts of energy/passenger (in some cases, 10% higher) as 200k/h trains on existing lines. This is certainly not the 'square power function of speed' effect that so many, including presumably Stokes, assume.

Replacing stop-start short trains on old infrastructure with purpose designed new high-speed trains running on new infrastructure results in minimal changes in energy consumption and carbon emissions per passenger carried.

### 'Replacing a Third World Railway'

The next argument is that our existing rail services, unlike those in other countries, are fast enough already.

Here Stokes lets us know why Leighton Buzzard – his home station – is such a popular spot amongst the railways fraternity – it has an hourly non stop service to central London that averages 83 mile/h. The problem is this is pretty much unique in Britain and not the norm. High-speed rail does have the potential to achieve step changes both in journey times over longer distances and in the quality of services offered to intermediate places on the classic lines (including other places on the West Coast Main Line that, unlike Leighton Buzzard, get a poor service today).

Chris Stokes must also know that, his line aside, journey times across today's rail network are slower than they were 15 years ago, and are gradually being further degraded as the network fills up with additional services. This is a trend that will continue. Our existing railways will get slower and less reliable unless something radical is done about route capacity. No-one is claiming this would be to 'third world' levels, but a depressing prospect nonetheless.

### Capacity

At last, an area on which we can all agree: there is a need for more capacity. Yes, First Class loadings in the economic downturn have fallen away, so in the short run there may seem to be an easy way, as Stokes suggests, to squeeze more seats on to existing trains by doing away with first class. We could simply throw more money at the existing routes with junction improvements to ease bottlenecks and more conventional trains. But the alternative rail upgrade investments assessed by DfT<sup>9</sup> produce only half of the capacity increase that HS2 offers at best, not 'about the same' as Stokes claims. The large scale rail upgrade offers about 100% capacity uplift with a benefit cost ratio (BCR) of 0.9:1, whereas HS2 offers 200%+, with a BCR of 2.4. 'Rail Package 2', which is the example used by Stokes, only allows an extra 4 -5 train paths/hour (tph) on the West Coast Main Line, to create a total fast line capacity of 15-16 tph, and its BCR is much reduced from

<sup>7</sup> Committee on Climate Change 'Meeting the UK Aviation Target – options for reducing emissions to 2050' 8th December 2009.

<sup>8</sup> <http://www.greengauge21.net/wp-content/uploads/Energy-Consumption-and-CO2-impacts.pdf>

<sup>9</sup> High Speed Rail Cmnd 7827, March 2010, HMSO.

the level quoted by Stokes when account is taken of the need to retain a reasonable level of service reliability<sup>10</sup>.

No, the work carried out looking at alternatives has been comprehensive and shows that the better investment is in a new line, not more upgrades, and that the new line has most value if it is built for high-speed.

### Business Case

Here Stokes gets way out of his depth. The analysis is based on a 60-year project life, he notes, worrying how anyone would be brave enough to speculate on the way the world will look in 2086. He should have no fear: the HS2 Business Case as published in March 2010 and on which his critique is based *assumes that there is no demand growth at all anywhere, just eight years after project opening*. So his first jibe: that all the risks are downside, is surely misplaced: there could well be continuing growth for decades (as has happened on the French TGV system for example), with commensurate growth in benefits. His professed concern for robustness of forecasts of course is valid but it is surely necessary to show *some* balance.

He says there is a risk that the benefits based on journey times are overstated. He queries – as have the Stop-HS2 campaigners – that the business travel time savings are bound to be overstated because they ignore the observable fact that people travelling by train on business often work *en route*. The argument is that for such people the value of travel time is over-estimated because they were being productively employed while travelling at slower speeds in the first place, and will lose some part of that opportunity of the journey is accelerated.

This is a complex area and Greengauge 21 will be publishing some work on it in due course. The productive use of travel time is almost certainly treated in too simple a manner in current appraisal methodologies. But the suggestion that in a case like HSR (where journey times are shortened) the benefits are being inevitably overstated is wrong. Consider, for one moment just one of the complicating factors – the impacts on those who switch from driving and from air travel to rail because the journey offer is so much better with high-speed rail. For them, there is the chance to work productively when travelling that is unavailable when using other modes. Indeed this may be a factor in their decision to switch. But nowhere is the increased value to the economy of creating additional productive time whilst travelling on HSR added into the analysis as it is currently conducted. This is a feature of the perhaps overly simplified current methodology too: it cuts both ways.

Improving this area of analysis (which would need to apply, for reasons of consistency, to all investment appraisals) will reveal additional benefits from HSR as well as possibly reducing others.

Next, Stokes says that the effect of competition from classic rail services has been ignored. Well, in the sense that it there is not to be (and should not be) a free ride provided to open access operators to soak up released capacity on the West Coast Main Line and offer slower but cheaper trains that wastefully rival HS2 services, he's right. But he's wrong if he feels that the modellers have assumed there are no conventional services continuing (such as the Chiltern Line services) in the analysis. These are all there, along with through services on the West Coast Main Line.

### The Opportunity Cost

Stokes wrote his piece before the Spending Review outcome was known, and so he expected 25% spending cuts. In fact, rail investment fell by only 11%. And this at the time when, with the most stringent spending cuts in living memory, a new fund of £750m was established to develop HS2. So the early evidence is that the opportunity cost argument (spend it on HS2 and the rest of rail will suffer) has no legs. And neither need there be an opportunity cost going forward. HS1 (then known as CTRL) always had a separate line of account from routine DfT expenditure. Like HS1, HS2 could be sold off on a concession

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<sup>10</sup> see HS2 Strategic Alternatives Study – Strategic Outline Business Case, March 2010.



basis in due course. This is an investment model for future British governments to savour, one where a capital investment brings a direct Exchequer payback soon after completion.

## Conclusion

Chris Stokes' article reflects a number of the concerns raised by the anti-HS2 camp. Right now their objection is that "the business case doesn't stack up". Their points are probably not all covered by Stokes, but there is much common ground. Many of the arguments in Stokes' article relate to the business case. So do his arguments stack up – or is there really a 'case against the case against'?

We have looked at the arguments he used under the seven headings he used in his article.

On **Growth Forecasts**, he wrongly claimed that total travel in Britain declined over the period between 1995 and 2008; he is also very probably wrong in his reasoning on why long term trends may have shifted.

On **Economic Regeneration**, he offered no fresh evidence and refers explicitly to the results of research by Imperial College, when the authors of the work in question point out it cannot be used as a valuation of the wider impacts of HS2. He should have checked this.

On **Environmental Benefits**, he ignored the role of airports on the near continent which serve as substitutes for London's airports and so reaches the wrong conclusion on whether short haul air travel is increasing or diminishing.

He suggested that high-speed rail means much higher energy consumption (and carbon emissions) when the published evidence makes clear that this is not the case.

He talked about how in Britain, it is wrong to think of HSR '**Replacing a Third World Railway**'. He's surely right as of now, but all is not as rosy as he would have us believe. He doesn't admit that rail travel speeds across the national network are getting slower as the network fills up with increased train frequencies.

On **Capacity**, there is some common ground: he recognised this is a key problem. But he was wrong to say that alternatives to HS2 tested by DfT and favoured by anti-HS2 campaigners achieve nearly as much capacity as HS2 offers. They don't and all of the published work shows that a continued tinkering with today's network does not offer the value for money that HS2 provides.

When he turns to the **Business Case**, he draws several threads of his argument together and introduces a further argument, this time about the benefits for business travellers which he claims are over-stated. But this doesn't follow either as we have explained: the business case for HS2 may well be strengthened by a refinement on this area of analysis.

Finally, under the heading **Opportunity Cost**, he frets about funding getting diverted from spending on the existing rail network. But the evidence so far, with serious money for the first time being allocated to HS2 in the recent spending review, suggests that this Government at least, is alive to that risk and sees instead a need for a balance of investment in new high-speed lines and complementary (existing) network enhancement. And the leader of the Labour Party has very recently re-stated the priority that he accords to the development of the HSR network too.

The case against HS2 has not been made.