

## HS2 is vital to provide for future capacity needs

High Speed 2 Action Alliance (HS2AA) have published a press release headed "HS2 not necessary to meet future rail capacity demand". Taking the various assertions from their press release in turn, this is why they are wrong.

Capacity really is the crux of the matter, so let's deal with it first. They say:

*WCML capacity can be trebled with targeted investment of the order of £2bn*

HS2AA are not even quoting themselves correctly. This statement that WCML capacity by can be trebled by a conventional "alternative" to HS2 (essentially the DfT/Atkins RP2 with knobs on) is blatantly false. Their claim when you read the small print covers just Standard Class capacity, which they propose to increase at the expense of First Class, but they don't then count the loss of First Class capacity.

HS2AA justify pretending that First Class does not exist by quoting an average all-day load factor in First Class of 20%. Here the flaw is ignoring the peaks, as the 20% load factor would be achieved if 20% of trains ran with First Class 100% full. No doubt that extreme is not reached, but First Class traffic it is precisely in the peaks when First Class cannot be ignored. Its users also pay very handsomely indeed, and effectively subsidise everyone else - aiming for 100% occupancy is not wise, as people will use other options for their journeys if there is felt to be even a chance that the premium service paid for will not be available.

The claim of trebling capacity then derives from a calculation based on:

- Aggregating capacity across the whole day, without taking any account of peak requirements;
- Comparing with a 2007/8 base, and so building into their claim proposal new capacity that is already committed, in the form of 11-car trains for the WCML to become available from 2013.

The following table compares how the capacity measured in total seats per hour would evolve for peak and off-peak hours under RP2 and the possible variations to it proposed by 51M, HS2AA, AGHAST and the Taxpayers Alliance:

	Seats per hour from Euston		% increase versus base		% increase versus 2012/3 commitment	
	Off-peak	Peak	Off-peak	Peak	Off-peak	Peak
Base (2007/8)	2634	4447				
December 2008 timetable on completion of WCML Upgrade	3760	4886	42.75%	9.87%		
2012 11-car trains for peak services	3760	6386	42.75%	43.60%		
2013 timetable, additional off-peak train	4199	6386	59.42%	43.60%	11.68%	0.00%
11-car on all trains	5549	6386	110.67%	43.60%	47.58%	0.00%
Conversion of one 1st class coach to Standard	5819	6686	120.92%	50.35%	54.76%	4.70%
12-car on all trains	6427	7370	144.00%	65.73%	70.93%	15.41%
Extra trains on completion of RP2 infrastructure works	7817	8065	196.77%	<b>81.36%</b>	107.90%	<b>26.29%</b>

So even under the most optimistic assumptions the alternative delivers only 26% more peak capacity than is already committed. Neither RP2 nor any extension of it will cater in the peaks for the most pessimistic assumption of 102% background growth from 2007/8. Meanwhile the off-peak hours are over-provided for.

Peaks of demand cannot be ignored. The peaks are when most people travel, and so when the economic benefits of improvements are highest, as is fares income and more importantly (given peak pricing to manage

demand) is fares yield. The peak demand we see is not unmanaged demand, but is demand that persists despite peak pricing levels. In effect, the peaks pay for the railway, which is then used at marginal cost to maximise off-peak revenue. The fact is that compared with the committed 2013 state, even taking every element of the alternative at face value, capacity per peak hour delivered by the proposed “alternative” would be no more than 82% above the 2007/8 level, and just 27% above the 2013 position to which we are already committed.

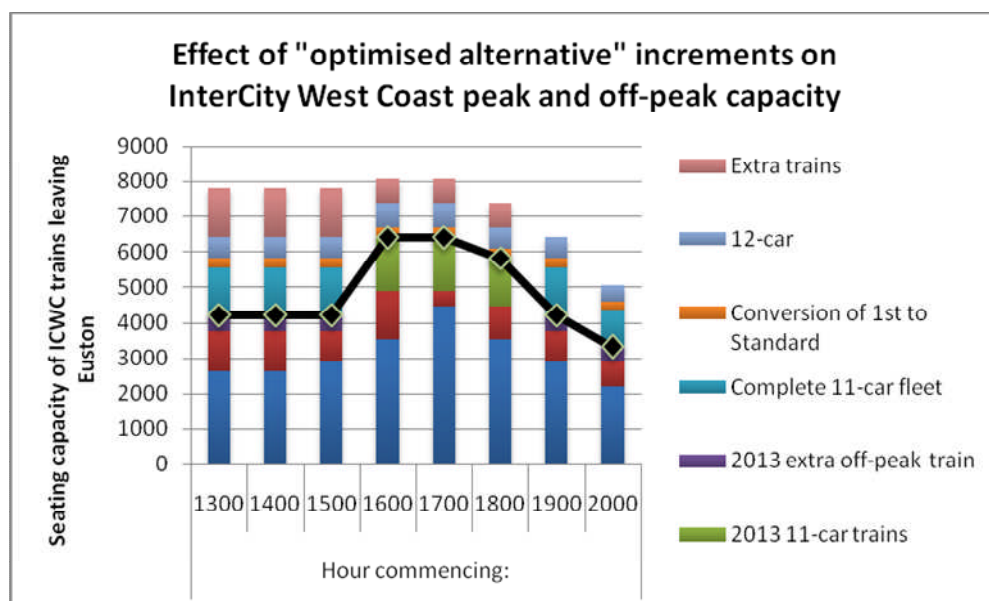
Which figure is the appropriate comparison depends on the context. If the purpose is to match capacity against the forecast of background growth from 2007/8, then 2007/8 is the appropriate base. But 82% extra capacity does not provide for even that very pessimistic forecast, which amounts to a rate of less than 2% per annum whereas current actual growth is above 5%, and had averaged 4% over ten years despite that period encompassing two financial crashes.

But if the idea is to build a business case, then comparison must be made not with the present (let alone the past!) but with the position to which we are already committed through implementation of 11-car operation from 2013. HS2AA make great play with the word “incremental” – they must understand that each business case must be based on the incremental benefits, and not double-count benefits that have already been used to justify committed schemes.

*Unlike HS2 the alternative approaches are low risk and can be commercially justified.*

The idea that 12-car trains are low-risk is dubious – why else did the current 11-car scheme stop at 11 cars? Extension of maintenance depots and servicing sidings on their current constricted sites is just one issue that HS2AA have not addressed – the likelihood is that such depots would need complete replacement on new sites purchased for the purpose. Whilst acknowledging that operation of 12-car trains into Liverpool Lime Street is for all practical purposes impossible, HS2AA have not thought through the implications of retaining an 11-car sub-fleet for Liverpool trains – optimising use of a terminus depends on any arriving train being able to form any departure regardless of route, and having trains that can only work back on the route from which they arrived is an excellent way of disrupting the pattern of terminal operations with major impacts on both capacity and reliability. The Stafford bypass, 14km of brand new railway, hardly counts as low-risk when its property and environmental impacts have hardly been considered as yet.

As for the commercial justification, proponents of RP2 and “optimised alternatives” to HS2 claim dramatic increases in capacity, but these figures are achieved mainly by over-provision in the off-peak periods because of the inability to deal adequately with the peaks. The figure below compares the ICWC seats per evening peak hour and the encompassing off-peak periods, for the various interventions, also comparing this with the increase that derives from already-committed schemes.



It is apparent that the bulk of the new capacity provided by the alternative falls outside the peaks, when fares yield is lowest even if demand exists. The low average load factors claimed as an advantage of RP2 and “optimised alternatives” in fact represent unused capacity provided at times when the market does not require it. That is not the basis of a business case.

And if anyone wants to argue that the worst crowding exists outside the peaks because of avoiding peak prices, this is actually easier for a partial fleet of 11-car trains to deal with, as over a more spread-out peak it is more likely that one train will carry heavy demand on consecutive trips. Compared with the situation illustrated above, there would be even less value in having a whole fleet of 11-car trains – except, that is, to generate eye-catching statistics that are irrelevant to serving the travelling public.

Things get worse when you unbundle the relatively quick and easy items, such as conversion of First Class to Standard (a commercially-driven decision that could be made at any time) from the big-ticket items, such as 12-car trains and the Stafford bypass, as the business case for the alternative depends on packaging together quick wins and major items without regard to which outputs derive from which. The extreme is the Stafford bypass, estimated at £1.2 billion, but which triggers just one more peak train per hour, because the binding constraint on usage of the route just shifts straight back to the section South of Rugby and the terminus at Euston.

Oddly, a capital cost of £1.2 billion per peak path per hour is about the same as offered by Phase 1 of HS2, but on HS2 the trains will be twice the length, and will bring the economic benefits and resource-cost savings that derive from speed, as well as having the potential for further trains under Phase 2. The speed improvements offered by RP2 and its variants are minimal, and in fact derive mainly from omitting stops. So by definition the business case for this element of the alternative must be inferior to that of HS2 – it will not happen, and the peak capacity increase compared with the committed state sticks at just 15%, for ever.

Even Andrea Leadsom MP who criticises the business case for HS2 has dropped this supposed alternative – although in the recent Commons debate she did come up with a novel idea for building a new suburban railway to Milton Keynes, which on examination involves the most expensive bits of both HS2 and RP2 for a fraction of the benefits.

*Incremental - Investments in alternatives are incremental so there is no wasted investment if the significant demand growth forecasted by HS2 does not materialise.*

Given the fact that the alternative does not meet needs deriving from background growth, let alone from anything approaching current actual growth levels, talking about “increments” here is suggesting taking tiny steps towards somewhere we don’t want to go at all. If the end state is no good, then nor are the increments of which it is composed. When we have had all the increments, there is then nowhere else to go – except to open up HS2 all over again.

This so-called “significant growth” forecast by HS2 is puny compared with what we see actually happening now. What’s more, with the retirement age heading for 70 and the population for 70 million, hoping current levels of growth will just wither is simply wishful thinking.

Far from the doubling of demand in 35 years implied by the forecast of background growth, current actual growth rates would double demand within 13 years.

*Overcrowding - HS2 offers no solution to current overcrowding for journeys to Birmingham for 15 years and Leeds and Manchester for 22 years*

Well, isn’t it a bit odd to have been talking just now about growth not materialising, and then in the next breath accepting that it actually has materialised to the extent that there is actually overcrowding now? As a testament to poor planning 10 years ago, the WCML is filling up, and for many practical purposes is full now, but I can’t see how that can be used to justify yet more short-sightedness now. In fact, the problems will be eased before HS2 opens, with 11-car trains now being delivered, and it would actually be very sensible to

convert some First Class accommodation to Standard on the remaining 9-car trains which will exist for off-peak services.

The fact that the WCML may not be a very nice place to be for the last few years before HS2 is not a reason for condemning it to being a very nasty place for ever.

*Quickly – Improvements can be introduced much more quickly than HS2 which offers no respite to train passengers until 2026 at the earliest*

Yes, the improvements just mentioned which are already committed can and will be introduced before HS2 opens. As committed schemes, they are not part of this alternative, and the alternative itself then, as demonstrated earlier, adds very little more.

In their more lucid moments, opponents of HS2 show great concern for commuters from Milton Keynes and Northampton, although I'd be more impressed if any of them had shown that concern when the last WCML upgrade was busy knocking the stuffing out of that commuter service. Their approach to relieving crowding on this route is a flyover to connect the Fast and Slow lines just South of Leighton Buzzard, combined with a new fleet of 125 mph tilting suburban trains to fit in amongst the Pendolinos, given which they reasonably hope to run another two fast trains serving Leighton Buzzard, Milton Keynes and Northampton in each peak hour. But the trouble with this is:

- It does nothing at all for all the other commuter services on the WCML to Watford, Hemel Hempstead and Tring, which are also overcrowded;
- It requires a small fleet of specialised trains of an as yet unknown type (hardly low risk, again). With some sensibly economical planning the uplift in the service would need 6 trains in traffic, and purchasing such a small fleet of trains with limited scope for use elsewhere is not going to be cheap;
- It leaves the various negative impacts of the alternative on other local and regional services as they stand.

But there are things that can be done prior to HS2 to ease this crowding. With 11-car trains, the Pendolinos will be able to take some of the Milton Keynes load off London Midland. Network Rail then say (in the recent WCML Route Utilisation Strategy) that given 125 mph tilting trains they could run one more train each peak hour as far as Milton Keynes – the difference between this proposal and HS2AA's alternative is that rolling stock to run that additional train could probably be found within the Pendolino or Voyager fleet, rather than requiring a new, uneconomically small, fleet of special purpose trains.

The negative impacts of the alternative on other local and regional services need a bit more explanation, as this is something that HS2AA stay very quiet about. Whilst trying to distance themselves from RP2, the anti's alternative in terms of the train service pattern is much the same thing, and indeed however the detail might vary, any attempt to run more trains on the WCML is going to have the same effects – missing out stops, and making more use of the Northampton route for shorter-distance InterCity services. For instance, Milton Keynes would lose all its direct trains to Birmingham, having a service only via Northampton, slower than now, and desperately uncompetitive with road.

Worse than that, the alternative, call it what you will, would lock us for ever into a situation in which badly-needed improvements that would be possible on a WCML relieved of fast through trains by HS2 are ruled out. For instance, if you live in Coventry, Milton Keynes should be within commuting distance – the off-peak trains do it in half an hour. But there isn't a train in the morning to take you to work, because in order to give the fastest times to the business trains from Birmingham, one of the ones that would match start of normal working hours doesn't stop at Milton Keynes, and the other doesn't stop at Coventry either! So if you want to take one of the many jobs now being advertised at Network Rail's new headquarters in Milton Keynes, tough, you can't unless you spend an hour doing it via Northampton, and never will be able to if HS2AA have their way.

*Resilience - Upgrades to existing infrastructure will provide a resilience allowing services to continue if a locomotive breaks down, unlike HS2 that is relying on as yet unavailable technology and a single track*

This is complete nonsense, and shows a total failure to understand the realities of rail operations. On a heavily-used 4-track railway such as the West Coast Main Line, if one of the tracks for one direction is blocked, even in the off-peak heavy delays would result from trying to run all trains on the other, and the only effect the supposed “alternative” would have is to make this even worse by running extra trains on the existing railway. There is nothing in the alternative that will provide any extra resilience on the critical 4-track section into London, yet HS2AA propose to increase its usage even further by packing the off-peak with trains as well as the peaks.

What HS2AA mean by HS2 relying on “as-yet unavailable technology” I simply don’t know – high speed passenger trains have been operating for years at extremely high levels of reliability. There are very few failure conditions that can lead to such a train being immobilised, as within the formation there are multiple traction motors and other items of critical equipment. Wear and tear on equipment is not so much a function of speed as of repeated stop-start cycles such as arise from constant signal checks and speed restrictions, to which HS2 will be much less exposed than the current mixed-traffic railway built to twist around landowners’ estates in days when no-one expected a steam locomotive to do more than 60 mph.

*Disruption – HS2 will create eight years of significant disruption as Euston is rebuilt.*

Certainly there is work to do at Euston, but the disruption has been exaggerated as the plan is to start work on a new site to the West of the current station, and when platforms there are ready, to bring them into use whilst parts of the existing station are then modified.

But what HS2AA fail to mention is that Euston is a problem already, and next on the list for a major redevelopment anyway. The waiting area, which really is nothing more than the main concourse, dates from the days when trains could take long turnrounds and allow passengers to join at leisure. Now that intensive working means that trains are often not opened for boarding until just before departure, it is crowded and inconvenient, and passengers congregating around the information displays ready to dash for their train block the way of others whose train is ready, or who are alighting from arriving trains and heading for the Underground. The ramps to the platforms make it a long walk from the concourse to the train, causing delays when a large number of passengers are suddenly told their train is ready just a few minutes before departure, and of course as the only entrance to the platforms is at the buffer stops end, anyone booked into the front coaches has a long walk.

This is significant, as HS2’s plans will improve the station dramatically for all passengers, as it involves a new access to the Underground incorporating Euston Square station. But best of all, the platform tracks will be extended towards the Euston Road, and access for passengers will be by way of a deck over the platforms, where people will be able to wait until their train is ready, before using one of many accesses to the platforms so as to put them right by their coach, and load the train from several points simultaneously. So the new station will be more convenient for everyone, as well as allowing trains to be loaded more quickly and avoid delays.

*Significant passenger dispersal problems will be created in London as Kings Cross passengers are diverted from Euston. The alternative requires none of this work to be carried out.*

Hang on, haven’t they just claimed their alternative would triple capacity into Euston? How do they expect to triple the number of passengers arriving at Euston, and simply leave the existing station and Underground links to cope? These arguments can’t both be right – though they can of course both be wrong.

HS2AA are failing to mention that HS2 allows a very large proportion of its passengers to change to Crossrail at old Oak Common and never need to pass through Euston at all. This creates much more convenient journeys to the West End and City, which currently have to be made on the overcrowded Victoria and Northern (Bank branch) lines. Crossrail will also allow Docklands to be reached with a single interchange onto Crossrail at Old Oak – today this involves a second change at Bank onto the DLR, or at Waterloo onto the Jubilee Line, both of which are also overcrowded.

As detailed earlier, this tripling of capacity is nothing of the sort. If the alternative delivers fewer passengers to Euston than HS2 would, that is simply a recognition that the alternative cannot provide the capacity for passengers that HS2 does. Even so, the suggestion that their alternative requires no improvements to either Euston station itself or its underground links is simply nonsense - the passengers are coming anyway, under the alternative they will just arrive on more crowded trains. There will be just as many of them for the Underground to deal with, with no equivalent to the Crossrail interchange to draw them away from Euston.

As for Phase 2 when a small number of extra trains would arrive at Euston from areas currently served from Kings Cross, the same applies – if anything, Kings Cross is more cramped and crowded than Euston, so must be given some relief to allow for growth in its own hinterland.

TfL have suggested that Crossrail 2 (otherwise known as the Chelsea - Hackney Line) would need to be diverted to serve Euston to help disperse passengers, and frankly this sounds like an extremely good idea. But it is absurd to try and land HS2 with the whole cost of the line - try a touch of simple arithmetic. A Crossrail train has a capacity for 1500 passengers, more than an HS2 train which carries 1100 passengers. TfL accept that the existing Underground lines can deal with HS2 Phase 1, so only Phase 2, which increases the service at Euston from 14 to 18 trains per hour, is an issue. The extra four HS2 trains would carry a further 4400 passengers into Euston, so the additional numbers arriving equate to only three Crossrail trains. A modern metro line will be able to handle 24 trains per hour with a potential ultimate capacity of 30, so even assuming every extra passenger heads for Euston, HS2 would represent between 10% and 12.5% of its traffic, and in reality probably about half of that allowing for some of those 4400 changing from HS2 at Old Oak Common instead.

This is not, as various opponents of HS2 have claimed, HS2 causing the need for a new tube line – rather, it means a line that is justified anyway being modified and possibly built a couple of years earlier than would otherwise have been the case.

*18 Trains/hr – HS2 will not be able to deliver the additional capacity claimed as this relies on running 18 trains per hour which can not technically be done. HS2 Ltd continues to refuse to release its evidence to justify the claim that 18 trains per hour is possible.*

The trouble with this claim is that HS2 Ltd have done precisely what HS2AA say they haven't, that is, publish analysis and reviews that show conclusively that running 18 trains per hour is possible.

Prior to this, published analysis by independent individuals has shown that this frequency would be plausible, so HS2AA were extremely foolish to come out with such a definite statement to the contrary, which only shows that they do not understand the issues involved in rail capacity.

All in all, this so-called alternative to HS2:

- Fails to provide capacity at the times when people actually need it;
- Rules out for ever beneficial improvements to local and regional; rail services;
- Cannot possibly form a positive business case.

The idea that easing “pinch points” can transform the capacity of our rail network is a myth. Over the years, the network and the train service have evolved together, so that where one offers opportunities, the other has already taken them. The result is that capacity and usage are pretty well in balance across the whole system, so that a capacity increment in one place simply shifts the binding constraint to another, probably the London terminus. Demand growth is not slowing, and all logic points to it continuing.

Only new construction, including at the London and regional termini, will provide the rail capacity necessary to take us into the second half of the 21<sup>st</sup> Century.

William Barter  
1 November 2011