

HS2S

High Speed Rail

the case for Scotland

Presented by:

High Speed 2 Scotland

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On behalf of:

***Scotland's Business Community & Public Sector Authorities,
including:***

The Scottish Chambers of Commerce

The Scottish Council for Development & Industry

Scottish Financial Enterprise

The Confederation of British Industry

The Institute of Directors

The Federation of Small Businesses

Glasgow City Council

City of Edinburgh Council

Scottish Association for Public Transport

Transform Scotland

SEStran

SPT

Visit Scotland

Foreword:

This paper has been prepared by all the partners named on the cover in consultation and with reference to members of those organisations and to existing studies, published documents and statements.

We have canvassed opinion across the political spectrum, both in Scotland and UK wide, throughout Scotland geographically, and from all the major business representative organisations, the Regional Transport Partnerships and local authorities.

We therefore believe this represents the most comprehensive group of representative bodies which could endorse such a paper. However, in a fast changing world we remain open to and welcome further comment. A debate that is vital to the future health of Scotland's economy is one that belongs to all.

In a short space of time we have been a significant contributor to the progress of an idea whose fulfilment may transform the infrastructure, environment, economy and connectedness of our nation. It would be difficult to find citizens who did not endorse such aspirations. We hope this document lays the foundation for the compelling arguments justifying early investment in a real High Speed Network connecting Scotland through England and Central London to our continental neighbours beyond.

Brendan Dick
Chairman
High Speed 2 Scotland
June 2009

HIGH-SPEED RAIL BRIEFING PAPER

What is high-speed rail (HSR)?

HSR commonly describes services with regular operating speeds of 300 kmh (186mph). Introduced to Japan in the 1960s and France in the 1980s, HSR has been adopted by countries including Spain, Germany, Belgium and China. The UK's only HSR route is the "High-Speed 1" Channel Tunnel link. Elsewhere, fastest trains (inc Scotland-London) achieve 125mph maximum.

Central Scotland-London travel

There were around 7 million trips from Glasgow and Edinburgh to London last year, 6 million by air with rail and road accounting for the balance (CAA statistics for 2008 quotes 6.05 million air passengers between the 5 London Airports and Central Scotland Edinburgh 3.16, Glasgow 2.49 and Prestwick 0.40). Rail accounted for just one-in-six of these, and is not generally time-competitive with air travel.

Fastest Central Scotland-London rail schedules (from Glasgow and Edinburgh) are 4hr10min, with others up to 5 hours. Sleeper trains are slower still, by design. Passenger numbers have been growing strongly on the West and East Coast mainlines (WCML, ECML) but largely on their Southern stretches – meaning less scope for accelerated, fewer-stop services from Scotland. Anglo-Scottish air traffic has grown strongly too, increasing by 240% from 1995-2004. Around 100 daily flights depart Glasgow and Edinburgh for London with additional flights to London airports from Aberdeen, Inverness and Dundee.

Scotland-London travel, 2007

London to	% trips by rail	Total by rail	Total by air	Total by car
Edinburgh	17	740,000	3,420,000	200,000
Glasgow	10	390,000	3,140,000	190,000

Current trends show the air trips continuing to rise in 2008, and taking a dip in 2009 as recession forces firms to cut costs. Edinburgh Airport returned to positive growth in April 2009.

Current modal shares contrast with countries where HSR operates and dominates the market for journeys of similar distance.

The case for Scotland-London HSR

The case for development of further HSR in Britain is generally based on three key criteria: the economic development case; rail network capacity; and environmental priorities. Whilst these criteria apply to all arguments for HSR it is clear that Northern (N England and Central Scotland) aspirations may be driven by a different balance of priorities from Southern ones (SE and Midlands of England).

i. The economic case

The economics of transport

Better transport links improve market access (e.g. for labour, suppliers, customers) and reduce travel cost (money and time). Important research by the Standing Advisory Committee on Trunk Road Assessment (SACTRA)ⁱ found that transport improvements aided economic development through:

- increases in output resulting from lower costs of production
- effects on labour market catchment areas (better matching of jobs and workers)
- reorganisation or rationalisation of production, distribution and land use
- stimulation of inward investment
- triggering growth which in turn stimulates further growth.

More recently, the influential Eddington reportⁱⁱ concluded that transport investment should focus on supporting economically-vital locations – congested urban areas, inter-urban corridors, ports and airports.

Transport assessment has evolved to include consideration of previously uncaptured wider economic benefits including agglomeration effectsⁱⁱⁱ and land value uplift. This has tended to reinforce SACTRA and Eddington's focus on urban areas and important inter-urban corridors, and could enhance the case for HSR. Furthermore, certain high-value (usually service) sectors respond particularly well to transport improvements - sectors of particular importance to Scotland such as financial and professional business services, for example.

HSR saves time-costs on existing journeys and make new ones feasible, opening up new markets and opportunities. Over distances of 400-800km, HSR is generally the quickest mode (taking into account connections, check-in, security, etc). Rail travel has the added advantage that it is possible to work for a greater proportion of the journey time than in airports/aircraft, rendering the journey time itself more productive.

Other particular benefits of HSR include:

- Enhancing the global connectivity of the UK's largest conurbations
- Linking major concentrations of financial and business activity
- Creating significant non-London economic zones including Glasgow/Edinburgh
- Facilitating face-to-face communications

Scottish Enterprise's submission to Parliament's Transport, Infrastructure and Climate Change Committee (inquiry into High Speed Rail) noted that some of what it viewed as Scotland's priority industries (financial services, food and drink and tourism) would benefit from HSR.

Scotland-London HSR

Atkins calculates that a London-Central Scotland route via Newcastle with a separate line to Manchester, would cost £31bn with economic benefits double that over 60 years, with £7bn accruing to Scotland (in current prices). Atkins identified a benefit:cost ratio of 2.5 for an 'east coast' route or 2.0 for a 'west coast' or a 'full network'. Others have arrived at similar benefit:cost ratios, **although many variables need to be considered and assumptions tested** e.g. route/stations and costs (construction, operation, ticket prices, underlying economic conditions). Network Rail studies show that Central Scotland-London HSR revenues could cover its operating costs, thus requiring no on-going subsidy.

It is clear more evidence is needed for the cost benefits of including Scotland in the early investment programme of HS2.

Little, if any, work has yet been carried out on the WEBs (wider economic benefits) of Scotland-London HSR, and perhaps more importantly, how to maximise them. There is no published work on the type of actions needed to maximise the benefits to Scotland of HSR. **This indicates another area for further research.**

Many specifics of the economic case for Scotland-London HSR remain to be calculated: HS2S would like these fully investigated as a matter of priority. Such research should address scenarios where HSR only serves the cities of central England. There is a danger that such a scenario would see Scotland significantly disadvantaged and becoming relatively less attractive as a place to do business.

These concerns regarding relative peripherality impacts could equally apply to areas north of the Edinburgh-Glasgow axis if High Speed Rail came only as far as Central Scotland and there was no improvement to existing rail connectivity for the regions of Scotland which lie north of the Central Belt. Areas further north e.g. Dundee, Aberdeen and Inverness would clearly benefit from reduced journey times between Edinburgh/Glasgow and England, but end to end journey times to London would be unlikely to be reduced sufficiently to make rail an attractive alternative to air travel. The relatively slower journey times north of the Edinburgh – Glasgow axis could also have an adverse impact on the economic competitiveness of these areas.

This reinforces the need for planned improvements to rail capacity, frequency and journey times, including extension of electrification of the Scottish rail network beyond Edinburgh – Glasgow as envisaged by the Strategic Transport Projects Review (STPR), to be implemented as a complement to an overall HSR strategy delivering benefits to the whole of Scotland. Conversely, the potential for release of slots to London airports from Edinburgh and Glasgow creates the possibility for more to be available for cities further north in Scotland which could help to offset the relative peripherality of northern Scotland.

In addition consideration should be given to extension of HSR to Aberdeen. Scotland is a big country with significant internal inter city journey times, especially on a north/south axis. Consequently faster north/south connections are essential to Scotland's economic wellbeing.

ii. Capacity

Despite the title, HSR is often promoted as a solution to capacity pressures on existing networks rather than as a way of reducing journey times.

Over the last ten years passenger growth on the UK rail network has increased by 40%, the fastest rate of growth in the EU. Long distance travel increased 65% from 1994-2007. The last time such patronage was seen was in the early post-War period when the network was twice as large. Freight traffic has also increased, by 49% over the same period^{iv}. By shifting fast long distance traffic to a separate (but interconnected) network, capacity can be freed up on the existing network for more freight and local passenger traffic.

It must be remembered that the network can never run at full capacity. Unavoidable delays, the need for reliability and maintenance needs dictate that. The East and West coast lines are severely hampered, for example, as tourism conduits to Scotland by the closure of parts of the line every weekend for routine repairs.

Rising demand is considered unlikely to abate over the long-term. Recent projections for ECML passenger numbers projected an increase of 69%, with WCML growing by 104%^v.

Network Rail latest figures for 2036 predict rises of London-Glasgow between 14% and 78%, for London-Edinburgh between 43% and 109%. The WCML is often seen as a case in support of providing new, rather than upgrading existing, lines. The logistics of upgrading a busy operational railway were such that the near-£10bn, 10-year, WCML upgrade (which caused long-term disruption) delivered a route that may still reach full capacity in 2016, and an average speed increase of perhaps only 10mph. It is recognised that there are no absolutes in terms of improvements possible on existing networks as scheduling, signalling improvements etc can all make differences. What we can guarantee is that such improvements of the existing network will not provide High Speed Services as specified above.

Road and air traffic have also seen major growth and there are serious questions about the capacity of London's airports. Road traffic is set to grow by a further 30% over the next two decades. All of the UK's transport networks face major capacity issues. This in turn affects economic performance adversely, as has been seen in the Central Belt in 2008 where a series of accidents (some as slight as an overturned chicken lorry, others more serious) have gridlocked the Central Belt for as much as whole days at a time. Closures of the M6 at Shap are not uncommon. The combined threat to transport stability through adverse weather and vulnerability to incidents reinforces the case for a High Speed Rail Network with well designed weather resistance and the improved opportunities for maintenance that that will afford to the existing network through (*in extremis*) diversionary routes.

It must recognise however that placing capacity as the leading argument disfavors Scotland as Southern traffic needs outweigh those in Northern England and Scotland.

iii. **The environmental case**

Scottish and UK Governments have set targets to reduce greenhouse gas emissions by 80% by 2050.

Transport contributes over one-quarter of UK’s CO₂ gases. Domestic aviation is an extremely carbon-intensive mode of travel, and one of its fastest growing sources. Emissions per London-Edinburgh air passenger are around eight times those of rail passengers^{vi} and aviation’s impact is further exacerbated by radiative forcing^{vii}.

High-speed trains require slightly more energy than current ones but resulting emissions per passenger kilometre are still much less than for aircraft. Furthermore, rail’s electricity will increasingly be from low-carbon sources. The figures below show increasing gains to be made.

Let us not forget that modern trains with better aerodynamic design, regenerative braking, built of lighter composite materials and with fewer stops per mileage can make significant advances in energy efficiency.

London-Paris return	kg CO ₂ /passenger trip	g CO ₂ /passenger km
Air (average) from Heathrow	122	168
Eurostar	10.9	11

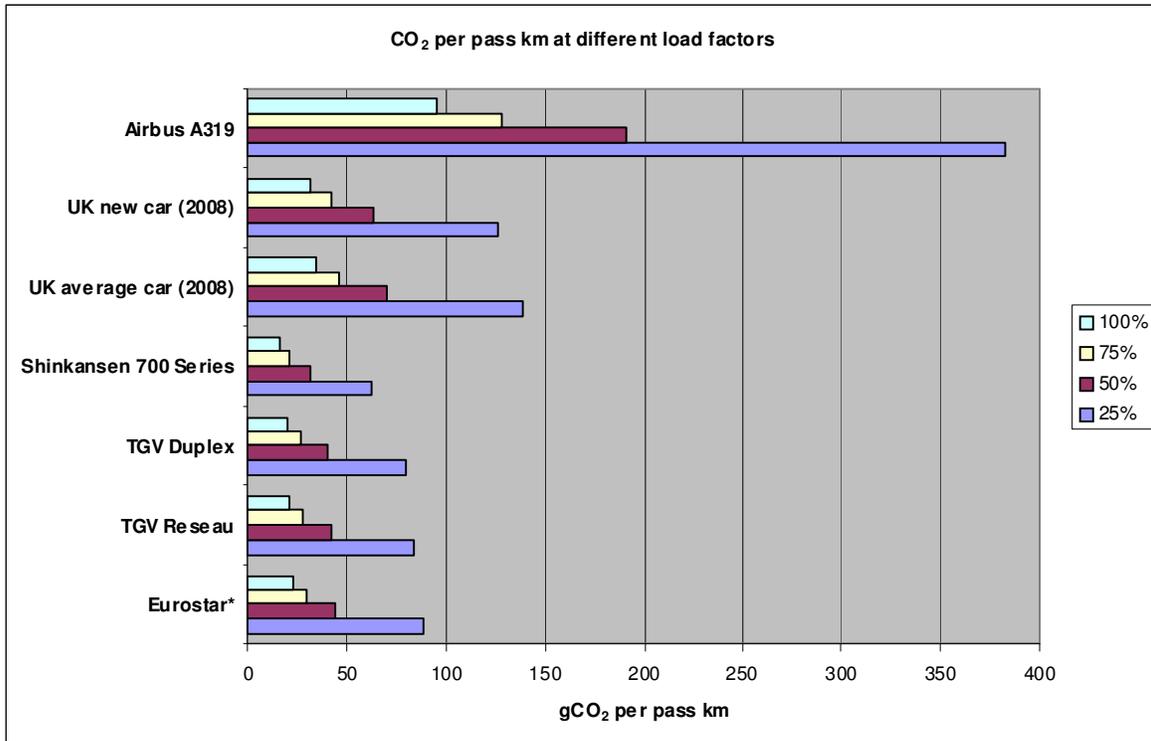
Carbon emissions from rail based on supply from British Energy

Aviation’s impact is exacerbated by radiative forcing - the impact on the atmosphere of carbon depletion and the generation of greenhouse gasses being different at higher altitudes from ground level. Aviation is one of the few (and – at least until recently – was among the fastest growing) sources of UK greenhouse gasses. Unlike most other fossil-fuel burning activities, there is currently no alternative to fossil fuels for aviation.

Greengauge 21 has recently compared the CO₂ emissions for various HS trains with those for other modes. The table below shows High Speed Rail to be consistently ahead of other modes in environmental terms at equivalent load factors. Even running at 25% capacity, the most energy intensive HS train still emits less CO₂ per passenger-km than a 100% full Airbus A319.”

Train	Class 390 Pendolino (2003)	Class 373 Eurostar (1993)	TGV Reseau (1992-6)	TGV Duplex (1995-7)	Shinkansen 700 Series (1998)	AGV* (2008)
Speed (km/h)	200	300	300	300	300	300
Seating capacity	439	750	377	545	1323	650
Length (m)	215	394	200	200	400	250
Vehicles per unit	9	20	10	10	16	14
Tare mass (tonnes)	460	723	386	384	634	510
Mass per train metre (tonnes)	2.14	1.84	1.93	1.92	1.59	2.04
Mass per seat (tonnes)	1.05	0.96	1.02	0.7	0.48	0.78
Energy consumption (kWh/seat km)	0.033	0.041	0.039	0.037	0.029	0.033 (est.)

When this is compared with their future projections for improvements in carbon usage across modes:



...it shows significant benefits for the improving environmental impacts of High Speed Rail. In short, the environmental benefits from modal shift will improve from an already advantageous position.

International experience suggests that where rail can offer sub-three hour journey times, two-thirds or more of passengers prefer rail to air^{viii}. It seems highly likely that cross-border HSR would carry the majority of Scotland-London travellers, significantly reducing greenhouse gas emissions providing competitive fares can be achieved when compared with the air travel alternative.

French experience suggests that a 3 hour journey time will ensure a share of 60%-70% of the passenger market. Before the introduction of the TGV Mediterranean service between Paris and Marseille in 2001, rail held only 22% of the air-rail market between them. Within four years of the introduction of the TGV service, the market share held by rail rose to 65%. Madrid-Barcelona on the Spanish AVE network has similarly evidenced such a level of modal shift.

At present, on weekdays there are around 50 flights to the five London airports from Edinburgh, and around 36 from Glasgow. The addition of Prestwick flights take us to the above quoted statistic of 'around a hundred'

The Royal Commission on Environmental Pollution has stated (2003) that, "If air travel expansion goes unchecked, aviation will be costing about a quarter of the UK's climate change budget by 2020, and by 2050 this could have risen to over half or even three quarters of the budget". A report by the Tyndall Centre suggests that the UK - by 2050 - would have to stop emitting carbon dioxide from *all other sectors* of the economy in order to allow aviation to expand as forecast, and still meet our

climate change targets. (<http://www.campaigncc.org/Howdoesairtravel.doc>). Given the need to maximise our international trade it is crucial we minimise our inland flights wherever possible. HSR offers just that.

Modal shift

Most figures on actual (rather than predicted) modal shift are based on journeys which have been reduced to two hours. Paris-Marseille and Madrid-Barcelona show where journey time has been cut to 3 hours (the figure most akin to Central Scotland- London as a modal shift opportunity), and have produced a rail share of 65%.

The London-Newcastle rail journey has been around 3-3.25 hours since the early 1990s and rail currently captures 48% of all trips.

On Liverpool-London, aviation which used to have 80% of the air-rail market; now just over 2 hours by rail, there are no flights on the route.

This reinforces the aspiration that we should be aiming for well UNDER 3 hours Scotland-London, to push the potential rail share well over 65%.

Options and issues

If the in-principle case of Scotland-London is won there will remain some important decisions to be made.

i. Route options

A number of Scotland-London HSR route options have been considered. Connections with England's major provincial cities are important but the priority is a central London link that serves both Glasgow and Edinburgh. The debate about what would be the best route is clearly influenced by the cost benefit analyses, which as noted, require further research. There is continual pressure to prove why we would need Glasgow-Edinburgh HSR. The answer is we don't. The investment costs of HSR only make sense if we are connecting (via central London) into the European network.

What is essential is that HSR should be developed as a new line rather than an upgrade of existing lines. At present the ability to introduce new stations and services on the East and West Coast main line is severely restricted due to the fact that these lines are primarily fast inter-city routes. By constructing a new HSR it would be possible to improve access to the existing lines considerably to the benefit of short to medium distance travel, and freight. In addition the disruption that would be caused by upgrading existing lines to HSR would cause a major detriment to economic activity and would be unacceptable

ii. Technology

There are two options for HSR: conventional 'wheel-on-rail'; and magnetic levitation (maglev). The latter promises higher speeds (up to 500km/h) but only has one commercial application (in Shanghai, maximum speed of 425km/h) and for only 35km. Maglev is more energy-intensive than conventional HSR and cannot use existing tracks – a particular issue on the approaches to major cities. Conventional HSR operates in many countries at up to 350km/h, and can access existing city centre stations on existing track.

In addition, it can continue onwards on conventional track to areas not served by a new high speed line.

The Rail Minister, Lord (Andrew) Adonis in commissioning the HS2 project has made it clear that the Westminster government has committed itself to a HSR system 'compatible with the existing network', which rules out Maglev. It has the advantage that such a network can be built incrementally.

The choice of a technological solution for Scotland-London HSR should be whichever provides the better solution to the specified objectives, i.e. those relating to economic, environmental and capacity issues.

iii. Construction phasing

In view of capacity pressures and market size, it seems most likely that a HSR network will begin between London and Birmingham, stretching to Manchester and Leeds later. Present indications are that the UK government is favouring a route via Heathrow. Such an approach has significant dangers for Scotland. The quality of our connectivity would be comparatively diminished by a delay in extending the network northwards. The present Rail Minister, Lord Adonis maintains that by allowing inter-city rolling stock to convert to HSR format, a train running to Birmingham New Street on High Speed Line 2 and then on to (say) Glasgow on WCML would achieve a half hour reduction in journey time. Such thinking creates a strong possibility the connection would never happen. For these reasons, we feel it is important that work on the Scottish section of a HSR network is undertaken in parallel with work in the South.

Only in this way can Scotland's comparative disadvantage avoid being perpetuated. In particular, as the European high-speed network expands, it may be an absolute disadvantage to be disconnected from it. However, it is currently difficult, if not impossible to quantify this effect.

Is the desire for Scotland's inclusion from the outset then political? Emotive? Without economic basis? Our evidence suggests not, but we accept the need for clarification. The following points are material to our case. Lord Adonis' contention that 'If Scotland is serious about wanting High Speed Rail then the strongest argument for Westminster is for the Scottish Government to commit to build Edinburgh-Glasgow' simply does not wash, as the economic imperative for such an investment is lost if it is not a guaranteed link in building through to central London and beyond. Additionally, it is clear from our correspondents in Yorkshire and NE England that a key driver for a N-S national HSL is for them to be able to trade with Scotland. AND, it is difficult (if not impossible) to design (and therefore cost) the optimum Edinburgh-Glasgow route unless you have a clear indication of how Anglo-Scottish HSR is configured through northern England.

It is worth noting that it is the Scottish sections of the existing Anglo-Scottish network that have the lowest operating speeds. Thus the biggest savings in journey time will be gained by constructing the northern section of the route. It follows that these journey-time benefits will be maximised by (also) starting construction at the northern end.

Fare structure

The costs of travel are considered as time and money. HSR clearly scores on the former but it will be important that ticket pricing is also competitive. Transport is, quite literally, a means to an end: we see that end as sustainable economic growth for Scotland. Any route franchise regime should give sustainable economic growth pre-eminence and would inevitably reflect the Scottish Government's other priorities too i.e. *wealthier, fairer, safer, stronger*, as a nation.

Making the case

A number of high-level studies into Scotland-London (and other UK) HSR have been undertaken^{ix}, with generally positive results. Network Rail and Greengauge 21 are currently undertaking more detailed studies, and – most recently (January 2009) – UK Government has established a company to bring forward proposals for HSR from London to Heathrow and Birmingham under its HSR2 company.

The Scottish Government is favourably-inclined towards HSR and it is included as an aspiration in the new National Planning Framework. This appears to have cross party support North of the Border.

The outstanding issue is the case for extending London-origin HSR beyond Birmingham or northern English cities. If that gap cannot be bridged then Scotland may be permanently disadvantaged as a place to do business. More work is needed to demonstrate the macro-economic benefits of such an investment to NE England and Central Scotland.

Amongst recent developments, the HS2 company established by the UK Government is a key body to influence. The current main problem is that Scotland has no seat at the HS2 table (Transport Scotland is one of numerous ‘stakeholders’) and top priority now should be to change this e.g. the Scottish Government must be seen to be more proactive. However, the CEO of HS2 has also stated that the Greengauge 21 and Network Rail studies will influence their thinking, in particular what should take place beyond Stage 1, so it is also important that we try to get our views clearly expressed to these organisations as well.

The Scottish Parliament’s Transport Infrastructure and Climate Change Committee concluded that ‘probably the single most important message’ of its recent report is that it is ‘imperative that the development of high-speed rail services in the UK must include Scotland as a component of any plans from the outset.’...‘the Scottish Government should, as a priority, enter dialogue with the UK Government to consider how the idea of a high-speed rail line to Scotland might be taken forward’

Network Rail has argued that a network is needed by 2020. Whilst this might be achievable for a first stage, the history of major projects in the UK indicates that it is highly optimistic for a large network. The scale of costs and the capacity of the construction industry indicate a phased approach, using the ability of ‘conventional’ HSR to use sections of existing route. This implies a timescale of two or three decades (as in France), and varying costs for each stage.

The case for starting in Scotland at the same time as the south reflects these timescales.

Whilst capacity is the primary driver of HSR in south England, journey time is more important to Scotland. In both situations, a robust business case needs to be developed. If that gap cannot be addressed, Scotland may be permanently disadvantaged.

In developing a network simultaneously from north and south, it is crucial that both ends are compatible in terms of system design, and technical specification. There is no obvious reason for Scotland to adopt different specifications. As detailed work on HSR in England

is about a year ahead of Scotland, it is probably sensible for Scotland to deploy the specifications as they are determined for the southern end.

HSR needs to be seen as a network of services, rather than a piece of infrastructure. The key issues are journey times and frequencies; with 'soft' issues such as fare levels and passenger service. In England the primary origin/destination is clearly London, followed by Heathrow Airport. In Scotland the primary origin/destination is also London, followed by major cities in north England, with Heathrow some way behind.

This focus means that any new infrastructure built from Scotland southwards will support a much greater proportion of cross-country/interregional services than will be the case at the southern end (which is likely to be exclusively London-centred).

It is well established that, because transport is a 2 way flow, a stronger economic area is strengthened rather than the weaker area if transport links are improved between them unless complementary measures are implemented to reverse the balance. Appropriate kinds of complementary measures have been identified. However, they must be implemented; it is not enough to build the HSR and expect regeneration or development to follow automatically.

A precondition for delivering these complementary measures is comprehensive 'local' decision-making and financial powers. Thanks to the devolutionary settlement, Scotland has the governmental tools for doing so; whereas in England this is not the case.

A major weakness of the Scottish case is the **lack of evidence on a High Speed line to Scotland**. Assumptions, national emotion, and so forth will not sway those in charge of funding.

We must ask searching questions. But they must be backed up with hard facts.

Is Scotland going to be left out?' We think HSR is will bring major economic benefits to N England and the central belt of Scotland, but recognise that this needs to be more thoroughly evidenced. We think the Scottish Government and the Westminster Government need to commit to this opportunity for Scottish and English regional economic renewal.

We believe the Scottish Government needs to commit to progressing HSR, assuming Westminster does likewise, as it appears to have done through HS2. Scotland's interests must be properly represented in planning HSR, from the outset .

We believe that the most peripheral regional centres within the north of Scotland and Northern Ireland that will not benefit from HSR should be provided with the alternative of assured air service access to Heathrow so they too can access international markets

For the Scottish Government to have a robust and public business case for HSR to/from Scotland requires further work. It needs to have a plan of how to maximise the wider economic benefits from HSR. Whilst other parties will produce work identifying how to do this generally, there needs to be something specific to Scotland.

We are behind Westminster on this issue. Our immediate objectives are:

- 1) Catch up
- 2) Scotland – South be recognised as an equally important starting point for HSR.

Any political party which is serious about the Union will recognise that this is a keystone to showing that commitment. Any party espousing independence will want the connectivity to balance our economic chances with our nearest neighbour. Therefore who would vote against such a proposal?

HS2S Terms of reference

HS2S has been formed to argue for a High Speed Rail link from Scotland to London. It is convened by the Scottish Chambers of Commerce of behalf of the Scottish Business Community.

H2S membership consists of a Chair, Executive Secretary, representatives from Scottish Chambers of Commerce, Scottish Council for Development & Industry, Scottish Financial Enterprise, Confederation of British Industry, Institute of Directors, Federation of Small Businesses, Glasgow City Council, City of Edinburgh Council, Scottish Association for Public Transport and Transform Scotland, are also members of the group as are the Regional Transport Partnerships, SEStran and SPT. Scottish Enterprise attend as observers as do Greengauge 21, when possible.

Specifically, the group will:

- *Understand and articulate the case, from a business perspective, for a High Speed rail link to central London and beyond.*
- *Engage with politicians, government, government agencies and interest groups in furtherance of the objective*
- *Use public and private fora, as appropriate, to deliver the argument*

- ⁱ Standing Advisory Committee on Trunk Road Assessment (SACTRA) (1999) *Transport and the Economy*
- ⁱⁱ The Eddington Transport Study. The case for action: Sir Rod Eddington's advice to Government (Dec 2006)
- ⁱⁱⁱ e.g. Wider economic benefits of transport improvements: link between agglomeration and productivity (2006) Imperial College London
- ^{iv} Statistics from Network Rail and the Railway Forum.
- ^v Source: *Inter-Urban Rail Forecasts: Final Report*, WS Atkins, December 2006.
- ^{vi} House of Commons (2004)
www.publications.parliament.uk/pa/cm200304/cmhansrd/vo040708/text/40708w05.htm. Passenger load per service (%) affect calculations
- ^{vii} <http://www.publications.parliament.uk/pa/cm200607/cmhansrd/cm070502/text/70502w0005.htm>;
- ^{viii} e.g. Eurostar achieves roughly two-thirds market share between London, Paris and Brussels. Likewise, France's TGV network attracted large shares of air traffic (e.g. Paris to Lyon, Marseilles, Brussels). HSR in Spain and Italy is expected to do likewise.
- Even in Britain, rail upgrades (speed, reliability and capacity) over shorter routes have seen significant modal shift: Virgin Trains claim a 121% increase in passengers on its Manchester/Stockport-London services in the three years to September 2007, with market share growing by more than half (to over 60%).
- ^{ix} e.g. (and in addition to those already mentioned) by Arup and the 2M group of London Councils