

The Transport Economist

The Journal of the
Transport Economists' Group

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THE TRANSPORT ECONOMIST

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Editor
Peter Gordon

Keynote address

Richard Brown, Chief Executive, Eurostar

Richard Brown began with an overview of the high speed rail market, highlighting different approaches to high speed rail and its impact, and noting some lessons from the Eurostar experience and key issues for the future.

The two main high speed systems in Europe are the French “Peugeot” TGV and German “Mercedes” Inter City Express, although other countries such as Spain and Italy are also developing networks. Trains may be articulated like the TGV, reducing weight and arguably giving a smoother ride at the expense of lack of flexibility, and may tilt, like some types of ICE. They may operate only on self-contained routes, like Japanese Shinkansen trains, or also on conventional route sections like the TGV or ICE.

The speed of services is rising. The Japanese Shinkansen started at 210 km/h and the TGV at 250 km/h, but this has been increased to 300 km/h and will soon increase further to 320 km/h.

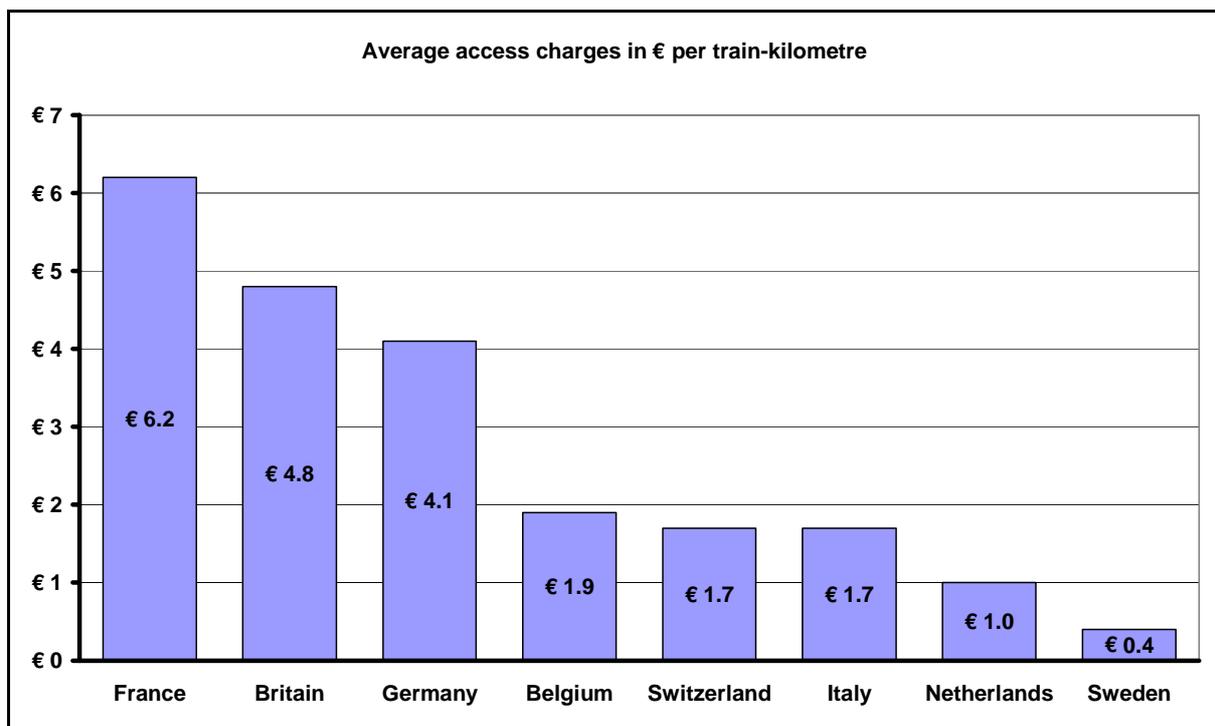
One of the most significant changes has been with the reservations and yield management model. TGV is a closed system, requiring pre-reserved seats with sophisticated yield management, and only operating trains when required by demand. ICE is a turn-up-and-go system and operates a generally standard all-day service. TGV’s average load factor is 71% while ICE’s is a little below 50% but can reach 150% on peak trains. Combined with a higher passenger yield (despite low lead fares), this gives TGV a much higher yield per train and passenger mile. TGV makes an 11% profit margin on a turnover of €4 billion (£2.7 billion), while ICE just breaks even.

It often seems that the French are better at running high speed trains and the Germans better at freight. It was notable that France has the larger network, despite being the less populous country, with around 450 TGVs against 150 ICEs.

The impact of high speed rail has been significant, with rail's share of the rail plus air market tripling between Paris and Marseilles to 65%, that of all modes increasing by a factor of 2.8 between Madrid and Seville to 53%, and that of rail plus road share increasing by a factor of 2.2 between Paris and Brussels to 52%.

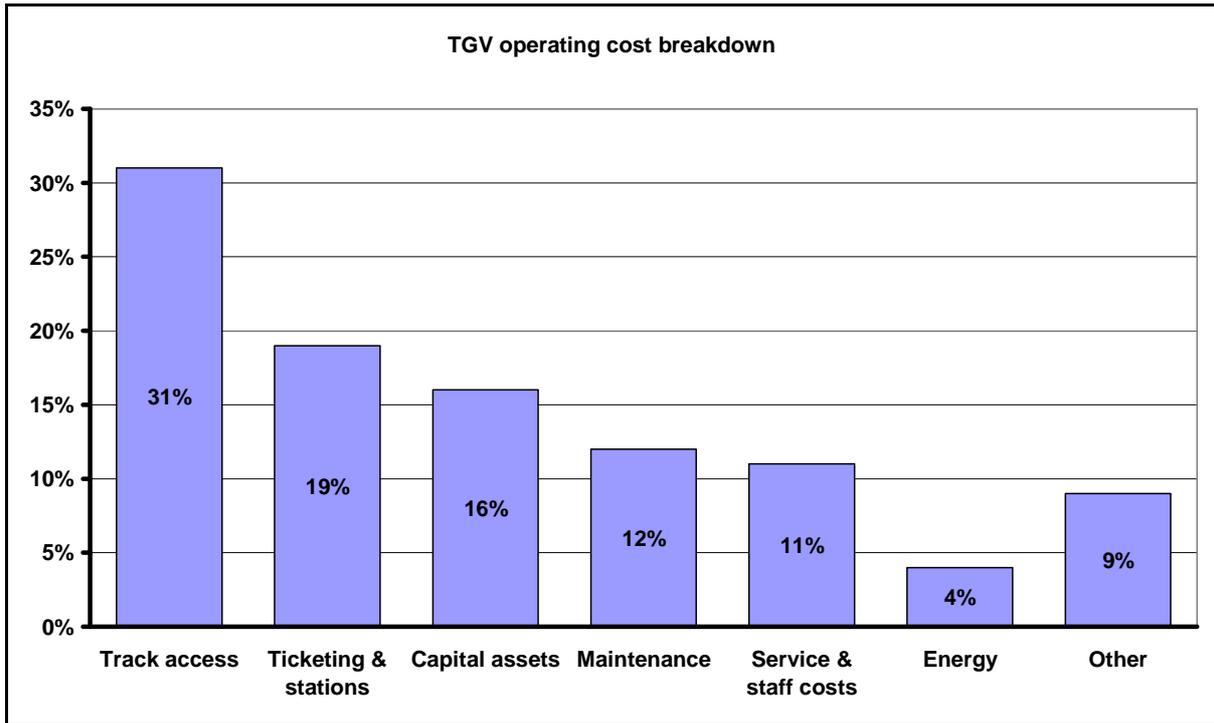
Eurostar produce an “S-curve” of rail market share based on time and distance. It has historically been thought that rail is competitive for journeys up to 3 hours, but there is evidence that this time is increasing. At the moment the market share between London and Paris is above, and between London and Brussels below, what would be expected. The latter increased dramatically with the opening of CTRL Stage 1, but the challenge was to increase the London to Brussels market share.

There are significant differences in track access charges in various countries, reflecting varying financial regimes.

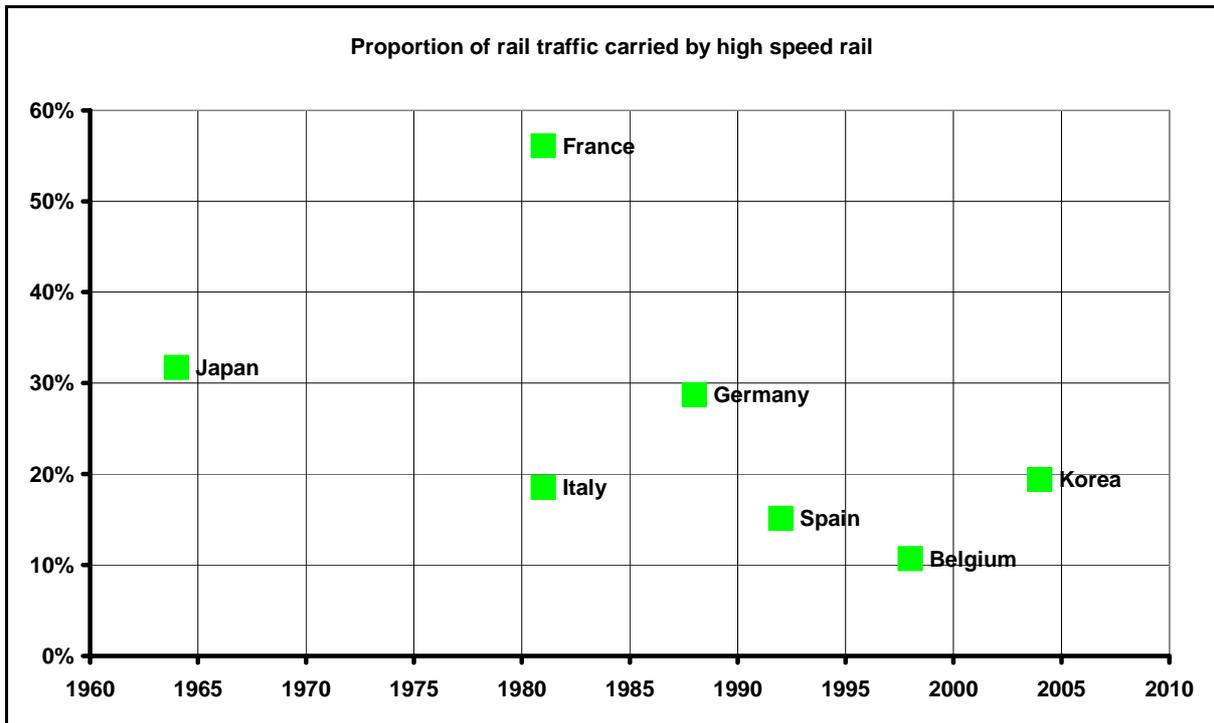


In Britain, most of the subsidy goes to the TOCs who then pay Network Rail, although this is changing. In Switzerland, in comparison, most infrastructure is financed directly by the State. The cost of Eurostar operating over High Speed 1 in Britain is £70 per train-km as charges were expected to cover all the capital costs.

The cost of operating TGVs comprised the following:



High speed's share of total rail traffic is plotted below against the launch dates of services on each network:



Richard went on to talk about Eurostar, an unincorporated joint venture between three companies with a unified management team reporting to a Board representing the three operators. It is a technically challenging operation, with four types of infrastructure, signalling systems, and safety regimes. The UK is not part of Schengen, so travellers must clear border formalities as well as security screening.

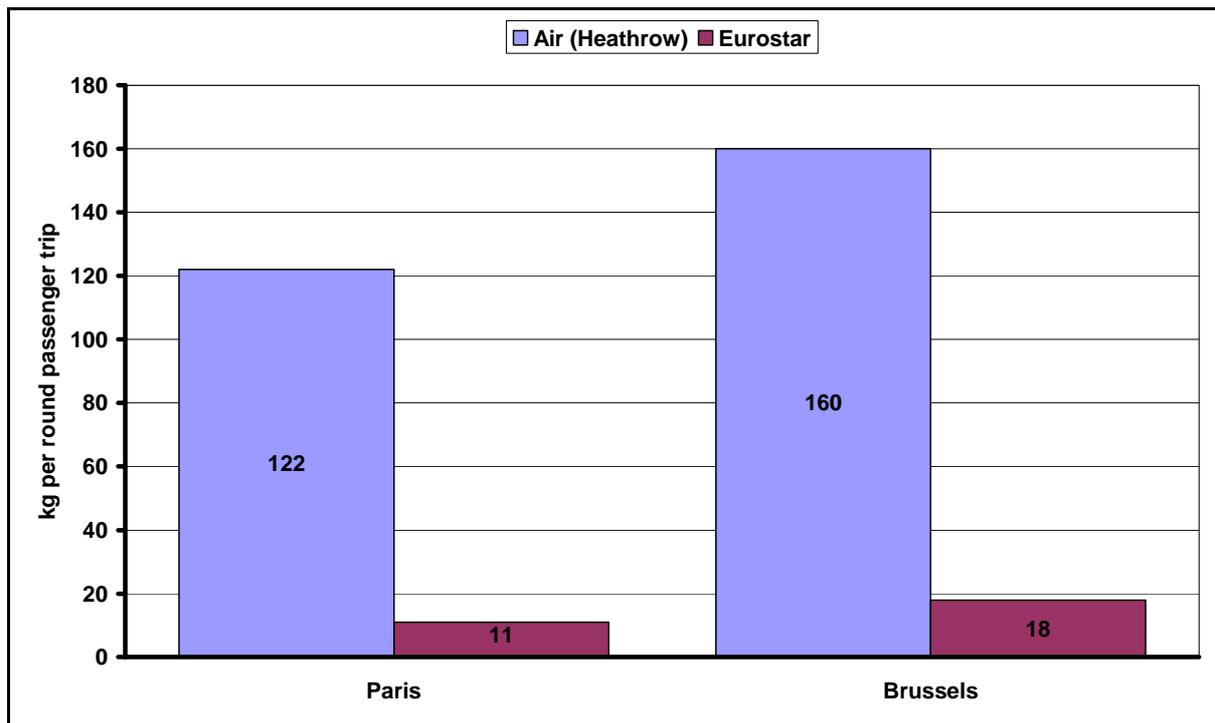
There is a global customer base with 10% of passengers being neither British nor French nor Belgian, who only represent 7% of demand. The principal competitors are the airlines, with road travel not a major competitor, so Eurostar's pricing policy has evolved to reflect that of air. The low-cost airlines have emerged as a new price reference for leisure travellers and, while not important operators in the London-Paris market, create expectations based on routes such as London to Barcelona and Prague. In 1994 the London-Paris lead-in price was £95 return, but by 2007 this had fallen to £59.

As with the airlines (and TGV) "ladder" model, Eurostar prices increase as the time of travel approaches, depending on how full the train is. This system was designed to optimise yield and occupancy simultaneously, and London-Paris load factors have increased to around 70%, targeting 73% for the next five years. London-Brussels load factors remains low partly because the trains are too large for the route.

Distribution is a key tool for high speed rail. Eurostar has to deal with three separate rail systems, to exploit rapidly-evolving e-distribution technologies, and to match airline ubiquity and ease of purchase to ensure that high speed rail is "front-of-mind" for consumers, all while reducing distribution costs. With this in mind there are many initiatives such as GDS3, eurostar.com, Eurostar Planet, travel portals and e-tickets. Distribution is 14% of costs in France but only 6.5% in the UK.

Eurostar is a relatively green way to travel. Research by the operator had showed that 39% of UK residents had changed their travel habits due to worries about climate change. Independent research showed that flying releases at least 10 times as much CO₂ as travelling by Eurostar. Rail is "green" but it must work upon becoming "greener still".

The chart shows kg of CO₂ per return passenger journey.



Aircraft emissions need to be multiplied by a factor of 1.5 to 2.7 to reflect “radiative forcing”.

The Railteam alliance with seven other European operators has been developed to promote through journey opportunities. The most promising initial markets were between the UK and the Netherlands and Northern Germany.

High speed rail drives regeneration and growth. High speed rail hubs in economically depressed urban locations are “beacons” for regeneration, attracting businesses and residents back into city centres and linking cities to centres of economic prosperity. Companies are more willing to relocate offices to regional cities with good transport links. Lyon and Lille have both benefited from high speed links to larger, more economically prosperous, cities. There are currently around 300,000 French citizens working in London.

A case study is Lille. In the 1980s it was an economically depressed post-industrial city, with nearly 40% unemployment and declining mining and manufacturing industries. Mayor Pierre Mauroy lobbied for the TGV Nord to run through the city, creating “Carrefour de l’Europe”. By the 2000s it was at the heart of the European high speed rail network and was France’s third most powerful financial, commercial and industrial centre, with unemployment of around 13.3%.

To conclude, there are many high speed models and one size does not fit all. Success requires adopting travel industry practices in revenue management, e-commerce and load factor management. High speed rail is big in Europe and Asia, drives economic geography, and is an environmentally-friendly alternative to flying.

Questions

Richard Brown had to leave early, so questions were taken immediately.

Don Box asked about track access charges, noting that each country has its own method and that charges are often not based on actual cost. Richard replied that in the UK there was a very high fixed element of track access cost and a low variable charge, ostensibly reflecting actual costs (although Railtrack disputed the low level of marginal costs), explaining why operators were keen to run additional services. France, in comparison, has high variable charges, which could be why SNCF tailored trains closely to demand and only runs them when there is a large load on offer. In France there is an element of ability to pay.

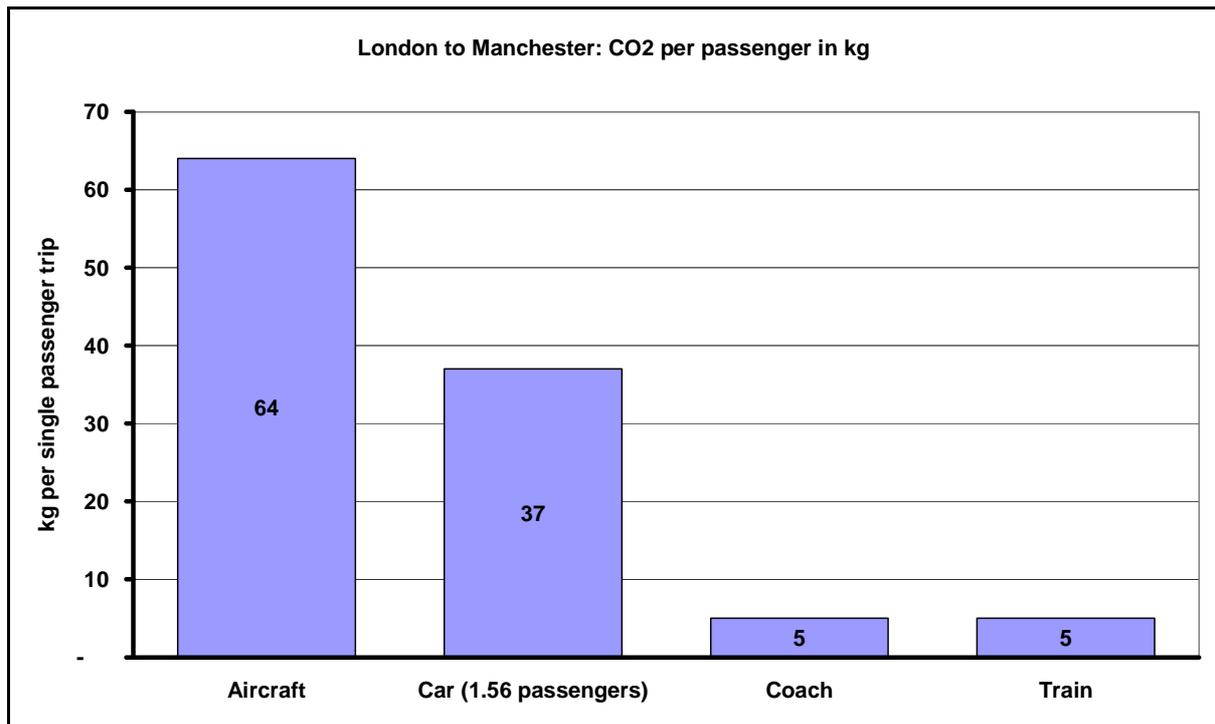
Stephen Bennett (ex BR) asked what Richard thought about competition within rail. Richard replied that the European Commission were keen to encourage this. Eurostar would be ready to take on other rail operators, but received plenty of competition from the airlines keeping him “on his toes”.

High speed rail: a white knight?

Jim Steer, Director, Greengauge 21 and Steer Davies Gleave

Jim began with the question “Isn’t the transport CO₂ issue all about urban areas?” and the answer “No, it is also about long distance travel”, while nearly half (47%) of all person-km travelled in Britain is on journeys of over 40 kilometres. It is the travel segment where half of the transport sector greenhouse gases arise, and where rail is a relevant choice of mode.

He first compared CO₂ emissions on the route between Manchester and London for each mode.



Jim noted that all generalised modal CO₂ comparisons are dangerous, as they critically depend on assumptions about occupancy and access modes. In addition, energy consumption tends to increase by the square of speed. Nonetheless, environmental policy studies have concluded that “*we must have high-speed rail between all major cities by 2030*” (Tyndall Centre for Climate Change Research, September 2006) and that “*high-speed rail is the missing link to reduce unsustainable air travel*” (Town & Country Planning Association, November 2006).

Jim thought that while the Eddington report (The Eddington Transport Study: The Case for Action, December 2006) did not rule out high speed rail, it did see the big problem as capacity. The report called for a distinction between conventional and innovative (higher risk) high-speed technologies, and for studies of the relative merits of high speed rail and other means of addressing capacity short-falls. He was sceptical that the European Rail Traffic Management System (ERTMS), designed to allow interoperability between European countries, would increase capacity.

The Eddington report suggests that benefit cost ratios for high speed rail are below the critical 2:1 threshold but Jim argued that it is above 2:1 in most cases. The report also wrongly assumed, from some Dutch research, that agglomeration benefits are negligible in Britain at distances over 130 kilometres or so.

Transport investment in itself is unlikely to stimulate regeneration, but the prospect of ever-increasing congestion will cost the economy dear. Allied to this, it was disappointing that there was no analysis of road user charging on the demand for rail transport. It will be interesting to see if this huge challenge will be addressed in the Department's 30-year rail strategy due out later this year.

Evidence for high speed rail

Jim put forward evidence for high-speed rail in four areas:

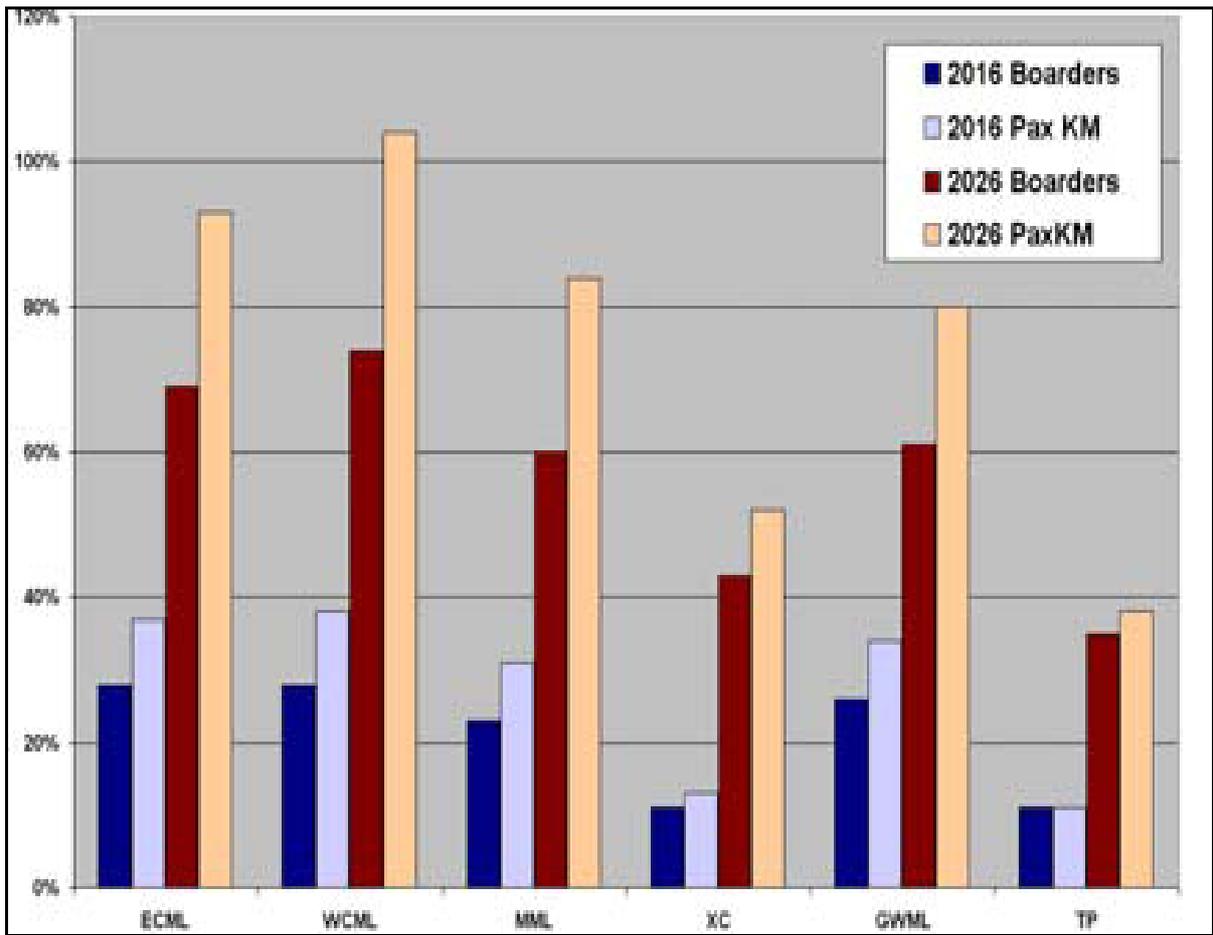
- Capacity, the critical rationale for high speed
- Wider benefits
- The domestic aviation sector
- European evidence

Capacity

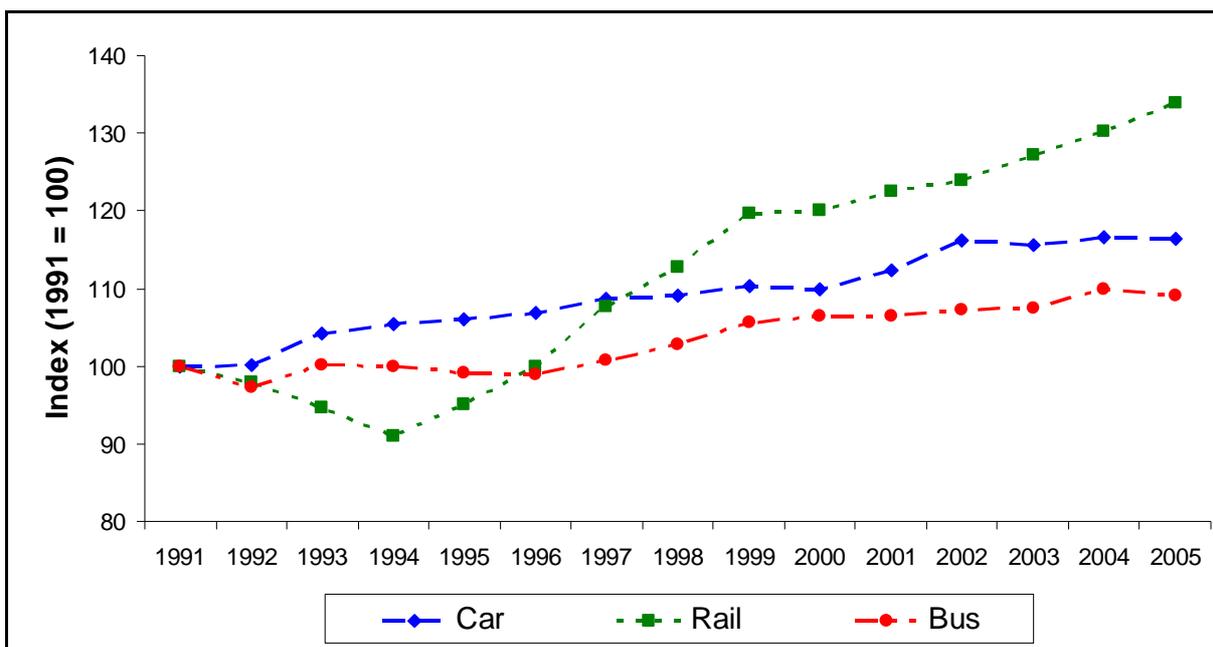
The rail network faces capacity deficiencies on:

- Main rail lines from London to Midlands and the North
- Key London commuter lines, especially to the North and West
- Connections between places within the South East
- Freight routes, especially to and from ports

It was posited that high-speed rail can address all three of these problems, and that the evidence is that it does so better than all of the alternatives. The figure below shows estimates of growth made by Atkins for the Eddington Report on six passenger corridors.



Over the last ten years, passenger traffic has grown faster on rail than on road-based modes. Transport Trends 2006 shows growth between 1991 and 2005 of 34% in rail passenger-km compared with 16% in car, van and taxi and 9% in bus travel.



Wider benefits

The most important high speed rail's wider benefits, which should be maintained if it is to compete with airlines, is to capitalise on rail's unique accessibility to city centres. High speed rail also has the potential to change regional economics, by creating new "national" clusters and ease development pressure in the South East. This could also reduce the wide regional disparities in productivity.

Studies of regional economic development conclude that "*journey time from London is one of a very small number of critical explanatory variables*" (Regional Productivity Differentials; Explaining the gap - 2006 Boddy, Hudson et al) and that for the West Midlands, "*high-speed rail is the best of all policy instruments*" (Regional Futures - 2005 for ODPM et al). Two further studies exemplified this:

- The Atkins study of Midland Main Line speed-up concluded that there was a BCR of 11:1, with geographically widespread benefits and 60% of wider benefits from agglomeration.
- Unpublished Northern Way research shows that the agglomeration benefits of a full high speed network are much greater than those for Crossrail and Thameslink combined.

The domestic aviation sector

Jim used Greengauge 21 research for Transport 2000, which showed that high speed rail could remove from Heathrow as much domestic and near-continent demand as could be accommodated by the proposed third runway.

European evidence

This shows that the wider regeneration benefits can be substantial but are not a free gift, and that connecting high speed rail to the existing transport networks is essential. Guillaume Pepy of SNCF points out the surprisingly strong demand, growth and value of non-Paris markets and regrets that a rail "périphérique" around Paris was not developed earlier.

Jim suggested that the economic case has already been well-made, with options already examined, the business case for a line to West Midlands/North West and a freight line alternative, showing positive results. Evidence has already been produced by Atkins/Ernst & Young for the DfT/SRA on the following policy choices:

- Upgrade of existing rail routes
- Investment in motorway/trunk road expansion
- Creating new high speed lines
- Creating new conventional speed lines
- Adding freight tracks alongside HSL
- Building a free-standing freight railway

As an example, the Cost Benefit Analysis (SRA Study by Atkins, Ernst & Young et al) for the London-North West (Staffordshire) corridor gave a benefit to cost ratio of 2.07:1. The study concluded that:

- There is a clear business case for north-south high speed rail
- High speed rail is better than alternatives of upgrades or existing rail and motorway expansion
- Two north-south lines (on east and west sides) are probably better than a central trunk and branches
- The reliability and safety benefits are not insignificant
- Traffic is diverted from road and air (with cautious assumptions on pricing the latter)
- Direct high speed connections to both CTRL and Heathrow Airport add value and improve the business case
- The capacity gain is substantial for existing commuter, local and freight rail
- It is essential to serve city centres

To make the case for high speed rail, capacity is the key: it adds new capacity and creates better capacity utilisation on parallel routes. Fast journey times also add commercial value and bring added wider economic benefits and allow rail to supplant domestic aviation.

Upgrading existing lines

The reality is that upgrading existing lines would be disruptive and expensive, particularly at terminals, and would perpetuate the inefficiencies of a mixed traffic railway, with all types of traffic managed sub-optimally.

However, it is not either/or, and some smaller schemes are certainly worthwhile, as are some larger projects such as Thameslink. Jim suggested that some bigger projects could be avoided through high speed rail, but gave no specific examples.

Context for high-speed rail network

It was suggested that there are two major economic/demographic problem areas: the North-South imbalance, and overheating and a strongly growing South East. These are exacerbated by the four rail network capacity deficiencies listed above.

It was proposed that these problems would be solved by two north-south lines in longer term, and by linking Heathrow to CTRL and to provincial Britain to reduce the need for a third runway.

Additionally, while only 11 trains per hour are possible at speeds over 300 km/h, 18 trains per hour are possible at “medium” speeds of 200-225 km/h, and this capability should be explored to enable regional services to be added to the new high speed network when approaching conurbations. High speed rail could then provide new fast links for the cities of the Midlands, North and Scotland and add capacity in the South East and for freight.

Jim considered it essential that high speed rail should serve city centre stations and not parkways. This would give a huge accessibility boost to the central core of the city regions and would stimulate the intensification of a sustainable development pattern in the new “knowledge-based” economy.

The costs and funding of CTRL should not be taken as a good guide to future domestic projects. Construction should be phased, but it should be done within an agreed strategy, with funding from road user and domestic aviation charges, and rail franchise premiums.

Jim posited a cascade of economic returns:

£90 billion conventional economic benefit and large agglomeration benefit (twice those of Crossrail plus Thameslink)



Economic stimulus to centres of core cities, especially in the North, where accessibility is transformed



Reduces pressure and demand in the South East



Public expenditure savings, tax benefits and efficiency gains

Conclusions

Jim concluded by saying that a clear business case for high speed rail does exist, even when using appropriately cautious assumptions, and that the wider economic benefits are substantial. High speed rail could support and potentially drive sustainable development patterns, reducing dependence on domestic aviation with a valuable carbon saving.

In addition, it produces benefits for commuting and for freight by adding more capacity, and provides opportunities for savings in other less productive capital programmes. Long lead times mean that decisions cannot be postponed, but investment in high speed rail is not an alternative to shorter term rail investment.

High speed rail

Richard Davies, Director of Strategic Policy, ATOC

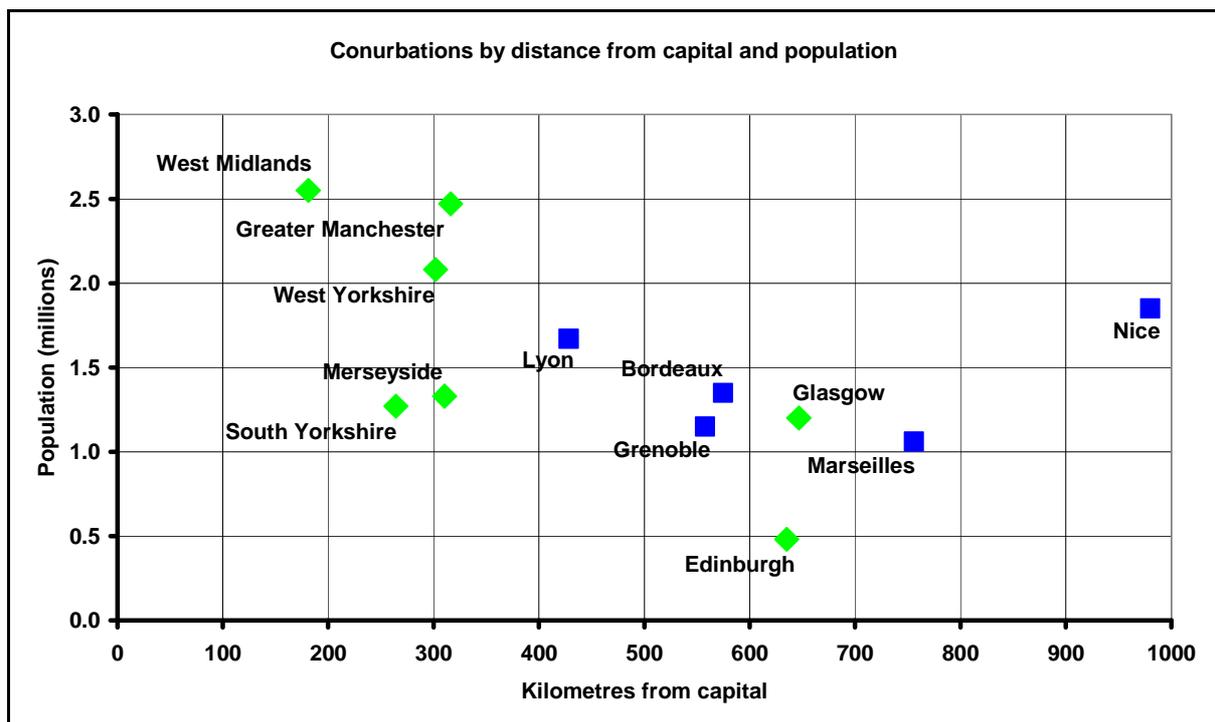
Richard began by saying that his remarks were delivered in a personal capacity and did not necessarily represent those of ATOC. Moreover, it would be wrong to describe him as an opponent of high speed rail. More correctly, he was agnostic as to whether it is the most appropriate major investment requirement, for reasons he discussed in his presentation.

The UK rail network compared with others

Richard first outlined the key decisions which have shaped the UK long distance rail network, beginning with the concept of InterCity services in 1965 and the introduction of the HST with a 200 km/h maximum speed under conventional signal headways in 1969. This was followed in the 1980s by the decision to go ahead with the Channel Tunnel, the InterCity WCML strategy and ECML electrification. In the 1990s came the go-ahead for CTRL, PUG-2 (225 km/h) and “Operation Princess”.

All these projects except the Channel Tunnel were about improving journey times on the existing infrastructure, and this has been the UK’s approach to high speed rail for 40 years. The result is that conventional long distance rail speeds in Britain are on average higher than in France, Germany or the Benelux countries and such services are offered to a very wide range of cities.

Part of the reason for this is the differences in population distribution in the UK and France, as shown below.



Most of the British conurbations with populations over one million lie within around 300 kilometres of London, and the two with the biggest potential time savings only have populations of about 1.4 million and 0.5 million. France, in contrast, has four cities with populations of over 1 million situated 400-800 kilometres from Paris, the ideal range for high speed rail.

Pros and cons of 150mph plus high speed rail

Richard then discussed some of the key issues with high speed rail. Additional energy consumption due to higher speed is one, but is not the critical factor in overall costs. Route selection, and hence the capital cost of building the line, is very important, particularly as access to city centres is needed.

Use of existing rail corridors can reduce conventional capacity and introduce the problems of construction alongside existing lines. Conversely, a completely new alignment can result in high costs of access into conurbations.

Any major new line raises issues of planning permission and noise. While the existing planning processes in the UK are time-consuming, the proposed Independent Planning Commission, a key recommendation of the Barker report, might help.

The financial case for operating rail services of more than 500-600 kilometres depends on the strength of competition from air, which has a good record of steady cost reductions through improved aircraft efficiency. Successive generations of medium-distance aircraft, currently A320s and 737-700s, are cheaper to operate, the benefits of which have been passed back to the market through lower fares. Although the trend of aircraft efficiency improvement will continue, in future it is likely to be offset by carbon pricing and capacity issues at airports. The effect of competition on rail is noticeable and estimates suggest that rail carryings to and from Scotland have declined by about 15% over the last decade, for example.

The basis for subsidising rail once a carbon price had been established needed to be considered. Once the environmental externality is addressed, the theoretical basis for subsidy would rely heavily on reducing road congestion.

Richard then turned to whether high speed rail is the appropriate solution to British rail needs. High speed rail has heavy public spending implications and the UK was already very close to the “sustainable investment” rule that the total stock of public debt should be no higher than 40% of GDP. Indeed, the Institute of Fiscal Studies estimates that once PFI obligations are added, the rule has already been broken. Public funding therefore places limitations on the ability to fund both a new high speed line and major improvements to the existing network so there is a choice between them. The two most important factors to be

assessed in making such a choice are the benefits of additional speed and additional capacity. He concluded that, in Britain, the additional capacity provided by rail investment will be the primary factor.

Capacity as the central issue

Overall annual growth in rail journeys has averaged 3.25% over the last eight years, but is now running at 6%, and recent figures indicate growth over the last 6 months may be as high as 10% per annum.

All sectors have been growing over the last ten years, but London, where 62% of all rail trips start or end, is a major driver of demand and a world financial, educational and tourist centre. On London and South East (LSE) regulated routes, the increase is in part because fares have actually been held constant in nominal terms over the period 1999-2003, and are now only 30% above 1995 levels, while average earnings have risen by nearly 60%. The reality is that RPI-1% did not apply for a number of years after Hatfield, since any increase was offset by charter discounts and the Fares Incentive Adjustment Payment (FIAP) regime. Growth has also been driven by the fact that average earnings in London are some 30% higher than in the rest of the South East, meaning that it makes sense for people to make what are often quite long journeys in order to increase their income.

As important as growth, however, has been the gradual redistribution of demand. In fact, total daily London peak arrivals in 1968 and 2006 were similar, but numbers have fallen on inner services and risen on outer services as long-distance commuting, including a significant element from intercity commuting, has increased. Moreover, there has been much higher growth towards the North and West of London rather than towards the South and East. The result is that peak arrivals at Liverpool Street and London Bridge, for example, are still lower than they were in 1968, in the case of the former by 30%! This suggests that in the London area, where congestion is greatest, rail travel is a “dependent variable” responding to factors such as regional planning, house prices, population growth and average earnings.

Options

Given that capacity growth is key, options for improving the capacity of the existing network include longer trains (and platforms), reallocation of capacity from inners to outers – a phenomenally difficult task on a live railway – and increases in line but particularly terminal capacity. It was noticeable that there was now a trend back to creating a set of dedicated

peak fast commuter services for the ring about 70 miles around London (Peterborough, Northampton, Oxford and Swindon) rather than trying to integrate these within the repeating intercity patterns, and this approach had great merit.

Longer trains and platforms form part of the scope of the Network Rail Route Utilisation Strategies (RUSs). Proposals for improvements will be included in the Network RUS documents currently in preparation. ATOC had been working on a list of 25 schemes right across the network, designed to increase capacity at existing bottlenecks at relatively modest cost, and had also called on DfT to plan for about 800 new vehicles for the next five years just in order to “stand still” on growth.

Fares might also be increased and the distance taper, savers and shoulder peak pricing might also be reviewed, though the Government’s was not looking to change the existing RPI+1% policy.

More far reaching planning solutions might include flexible working and changes to development planning policies in the South East. However, the option that many rail planners sometimes look back to, of encouraging dispersal of offices to the regions as the “Location of Offices Bureau” did in the 1960s, is unlikely to happen in the market-orientated world of the 21st Century

So in a very real sense, the high speed rail proposals are in competition with the RUS proposals for Government funds and the priority is capacity on all corridors into London not just a single corridor that an HSL would serve.

Reflections on cost-benefit analysis

If public funds are limited, how should we choose between competing proposals providing alternative solutions to a common problem?

The conventional economic view is cost benefit analysis (CBA), which for transport in the UK is closely tied to welfare benefits, particularly time savings. The Eddington Report supported a move towards including wider costs (congestion, environment) and benefits, particularly those associated with economic growth and increases in GDP. There is also a need to continue to align road and rail CBA analysis and demand forecasting, since in the London area there will undoubtedly be an interaction between road policy (such as road pricing) and rail passenger volumes.

But even with these changes CBA does not by itself deal with the questions of sustainability (which is linked to the choice of discount rate), compensation for losers, or the distribution of the benefits across the population as a whole, all of which are crucial to the political debate. A CBA analysis can only be part of a wider process of evaluating the alternative solutions to the future rail capacity problem in the UK.

Conclusions

In summing up, Richard said that it was important to recall that the UK's rail strategy over the past 40 years had been significantly different from that of other European countries, with the emphasis on upgrading existing InterCity lines to 200 km/h and, through CTRL, providing a link into the European rail network.

An important factor to be taken into account in evaluating high speed rail was the relative importance of higher speed and greater capacity. Developing a strategy for increasing capacity into London along all routes must be a priority, and a high speed rail network may be competing for public sector transport funds.

In deciding between alternatives, CBA will undoubtedly have a role, but the techniques require improvement and CBA cannot provide the sole decision criterion.

Discussion

Robert Cochrane (TEG) spoke to defend the work of and for Eddington. He argued that no one had identified the effects of road user charging on demand for rail, but Eddington's emphasis was on getting the prices right, especially for car, although prices for HGVs may already be about right. Eddington's objection to "grands projets" should be seen as a criticism of politically driven projects, rather than large schemes per se. Robert agreed that the real dominant issue is how we get capacity into and out of London.

Jim Steer said that he had taken the cost-benefit ratios he had quoted from answers to Parliamentary Questions and repeated the citation from Dutch work. He was concerned that we do not identify all the effects of large projects. Given that most of Europe wants better links to London, it would be odd not to let the UK regions have good links to their own capital, and the regions are worried about being crowded off the rail

network by shorter distance London commuter traffic. He noted that Edinburgh-London rail journey times are now rising, partly as longer-distance trains have stops added to fit with other services. He also welcomed the fact that the Eddington team had reviewed the Atkins work on high-speed rail.

Richard Davies noted that a difficulty of large schemes is their inflexibility: in aviation, in contrast, only the runways are fixed. He reminded the audience of the political context of the Eddington report (that the Chancellor is looking for ways of reducing budgets) and noted that cost-benefit analysis can be a helpful means of demonstrating the weaknesses of certain large projects.

Mary Acland-Hood (TEG) was concerned that Eddington's philosophy of identifying requirements while still remaining agnostic on mode was still "predict and provide".

Jim Steer said that projects would still stand or fall on their cases provided the externalities were properly captured: in some cases the decision would be not to provide.

Gradimir Stefanovic wondered how well the tools were calibrated: what were the cost-benefit ratios of Stockton-Darlington, and whether we had "too many intelligent people in a small room". The Spanish are happy with their high speed network: is London getting closer to Europe but further from Britain?

John Preston asked whether there had been an ex-post evaluation of CTRL.

Richard Davies said that, in practice, we tend to use cost-benefit analysis to speed up and slow down project development, rather than to ration funds in the classic capital budgeting approach, in which projects can be scrapped. Countries such as France are much closer to having a national planning process. He also pointed out that elasticities used in appraisal are derived from empirical data, an example of learning from experience.

Jim Steer noted that "we don't do national prestige" in Britain, but the French are still finding adequate *ex post* cost-benefit cases for expanding the TGV network. He felt that the CTRL was not the best of projects but noted that its spare capacity was being used to facilitate long-distance commuting into London and that this "may rescue it". More generally, we do not learn enough from past experience.

Dick Dunmore (Steer Davies Gleave) noted that a six-year-old, given a map of Britain and asked to draw a high speed line from London, would go north: he had tried the experiment several times. What were thoughts on the first step of a network: would this be a short bypass of the bottom of one of the main lines into London, and what would this cost?

Jim Steer said that Atkins had noted that London access would be expensive, and that no one dared put a line on a map, but that engineering work for Greengauge 21 had identified intact corridors into most of the major cities. With stations and depots costing £0.5-1 billion, we should look for and conserve possible sites and space, such as at North Pole.

Graham Nalty (Railfuture) stated that he was firmly behind Greengauge 21, but asked what could or should be done about links between fast-growing centres such as Oxford, Milton Keynes, Peterborough and Cambridge. Huddersfield and Blackburn are more mutually accessible than Oxford and Cambridge. What are the gaps within the regions' networks? Surely a priority for a high speed line would be from CTRL to Birmingham with a link to Heathrow, but why was £500 million being spent on Birmingham New Street without incorporating a high speed station? High speed rail was also needed to reach Staffordshire without the existing conflicts en route.

Jim Steer commented that Oxford-Cambridge would stand or fall on its own merits, and that a high speed bypass to the bottom of the West Coast Main Line would relieve capacity for freight or for outer suburban services to Milton Keynes.

Richard Davies raised the issue of lack of money: as WCRM and CTRL wind down, investment in rail enhancement is actually falling, and there were many current priorities, including station facilities and disabled access.

John Preston took three further questions.

Mark Sullivan noted that Swampy did not disrupt CTRL and that, in continental high speed schemes, rural construction had been seen as affordable because capacity was available on the urban approaches. Do we have the opposite problem in London, Europe's largest city? Who would get the benefits to city centres of high speed rail accessibility: would they all go to developers?

Richard Davies said that planning gain supplement has been proposed but is bitterly fought by developers, as are changes to business rates.

Jeremy Drew responded to *Jim Steer's* "what more does Greengauge 21 need to do to demonstrate the case?" and asked if Atkins really looked at all the alternatives?

Jim Steer responded that Atkins had looked at the only obvious non-rail option, expanding motorway capacity, but they had not looked at dedicated rail freight routes. He thought that Eddington would be devastated if he thought that the outcome of his thinking would be only short term, and that we needed to plan now to achieve in the longer term.

Tom Cohen (Steer Davies Gleave) raised the issue of "*the two-way street*": could high speed rail to/from London suck life out of already struggling regional centres, and do we want, or need, to go ever faster?

Richard Davies agreed that there was a perfectly respectable argument that ever-faster lives might not be a good thing, but the reality seemed to be that, given the choice, people seemed to select them.

Jim Steer noted that, in the real world, speed stimulates activity and that high-speed rail was unique in stimulating urban centres rather than the periphery, but conceded that there was a risk of the two-way road effect as described.

The Impact of Technology on Ticketing and Rail Pricing

Alec McTavish
Director, Policy & Regulation, ATOC
ARUP, Fitzroy Street
20 June 2007

Alec McTavish began by saying that there have been various types of ticket over the years including cardboard, computer printouts with barcodes, magnetic stripe APTIS (BR's All Purpose Ticket Issuing System), mobile phones and smartcards such as Oyster.

Thomas Edmonson, a clerk at Brampton Junction on the Newcastle and Carlisle Railway invented the pasteboard ticket in 1837. Fares regulation was to follow seven years later, although the speaker was not sure if these events were linked. The drive was on to reduce costs and opportunities for fraud. The Edmonson card ticket became an international standard – without any input from the International Union of railways (UIC) or the EU, and lasted until 1990 - over 150 years! It is still used on some smaller railways today.

The product range was only limited by space and imagination. Different types of ticket could be issued to deal with factors such as whether single, return or season, class of travel, origin, destination, adults, children and animals.

Alec said that the talk would cover the following:

- What are the economic drivers of ticketing technology?
- Where is ticketing technology going?
- What is the link between products and technology?
- How did ticketing and products survive privatisation?

These would be illustrated with case studies.

The Economic Drivers of Ticketing

Total National Rail revenue had recently exceeded £5 billion a year and was currently growing at 12% pa.

Revenue	£5,000m
Cost of selling tickets	£ 500m
Cost of ticketless travel	£ 250m

The combined cost of ticketing and fraud at £750m p.a. was double the annual Train Operating Company (TOC) profits.

The provision of useful and timely information was vital. It was difficult to know the total number of people travelling, let alone the number on individual trains. The Association of Train Operating Companies (ATOC) had recently spent £25m on a new system to provide better information.

There is currently significant revenue growth, especially on longer distance services. This led to issues of revenue allocation, which is obviously of great importance to TOCs.

Improved ticketing is seen as being of critical importance to improve customer convenience.

Case Study 1 – National Reservations System (NRES)

In 1995 Telephone Enquiry Bureau provided an expensive service costing 70 – 80p per call and information was looked up from printed timetables and fare manuals. The call quality was not very high. Alec explained how figures for the number of calls could be manipulated by placing the monitoring machine before the constraint rather than after it.

By 2002 the cost had reduced but it was still costing around £37m p.a. Now in 2007 the quality of service has improved but the cost has halved and only a small proportion of contacts are by phone. The total number of contacts per four-week railway accounting period in millions is:

Internet Online Journey Planner	5.8
Text messages	0.1
Train Tracker	0.4
Live Departure Boards	1.2
Phone calls	<u>1.7</u>
Total	9.3

The value of advertising on the ATOC internet site is greater than the cost of operating the service.

Case Study 2 – Barcode Tickets

The customer purchases a ticket on the internet and prints it off at home. Two dimensional bar codes are used, which can provide much more information than single dimension ones. They are best used with reserved seats because there is obvious scope for fraud from photocopying forms. Passengers can confirm the printout is valid by providing a matching identity document or credit card. An advantage is that the system compatible with the industry's back office systems.

Case Study 3 – Mobile Phones

There are a number of passenger-focused applications. Mobile phones can be used to provide real time travel information, advise details about disruption, keep details of favourite journeys, advise about engineering works and be used for journey planning.

Mobile phones can also be used for ticketing by displaying a barcode. This can then be read by ticket barriers, or by hand-held readers.

Case Study 4 – Smartcards

Oyster cards are now widespread in London providing zonal tickets and Pay As You Go (PAYG) although the latter is not yet available on most of National Rail. However from January next year it will be available on part of c2c, One Railway and Chiltern. From January 2009 it will be throughout London. This will require all gates to be compatible and also validators at stations without gates, as most of the National Rail is only partially gated unlike the underground network, which is virtually fully gated. It is important for customers to remember to touch in and touch out in order not to pay the full fare.

There are a number of issues with smartcards in London.

Oyster is a proprietary standard and hence expensive, so there is interest in the ITSO standard, which would apply across all operators.

Replacing a vast number of point-to-point fares with a much smaller number of zonal fares will simplify matters but expose a number of historical precedents. For example, fares in west London have traditionally been more expensive than those in southeast London. There can also be steep increases for a short increase in distance if a zonal boundary is crossed.

Banks and mobile phone operators are also interested in using smartcards as electronic purses. This will increase the number of people using them and should help reduce costs.

Who has the cash? The interest received on fares paid in advance is significant. Even more importantly, there can be major cash flow and liquidity issues if a party other than the operator holds cash from fares paid in advance.

Revenue allocation is very important. The information from smartcards is much more detailed than that currently available. However, better data may result in losers as well as winners from any changes in allocation and the former will not be too happy about the changes.

It will enable operators to know their customers better.

How Did Ticketing Survive Privatisation?

The rail ticketing system has survived privatisation with provisions for a continuation of network benefits such as interavailability, through and zonal tickets included in franchise agreements. An ex BR system called ORCATS is used to allocate revenue between different operators whether in series, providing competing services on the same route or on parallel competing routes. It has a number of imperfections, for example some of the profiles used to allocate demand by time of day are based on 1981 data.

Bidder confidence was obviously crucial to privatisation and auditors were insistent in checking and understanding the systems. It was also important to be able to deal with new Open Access operators and to have systems in place to deal with disputes. Operators can use survey data if they are not happy with the results from ORCATS.

Alec concluded by saying the ticketing had been a remarkable success, being one of the least problematic areas of privatisation.

Case Study 5 – The Rise of Yield Management

Airlines have employed yield management for many years. Rail Settlement Plan (RSP), which is part of ATOC, introduced a new reservation system two years ago at a cost of £35m and some TOCs have invested in yield management systems.

The result has been higher yields and a significant growth in advance purchase sales, increasing from £288m in 2005/6 to £370m in 2006/7. Internet sales also rose by nearly £200m over the period. Load factors have also increased at the longer distance operators.

National Rail Sales Revenue

Sales revenue by product type (£m)

	2005/6 Total	2006/7 Total	Change
First – full	297	329	11%
First – reduced	52	44	-15%
First - advance purchase	11	20	82%
First – seasons	50	56	12%
Standard – full	1,193	1,325	11%
Standard - reduced	1,494	1,670	12%
Standard - adv purchase	277	350	26%
Standard - seasons	1,168	1,255	7%
Other	63	87	38%
Total	4,604	5,137	12%

Where is Technology Going?

The drive to reduce cost, improve passenger convenience and grow revenue will lead to the following:

- Moving retailing out of stations
- More internet selling
- The advance of the mobile phone
- More smartcards, but possibly in mobile phones
- More gatelines and validators.

The RSP envisages a significant shift in sales mode between now and 2013/14:

	Now (£5.0bn)		2013/14 (£8.0 bn)	
<u>Retail Channel</u>				
Station Based	<u>70%</u>	<u>3,510</u>	<u>50%</u>	<u>4,010</u>
Ticket Office	60%	3,010	20%	1,605
Vending machines	10%	500	20%	1,600
Autorenewal			10%	800
Non Station	<u>30%</u>	<u>1,500</u>	<u>50%</u>	<u>4,010</u>
On Train	12%	600	10%	800
Internet	6%	300	25%	2,010
Mobile Phone			5%	400
Call centre/agents	12%	600	10%	800
<u>Fulfilment media</u>				
Direct	<u>99%</u>		<u>40%</u>	
Magnetic stripe	85%			
Mag stripe via POS	14%		40%	
Indirect	<u>1%</u>		<u>60%</u>	
Smartcard			20%	
Self print			20%	
Mobile			20%	
<u>Validation method</u>				
Visual	40%		30%	
Un-validated	30%		10%	
Gatelines/validators	30%		60%	

Questions

Operators use two sizes of tickets. Most were credit card size but a number of longer distance tickets were airline style ATB tickets. Surely this was expensive and not very convenient?

Alec McTavish said that the reason for the larger size was that at the time it was possible to accommodate a lot of additional information on the magnetic stripe on the back of the ticket. Some gates would accept both formats but the airline style format was in any case being phased out.

Dick Dunmore (Steer Davies Gleave) said that most airlines planned to go ticketless by the end of the year and noted the advances in yield management where there was no longer an expectation of a standard fare, at least for leisure traffic air travel. There was a significant difference with the railways between long and short distance flows where the former were much more amenable to yield management. Were we seeing a divergence or a convergence?

The speaker said that barcode tickets required additional checks to prevent fraud by duplication – these was not possible for urban railways owing to the volume of traffic. He noted that Edmonson tickets had lasted for 150 years, APTIS for fifteen and current systems probably for a much shorter timescale.

David Starkie (Economics Plus) noted that smartcards have enabled greater differentiation by time and the expense of less differentiation by location. We are therefore throwing away the ability to fine-tune individual fares in London.

Peter White (University of Westminster) noted the importance of ORCATS as a means of allocating revenue to new Open Access operators. How fair is this seen by existing and new operators?

Alec replied that any new Open Access operator was advised to learn the industry dispute rules, which generally worked very well and would correct any irregularities.

Peter Gordon (DeltaRail) followed up by commenting that in BR days certain sub sectors were very adept at “ORCATS raiding” whereby timetables were designed to maximise shares of revenues than be optimal for the passenger and that things are probably better now!

Stephen Bennett (Retired SRA) said that he had recently been at a talk at which Richard Bowker said that TOCs should lead the industry more efficiently but noted that they had failed in invest. Many things could have been done years earlier. Have we turned the corner?

The speaker said that operators needed to see a return on their investment. What happened if the payback period was greater than the life of the franchise? Work was being done by the Government and other parties to help remedy this.

Andy Heslop (DeltaRail) noted that there was a conflict between policy drivers, for example there could be congestion at stations whilst people were waiting for their allocated train. The left hand didn't always know what the right hand was doing and there were questions of social inclusion.

Alec said that there were steps to deal with the latter – for example there were one million Freedom Passes in London. Also technology had to be inclusive – for example not relying on everyone having a mobile phone.

Dick Dunmore gave the example of an unusual transaction, which could only be done by a foreign language call centre. Would there be a trend to being able to do everything on the web and/or greater international standardisation and commonality?

Alec said that it was important to keep things simple.

Peter Gordon commented that the move to compulsory reservation was off-putting to some people and he knew colleagues who did not travel on certain services as a result. He also said that he was currently working on programming automatic ticket barriers and concurred with comments about the complexity of ticket restrictions.

Robert Cochrane (Independent consultant) noted that there had been a view that the introduction of the Octopus card in Hong Kong had raised social exclusion issues but that it was now widely welcomed and the need to only touch in and out was seen as simple for older people. He then raised the question of revenue protection.

Alec agreed that this was very important and needed to be addressed.

Gregory Marchant (Retired SRA) noted advances in pricing. Whereas airline passengers no longer expected a standard fare this was the case with the railways and this fare was often regulated. How do you challenge that?

The speaker noted that walk-up fares were still contributing a very large proportion of revenue, even for longer distance operators and were the highest yield fares.

Peter Gordon asked about problems with connections where passengers could lose out if they could not make their booked service. He also asked whether it was possible to apply yield management to flows requiring travel by more than one TOC.

Alec said that in general there were better passenger rights on UK railways and that the European Commission was looking to spread a watered-down version of this to other European countries. He said that compensation regimes could be improved, for example by giving a refund for each delayed service the passenger had travelled on rather than applying a blanket 5% discount.

Multi-operator flows could be dealt with by co-operation between operators. At the moment a “lead operator” sets the fares for journeys requiring travel with more than one operator.

It was also noted that the speaker had said that yield management had increased revenue by a third – mostly on longer distance services. He was surprised by the size of the windfall.

Alec noted that there were now revenue share arrangements between operators and the Government with almost 90% of incremental revenue going to the Government in extreme cases. The Government obviously wished to incentivise operators so had to make it worthwhile to grow revenue. There was a strong desire by TOCs to grow load factors.

Revenue gain was increasingly going to the Government as this was increasingly being achieved in any case by the amount of revenue assumed in bids. He noted that self-printed tickets were fine with reserved seats but that people could obviously photocopy tickets! It was interesting that the German Railways using a high technology approach to checking such tickets, whilst the Norwegian railways adopted a much simpler approach to reading tickets – which nonetheless appeared to work well!

Dick Dunmore noted that operators did not have much personal information on passengers – compare this with airlines.

Robert Cochrane noted that unlike the airlines the railways were an open system and by necessity had low quality revenue protection without ID checks.

TEG Committee 2007/8

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TRANSPORT ECONOMISTS' GROUP

The Transport Economists' Group, formed in 1973, provides a forum for people involved in transport economics to meet regularly and discuss matters of mutual interest. Membership is open to economists working in transport and others whose work is connected with transport economics.

The aim of the Group is to improve the quality of transport management, planning and decision making by promoting lectures, discussions and publications related to the economics of transport and of the environment within which the industry functions.

Meetings are held every month from September to June (except December) at Arup's Central London HQ at 13 Fitzroy Street. The meetings consist of short papers presented by speakers, drawn from both within the Group's membership and elsewhere, followed by discussion.

The Group's Journal, 'The Transport Economist', is published three times a year reporting on meetings and other activities of the Group. It reviews recent publications of interest and contains papers or short articles from members. The editor welcomes contributions for inclusion in the journal, and can be contacted at peter.gordon@deltarail.com

The current membership of over 150 covers a wide range of transport modes and types of organisation. Members are drawn from transport operators, consultants, universities, local and central government and manufacturing industry. All members are provided with a full membership list, updated annually, which serves as a useful source of contacts within the profession. Applications from people in all sectors are welcome.

Applications for membership should be made on a form obtainable from the Membership Secretary at gregorymarchant.teg@btinternet.com.

Alternatively, an application form can be downloaded from the Group's website: www.transecongroup.org.uk.

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Details of meetings are on our website at

<http://www.transecongroup.org.uk/meetings.htm>