Briefing
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High-speed rail in the EU

SUMMARY

High-speed rail (HSR) started developing in Europe in the late 1970s, first in France and Italy, and subsequently in Germany, Spain and the UK, among others. In the early stages, its development took place largely at national level. The EU started providing specific support to European rail projects with the establishment of the trans-European transport network (TEN-T) in the early 1990s, some priority projects of which concern HSR. The EU also promotes HSR development through other means, including technical harmonisation measures, security systems and funding instruments. The importance of high-speed rail has increased over time in the EU in terms of network length, number of passengers carried and modal share. Nevertheless, EU Member States each have their own specific characteristics in this regard.

The impact of HSR on economic growth and sustainable regional and urban development is not easily measurable, each project having to be analysed individually. HSR can contribute significantly towards meeting some of the objectives – notably on energy efficiency and reduction of emissions – set by the 2011 European Commission White Paper on Transport. To this end, specific targets for developing the HSR network are set out in the Roadmap to a Single European Transport Area. Worldwide, the development of HSR lines could also provide commercial opportunities for the technological know-how of the EU rail industry on foreign markets. However, the sector's future depends on a diverse range of political, economic and technical factors or challenges, among them the increasing costs of rail works and infrastructure, varying rates of investment returns, and the adverse impacts of the recent economic crisis. In the context of budgetary constraints, public authorities in some EU countries have questioned HSR's overall added value.

In this briefing:

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Introduction

At the beginning of the 1980s, high-speed rail (HSR) was a novelty in Europe, to which the public had limited access. Between 1985 and 2013, the HSR network expanded exponentially, initially from two, to more than ten countries today, and is nowadays a relatively widespread means of transport.

HSR offers reduced travelling time between the cities served by its network and can complement other transport modes (mainly air and road), or compete with them.

Besides high-speed trains and rolling stock, HSR also requires special infrastructure, including dedicated or upgraded lines, signalling systems and specific operating rules.

Historical overview of HSR development in Europe

After having launched the first *Pendolino* (tilting) train[1] for public service between Rome and Ancona in 1976, in 1977 Italy pioneered the use of high-speed rolling stock on the *Direttissima* line between Rome and Florence. However, progress was slow and it was not until 1992 that the line between these two cities was completed and able to handle speeds of up to 250 km/h.

France played a key role in HSR development, after its government decided to build a new and more direct route on its major north-south transport corridor, which would link Paris and Lyon and serve 40% of the French population. The first section of this 430 km-long HSR passenger line (*ligne à grande vitesse*) opened in 1981 and became fully operational in 1983. The extension towards the Mediterranean Sea (the cities of Valence and Marseille) was completed in 2001. Other key HSR routes from Paris followed: towards the west in 1989-90, with the intention to enhance services to Brittany and the south-west of France via the cities of Le Mans and Tours, respectively. HSR development continued northwards in 1992-94 and eastwards in 2007.

In turn, Germany and Spain launched their own HSR projects. Germany adopted a double-policy approach, building new HSR and upgrading its existing railway infrastructure to allow high-speed trains to run on it. After the opening of new sections in 1991, notably between Hannover and Würzburg, the first InterCity Express trains (ICEs) were introduced. Subsequent construction followed in 1998 with the Hannover-Berlin line, in 2002 with the first 300 km/h line between Cologne and Frankfurt, and in 2004, with the HSR between Hamburg and Berlin. Spain drew up a comprehensive new rail plan in the late 1980s and developed further plans in 1993 and 1997. Its first 471 km-long HSR line – between Madrid and Seville – was opened in 1992, reducing the travel time between them by two thirds. A new HSR line between the capital and Barcelona opened progressively between 2003 and 2008, and a further one from Madrid to Valladolid was finished in 2007. As of 2013, Spain has Europe's longest and the world's second longest (after China's) HSR network in terms of length.

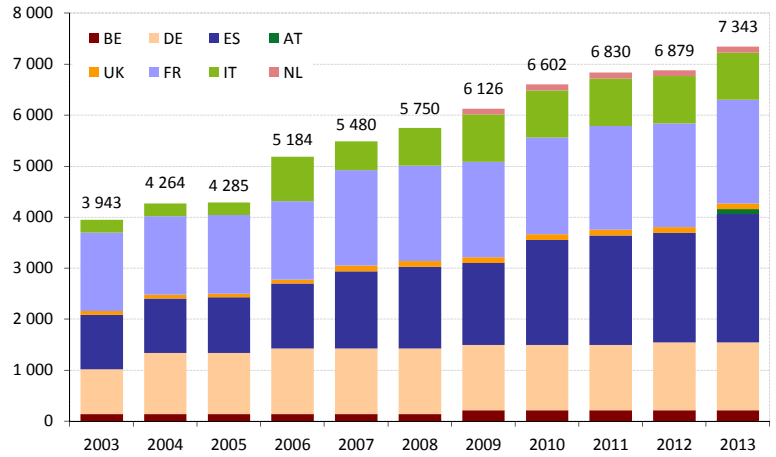
The United Kingdom opened its first purpose-built HSR, the first section of the Channel tunnel rail link now called High Speed 1, in 2003. It was opened in full to London's St. Pancras Station in 2007. Currently, HSR services are offered in many other EU Member States, with different maximum operating speeds: Portugal, Belgium, the Netherlands, Sweden, Finland, Poland and Austria.

Facts and figures

Time savings

Dramatic time savings between urban centres served by HSR are its most evident advantage. For instance, the Madrid to Seville journey time has fallen from 6½ hours to just over 2½, while the trip from London to Paris on the Eurostar now lasts a little over 2 hours, less than half the previous combined time for rail and sea travel. Similarly, the journey time between Paris and Marseille has fallen from over 6½ hours in 1975 to slightly more than 3 hours currently. In general, experts estimate that on specially designed HSR lines, time savings vary between 30% and 60% off the previous travelling time. By comparison with road transport and particularly on short journeys up to 80-100 km, these savings can however be offset in part or wholly by the additional time passengers need to reach their final destination. When compared with air transport, HSR is deemed to be most competitive for journeys up to 800 km.

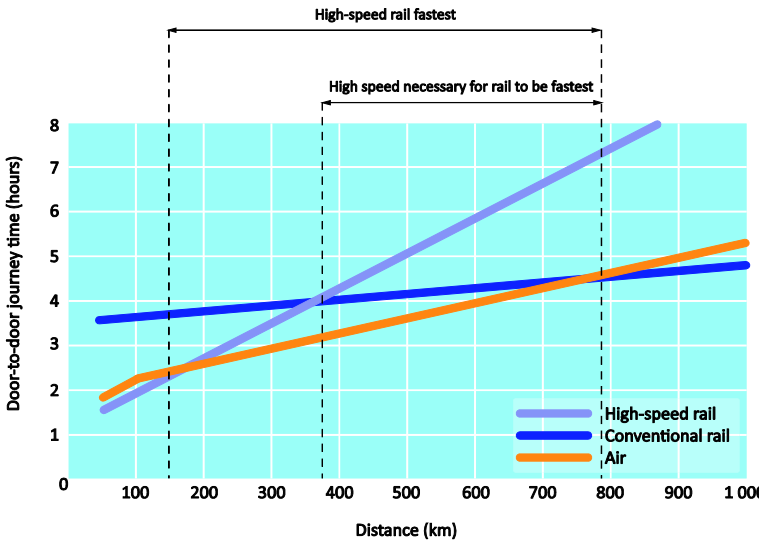
Figure 1 - Length of HSR network (*)



Data source: EU Statistical Pocketbook, 2014.

(*) Lines or sections of lines on which trains can go faster than 250 km/h at some point during the journey.

Figure 2 - HSR, conventional and air journey times v. distance



Data source: High-speed Europe - European Commission, 2010.

The demand

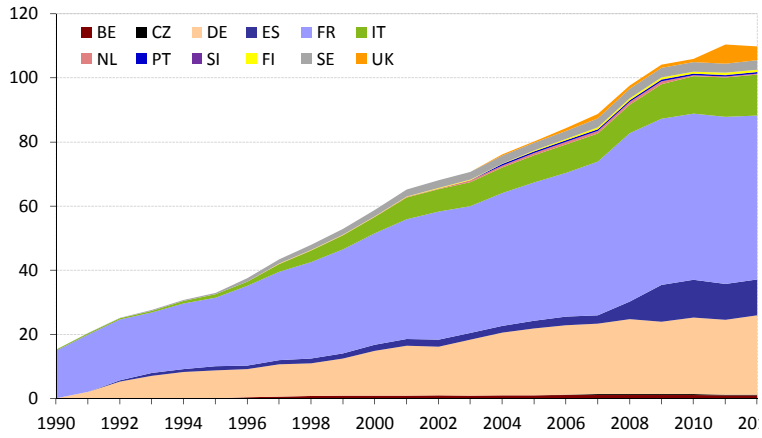
The HSR network has expanded ten-fold in Europe, increasing from 643 km in 1985 to 7 343 km in 2013. This trend has also been accompanied by an increase in HSR speed, frequency and capacity, resulting in a boost to passenger demand for HSR services in the EU: from roughly 15 billion passenger-kilometres (pkm^2) in 1990, demand reached about 110 billion pkm in 2012.

Against this backdrop, there are significant differences among EU countries. For instance, in France (where the increasing trend of HSR demand has been the most pronounced) HSR passenger kilometres rose from almost 15 billion to 51 billion between 1990 and 2012. That said, since 2008, HSR demand in France has weakened slightly, which is also true for Spain, Portugal, Belgium and the Netherlands. In Germany, the impact of HSR has been sizeable but less impressive than in France: in 2012, its HSR demand was more than 24 billion pkm, double the amount in 1999. The sharpest increase in HSR demand was in Spain, where it registered five-fold growth between 2005 and 2010. Nevertheless, Spain started at very low levels and, like Italy, has more modest absolute levels of pkm travelled. In 2010,

with approximately 106 billion pkm travelled, HSR services represented a quarter of all rail passenger travel in the EU (compared with roughly 16% in 2000 and 21% in 2005).[3]

The impact of HSR on transport modal shares on specific lines can be very pronounced. According to a 2004 report, HSR services accounted for 91% of the rail and air markets combined between Paris and Lyon, and for 89% of the market between Paris and Nantes. The Eurostar service between London and Paris and Brussels also brought about an important shift towards HSR: it represents 71% of the London–Paris rail-air market and 64% of that between London and Brussels.[4] According to a 2006 report prepared for the Commission,[5] the same trend was observed on the Madrid–Seville route, after the opening in 1992 of its HSR link: the share of (conventional) rail increased from 14% to 52% (HSR), while that of air decreased from 11% to 4% and that of bus and car from 75% to 42%. Experts generally estimate that HSR services take at least 70% of the rail–air market on journeys under three hours.

Figure 3 - HSR transport expressed in billion pkm (*)



Data source: EU Statistical Pocketbook, 2014.

(*) HSR transport covers all traffic with high-speed rolling stock (incl. tilting trains able to travel at 200 km/h). This does not necessarily require high-speed infrastructure.

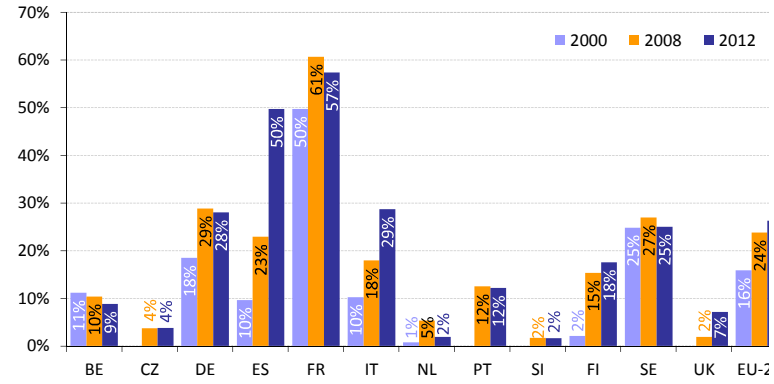
The operators

HSR passenger services in the EU are provided primarily by national railway undertakings, which generally operate conventional and high-speed train services in their respective countries at the same time: this is the case in Sweden, Germany, Spain and Italy. Some of these undertakings have set up joint subsidiaries dedicated to exploiting HSR international routes.

This is the case of Eurostar International Limited, for example, which has been operating between the UK, France and Belgium through the Channel Tunnel since 1994. This is also the case of Thalys International, which started providing HSR passenger services in 1996 on behalf of the French (SNCF), Belgian (SNCB), German (DB) and Dutch (NS) national railway undertakings between Paris, Brussels, Cologne and Amsterdam. Another HSR joint subsidiary, called TGV (*Train à grande vitesse*) Lyria, was created in 2002 by SNCF and the Swiss Federal Railways (SBB-CFF-FFS) to operate services between France and Switzerland. The railway privatisation process which took place in the UK gave domestic private railway companies the opportunity to become HSR operators. These so-called 'train operating companies' can provide services on condition they hold a licence. Although relatively numerous, they are sometimes linked to a more limited number of larger transport groups, such as FirstGroup or Stagecoach Group. New private operators are also emerging in other countries. Nuovo Trasporto Viaggiatori (NTV), for instance, was the first new entrant on the Italian market. Set up in 2006 and owned by Italian private investors with the participation of France's SNCF (20%), NTV started HSR services in 2012 between major Italian cities.

In order to facilitate cross-border HSR services, ensure seamless end-to-end travel for their customers and compete with low-cost air carriers, seven rail undertakings (DB, SNCF, SNCB, Eurostar, NS International, Austria's ÖBB, and SBB-CFF-FFS) plus two associate members, Thalys International and TGV Lyria, formed an alliance in 2007, called Railteam. This aimed to simplify passengers' rail connections through the use of a single website and five rail hubs in Lille, Brussels, Cologne, Frankfurt and Stuttgart.

Figure 4 - Share of HSR in total passenger-km in rail transport



Data source: EU Statistical Pocketbook, 2014.

HSR freight transport: the EURO-CAREX plan

With the exception of parcel and mail transport services, which have been operated since 1983 on specific HSR lines by TGV in France, HSR freight transport is still the 'poor relation'. Nevertheless, new projects are emerging in this field. Created in March 2009, EURO-CAREX is an international association bringing together public and private partners: local and regional authorities, airport and rail infrastructure operators and most importantly, air freight operators. Its plan foresees a shift of air freight, which is currently transported by a mixture of short to medium haul flights (50%) and trucks (50%), to HSR. The project has the backing of several parcel delivery companies and of four airports that could be served in a first phase (2015-17): Roissy Charles de Gaulle, Lyon Saint Exupéry, Liège and Amsterdam Schiphol. Subsequently, it will also link with the London area and Germany (2018-19). To provide the service, 20-25 train sets will be put into operation, each train being able to transport roughly 100 tonnes of freight, which would otherwise require 6-7 lorries or 3 cargo Airbus A310s. To this end, it will be necessary to build new dedicated air-rail terminals in the vicinity of HSR lines and airports, and to manufacture specific rolling stock able to transport air pallets and containers with a guaranteed short loading/unloading time. A future extension of the EURO-CAREX network to Italy and Spain is also planned.

The EU policy framework

Although the 1957 Treaty of Rome provides for a common transport policy, efforts to establish a comprehensive EU framework for HSR development are much more recent. Early HSR development therefore chiefly reflected national economic and political considerations of the Member States concerned and was mainly financed through resources allocated from national budgets. Nevertheless, HSR is now treated within the broader context of EU transport and rail policies and is an important element in the Commission's 2011 White Paper, 'Roadmap to a Single European Transport Area'.

Among other objectives, it sets the goals of completing a European HSR network by 2050, tripling the length of the existing HSR network by 2030 and the maintenance of a dense railway network in all Member States. By 2050, most medium-distance passenger transport should be carried by rail. Considered an energy-efficient mode, HSR is also supported by the EU as a means capable of contributing to the goal of achieving a 60% reduction in transport emissions by 2050. EU support for HSR has many aspects: development of the network, implementation of harmonisation and security measures, financial support and gradual liberalisation measures.

The trans-European transport network

The TEN-T was established in the early 1990s as a broad policy instrument in the field of transport, alongside similar instruments for telecommunications and energy infrastructure. Articles 170-172 of the Treaty on the Functioning of the European Union grant competences to the EU to contribute to the establishment and development of trans-European networks in these areas. In the field of transport, TEN-T aims at creating a single, coherent and multimodal network that can integrate land, sea and air transport throughout the EU. In order to ensure a coordinated development of the transport networks, nine core network corridors have been identified.

The EU also defined priority transport infrastructure projects of critical importance in terms of size, impact and sustainability; since the EU's 2004 enlargement, these projects have increased to 30, of which 18 relate to rail and 14 specifically to HSR.

Technical harmonisation measures and security systems

In order to achieve the interlinking and interoperability of national HSR networks, the EU has defined technical harmonisation measures. They set out provisions concerning the HSR systems, parameters, inter-operability constituents and procedures necessary to ensure the compatibility of the trans-European HSR network. For this purpose, the EU laid down technical specifications for interoperability (TSIs), which were defined by the European Association for Railway Interoperability, a joint body bringing together representatives of infrastructure managers, railway companies and industry. The first six sets of TSIs were adopted by a decision of the European Commission in 2002. Another set of decisions concerning TSIs was adopted in 2007-08.

Definition of HSR

The EU defines HSR on the basis of technical regulatory requirements concerning infrastructure and rolling stock, but from the specific perspective of interoperability. Annex I of Council Directive 96/48 EC on the interoperability of the trans-European HSR system indicates that HSR infrastructure comprises:

- specially built HS lines equipped for speeds generally equal to or greater than 250 km/h,

- specially upgraded HS lines equipped for speeds of the order of 200 km/h, and

- specially upgraded HS lines which have special features as a result of topographical, relief or town-planning constraints, on which the speed must be adapted to each case.

HS rolling stock must be designed in such a way as to guarantee travel:

-at a speed of at least 250 km/h on the lines specially built for HS, while enabling speeds of over 300 km/h to be reached in appropriate circumstances;

- at a speed of the order of 200 km/h on existing lines which have been or are to be specially upgraded;

- at the highest possible speed on other lines.

Security on HSR is provided by the European rail traffic management system (ERTMS). Developed and co-financed by the EU, this unique system contributes to making European HSR interoperable. One of its components, the European train control system (ETCS), limits potential mistakes by train drivers. The European Railway Agency (ERA) also plays a key role in ensuring the safety, efficiency and operability of the European rail network.

Financial support instruments

The EU provides financial support to rail and HSR chiefly through its European structural and investment funds (ESI), notably the European Regional Development Fund (ERDF) and the Cohesion Fund. These regional policy instruments are aimed at narrowing the development imbalances between regions and Member States and pursue broad economic, social and cohesion objectives. Additional EU funding sources can be made

available through the research and innovation programme Horizon 2020, and in particular through its Shift2Rail technology initiative.

According to Article 3(1)(c) of Regulation 1301/2013, the ERDF supports investments in infrastructure providing basic services to citizens in the area of transport. Investments in the TEN-T are also part of the thematic objective 'Promoting sustainable transport and removing bottlenecks in key network infrastructures'. Financial support to the TEN-T is also provided by the Cohesion Fund, which focuses on priority projects of common interest, with particular European added value. From a total budget of €63 billion for the 2014-20 period, the Cohesion Fund devotes a specific financial envelope of €11 billion to support transport infrastructure for eligible Member States through the Connecting Europe Facility (CEF). The CEF is the new instrument for TEN projects in the fields of energy, telecommunications and transport. With a budget of €26 billion to co-fund TEN-T, it provides higher co-funding rates for identified priorities (for instance, cross-border connections and multimodal platforms), and allows for the use of innovative financial instruments. The Regulation establishing the CEF includes a list of priority projects, some of which concern HSR works or studies on pre-identified TEN-T network corridors. It also sets the limits of EU financial assistance (Article 10). The recent adoption by the EP and Council of the Regulation on the European Fund for Strategic Investments (EFSI), which supports projects in a broad range of areas including transport, reallocates €2.8 billion from the CEF budget and €2.2 billion from the Horizon 2020 budget to the €16 billion EFSI guarantee fund.

Liberalisation measures

In order to offer efficient and competitive rail services, the EU has introduced various sets of measures, known as rail packages, allowing the gradual opening of its rail transport market to competition. The first railway package (2001) introduced the current regulatory framework and opened the international freight market to competition. The second package (2004) created the ERA and introduced a common approach to rail safety. The third package (2007) is of direct relevance for HSR since it dealt with passenger transport and provided for the opening of the international passenger market. The proposals of the European Commission for the fourth railway package, still being debated, include both technical and market liberalisation pillars. The latter aims at opening domestic passenger markets, giving access to all operators and introducing mandatory tendering as of December 2019, with the possibility of some restrictions.

European Parliament

In the framework of the TEN-T policy, the EP is supportive of HSR and rail in general. In its 2009 resolution on the future TEN-T policy, Parliament called upon the Commission and the Member States to give priority to rail and to key projects relating to the main rail routes, focusing particularly on cross-border connections with the Member States that had recently joined the EU and third countries. In its legislative resolution, adopted with a large majority in July 2012, on the proposal for a directive establishing a single European railway area (recast), it insisted on the importance of Member States developing their national railway infrastructure taking into consideration, where necessary, the general needs of the Union. The EP invited the Member States, after consulting with all stakeholders, to draw up a rail infrastructure development strategy, based on sustainable financing of the railway system.

Pros and cons of high-speed rail: competing views

Public authorities' perspective

For HSR, investment costs are paramount: the construction of infrastructure, network operation and maintenance, as well as the construction and exploitation of rolling stock all imply high costs which rely at least partially on public subsidies. However, resources for future financing of HSR infrastructure by public authorities appears as a major challenge, especially considering the current limited scope for budgetary manoeuvre in the Member States. HSR investment costs have varied widely over time and geographical location. According to an expert who gathered data on 45 HSR projects, the range in costs per kilometre, excluding planning and land costs, varies from €6 to €45 million, with an average cost of €17.5 million. Another report from the International Transport Forum and the OECD reaches similar conclusions with slightly different costs. The highest costs were found in Germany, Italy and Belgium, the lowest in Spain and France. Moreover, these costs show an increasing trend: for instance, the 1981 Paris-Lyon HSR required an investment of €4.7 million per kilometre whereas the costs per kilometre of the TGV *Méditerranée* opened in 2001 were €12.9 million. A 2014 report of the French Court of Auditors confirmed this trend. According to experts,[6] the rate of return on HSR investments, depending among other things on the demand for HSR services, varies considerably over time and location. In France, TGV *Atlantique* shows a return of 7% but TGV *Nord* registers only 2.9%. Their social rate[7] of return is higher, at 12% and 5% respectively. Specialists tend to consider that future HSR projects are unlikely to offer the same profits as those provided by early HSR investments.

Recently, the ADIF, the Spanish company responsible for the administration of rail infrastructure and rail traffic management, also declared its concerns regarding the Spanish HSR network's profitability. In his statement, the head of ADIF pointed to the rising cost of rail works in his country and to the insufficient use of HSR: 24 million passengers/year in Spain compared with 160 million in Germany and 120 million in France. In Portugal, a project concerning the development of an HSR link for freight and passengers between Lisbon and Madrid was suspended in 2012, after the Portuguese Court of Auditors stated that the project was not financially viable.

The 2014 report of the French Court of Auditors on HSR

A 2014 report on HSR by the French Court of Auditors assesses the performance and the contribution of HSR to society as a whole. It points out that on some routes the conditions for HSR relevance are not met: for instance, the presence of large population areas, high train frequency and occupancy rates, few or no intermediate stops. According to this report, the development of HSR in France has been accompanied by deterioration in conventional lines. As a consequence of a recent change in consumers' behaviour, who focus more on cost than on time savings, the occupancy rate on HS trains has stagnated since 2008 at roughly 54 billion pkm/year. Competition with low-cost air carriers, coaches and car-sharing schemes is therefore becoming fiercer. Coupled with an almost six-fold increase in infrastructure costs, HSR profitability for SNCF fell from 28% of its operating margin in 2005 to 12% in 2013. The French decision-making process leading to building new HSR lines was also seen as being biased in favour of HSR. In its recommendations, the Court calls for better integration of HSR with other mobility options, and for a stronger focus of public financial resources on network maintenance rather than on development of new projects.

In recent questions to the Commission specifically concerning HSR, a number of MEPs have highlighted the issue of HSR's economic sustainability. Their concerns related either to specific controversial HSR projects or to national HSR networks.

Economic, regional and urban impact

HSR also enables the EU's research, development and industry communities to prove their capacity to develop and implement innovative rail technologies. The EU rail industry has made technological achievements and improvements for both HSR infrastructure and rolling stock, which can create export opportunities in a world market on which competition, especially from Asia, is increasing.

China's export ambitions of HSR technology

Today, China's HSR network is the largest in the world, exceeding 15 000 km. Over recent years China's ambitions in HSR technologies have been extending fast and far beyond its borders. After it completed its first foreign project in Turkey, a 530 km HSR line between Istanbul and Ankara, in December 2014 China signed a memorandum of understanding with Hungary, Serbia and Macedonia for the construction of an HSR link between Budapest and Belgrade. This line would also be extended to the Greek port of Piraeus, where a Chinese shipping group already owns a concession to run two cargo container terminals. Moreover, in October 2014, China and Russia signed a memorandum of agreement for a 7 000 km HSR project linking Beijing and Moscow, with an estimated budget of US$230 billion.

In Europe, the broader effects of HSR on economic growth are contested. The increased accessibility of cities served by HSR could enlarge markets and reinforce the productivity of firms situated within a newly connected region. This, in turn, could boost the economic specialisation of the regions concerned as well as the overall economy. Some studies indicate that the expected economic stimulus brought by HSR development should not be overestimated and would lie within the range of 1-3% of GDP.[8] For UNIFE, the European Rail Industry Association, cost savings resulting from the modal shift towards HSR have also to be taken into account in terms of gains in time, energy or other externalities. According to an ADIF study quoted by UNIFE, the new HSR line between Madrid and Barcelona generates about €325 million in public savings per year, compared to the previous situation.

Studies have been carried out to assess the potential impact that investing in HSR could have on reducing development imbalances between the central and the peripheral areas of large cities, by boosting regional/urban investment and employment. Studies relating to the influence of the Paris-Lyon and south-east high-speed lines in France show that the answer to these questions is complex: some economic actors saw growth in demand (for instance, consultancies and hotel businesses outside the Lyon region), and Lyon's medium-sized enterprises in particular seized the opportunity to enter the Paris market.[9] Subsequent studies concerning France showed that HSR presence was only one of the factors in determining businesses' location and that its impact was limited in terms of job creation and even relocation of economic activities.[10] Other studies focusing on the UK's Ashford area and France's newly created Euralille district suggest that the presence of new HSR lines and stations is not sufficient to ensure the success of urban regeneration. To achieve this effect, HSR needs to be complemented by supporting policies from the public planning and development authorities and by the presence of good internal transport links, including tramway links acting as 'feeders' to HSR stations.

Some experts maintain that the presence of HSR may even deepen the gap between city centres and their peripheries. According to one such expert,[11] HSR can bring out the competitive advantages of big cities in terms of economic development and services and thus help reinforce the fragmentation and urban concentration of territories. Connecting places to an HSR network can also harm their property markets and give rise to speculative operations, this expert further argues. Moreover, regions not served by HSR can be affected by the ageing of their – frequently less profitable – conventional lines and by delays in their maintenance and renovation. Lastly, cities crossed by HSR but not served by it, can be affected by the so-called 'tunnel effect', which reinforces their socio-economic inequalities.

Environmental impact

Out of the 29% of $C0_2$ emissions attributed to transport in the EU in 2012, only 0.6% came from rail, compared with 12.9% from civil aviation and 71.8% from road transport. In the same year, railways transported 6.5% of passengers and 10.8% of freight. Although it is not easy to measure the exact impact of HSR on air quality, data like those provided by the French ADEME (Agence de l'environnement et de la maîtrise de l'énergie) indicate that its carbon footprint is low: on a journey between Paris and Marseille, HSR generates 2.7 grams of CO_2 per pkm, individual cars produce 115.7 and airplanes 153.[12] It is nevertheless true that these comparisons could be affected by the way in which electricity is produced (fossil fuels, renewables or nuclear energy), the energy and carbon emissions used for constructing the rail infrastructure and the occupancy rates of the vehicles compared. HSR compares well also in terms of energy consumption: according to studies carried out by two independent institutes INFRAS (Zurich) and IWW (University of Karlsruhe) for the International Union of Railways (UIC), the energy used by HSR measured in equivalent litres of petrol for 100 pkm is 2.5 compared with 6 for cars and 7 for aircraft.

But HSR also has other impacts on the environment: barrier effects, particularly for animal species, visual intrusion, loss of agricultural land, and noise. These impacts are sometimes criticised by NGOs or landowners' interest groups. In order to mitigate the noise effects, tunnelling operations are carried out and noise barrier constructions put in place, which bring rail infrastructure costs up. The green credentials of HSR have also been challenged by some European environmental NGOs. A 2009 report[13] from an independent Swedish expert group for environmental studies questions the political consensus according to which investing in HSR can systematically contribute to economic growth and to a reduction of carbon emissions, and argues that such an environmental rationale can be misleading. In the UK, wildlife trusts which represent landowners and other NGOs have emphasised the need to take into consideration the impact of HSR projects (like for instance the HS2 project between London and north-west/north-east England) on the environment, on woodlands along rail routes, landscapes, cultural heritage and local communities. Lastly, a major world conservation organisation, the World Wide Fund for Nature (WWF), is supportive of more frequent use of HSR for short-haul journeys previously made by air and of sending more freight by train in an attempt to further develop more energy-efficient modes of transport.

Conflicting views: the example of the Lyon-Turin HSR link

As an important missing part of the TEN-T Mediterranean corridor, which would help link the Iberian Peninsula to the Ukrainian border, the project to connect Lyon and Turin via HSR has engendered a controversial debate over the past 20 years. Once connected, these two cities will become part of the broader French and Italian HSR networks – a move believed to help halve passenger travelling time and to considerably boost a freight modal shift towards rail. The most controversial part of the project is the construction of a 57 km cross-border tunnel between two valleys: Susa in Italy and Maurienne in France. Those in favour of the project point out that it would bring time savings for passengers, a considerable increase in the volume of rail freight transport, a corresponding reduction of lorries on the roads in the fragile Alpine environment and a reduction of gas emissions.

The project's opponents, grouped around the 'NO TAV' (the Italian acronym for no to HS trains) movement, challenge its worth, question the traffic forecasts for the HSR route and the economic viability of the investments, mainly provided by Italy and France. They also argue that the tunnelling operations risk threatening groundwater reservoirs and will face challenges linked to the presence of uranium and asbestos deposits in the Alps. They have held rallies that have led to occasional violent clashes with the police. Another criticism comes from the French Court of Auditors in connection with the inaccuracy of the traffic forecasts for the new line and the increase of the project costs from €12 billion in 2002 to €26 billion in 2012. On 24 February 2015, France and Italy signed an amendment to the 2001 Treaty of Turin in order to move on with the project, and made a joint application for EU co-financing of the construction works to be carried out between 2014 and 2020. Overall project costs are now estimated at €26 billion, and the two governments would like to secure up to 40% of the funding from EU sources.

Outlook

The development of HSR as a new means of transport has continued and even gained speed in some EU countries; it is now a very important element of the priority TEN-T. The number of countries with HSR is growing: Austria, Sweden, Finland, Portugal and now the Baltic States, with the North-South Rail Baltica cross-border link plan, to mention a few. Poland started operating its first HSR line between the cities of Gdańsk, Warsaw, Kraków and Wrocław in December 2014.

Nevertheless, this trend must be put into perspective since HSR development has to take into consideration a broad range of factors and may involve organisational, technical, financial and political challenges. Public acceptance of HSR can also represent a pitfall since when this is lacking it can lead to strong forms of opposition to political decisions. The long-term nature of HSR investments makes it difficult to forecast precisely their benefits for the economy and their impact on jobs, growth and regional development. Their timescale often also differs from that of political actors' perspectives. The aftermath of the recent economic crisis has brought a new set of conditions and has challenged the profitability and worthiness of some HSR lines and projects. In this new context, the French and German national railway companies, which both operate HS trains, have each decided to launch their own coach services between European cities.[14] The issue of HSR investments and profitability that has come recently to public attention brings the EU back to the question of the availability of public funding for major infrastructure projects, and the difficulties of forecasting demand for HSR services at a time of economic uncertainty and fiercer competition with other transport modes.

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TRANSFORuM thematic workshop paper 'High speed rail' – Rome (2014)

Endnotes

1 A *Pendolino* (Italian for 'small pendulum') tilting train is equipped with a mechanism enabling it to tilt when going round bends, counteracting its centripetal force. Tilting trains can run at higher speed on conventional tracks.

2 Pkm: meaning passenger-kilometre, is the unit of measurement representing the transport of one passenger by a defined mode of transport over one kilometre.

3 Banister, D; and Givoni, M. 'High speed rail development in the EU 27: securing the potential' (2012) Unpublished paper quoted by TRANSFORuM thematic workshop paper 'High speed rail' – Rome (2014) p.8

4 Gourvish, T. 'The High speed rail revolution: history and prospects'. p.23 quotes Gourvish, T. 'The Official History of Britain and the Channel Tunnel (2006) p.371, and Preston, J. and Wall, G. 'The ex-ante and ex-post economic and social impacts of the introduction of high-speed trains in South East England' (2008) p. 405

5 'Air and rail competition and complementarity', Case Study Report Steer Davies Gleave (2006) p.54

6 Quoted by Gourvish, T. 'The High speed rail revolution: history and prospects', p.25

7 The social rate of return is a method used to assess the non-financial value (including environmental or broader social benefits not taken into account by a conventional financial calculation) of an investment.

8 Quoted by Gourvish, T. op. cit, p. 26

9 Bonnafous, A. 'The regional impact of the TGV' Transportation 14 (1987) pp.135-36, Meunier, J. 'On the fast track: French railway modernisation and the origins of TGV (1944-1983) (2002) p. 224

10 Quoted by Gourvish, T. op. cit, p. 27

11 Dubois, S. 'TGV: un quart de siècle de bouleversements géoéconomiques et géopolitiques' Géoéconomie 1/2010 No 52 pp.89-99

12 Quoted by European Commission, 'European High Speed Rail - An easy way to connect' (2009), p. 96

13 See EurActiv, 'High-speed trains "not the answer" for cutting emissions'.

14 The SNCF set up its own subsidiary, iDBUS, in 2012. In Germany, DB set up IC Bus in 2013. Since its launch, the former has carried over 1 million passengers and is present in seven European countries and in 19 cities. The latter offers its services between almost 40 cities in 11 EU countries and in Switzerland.

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