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The "Belt and Road Initiative": impacts on TEN-T and on the European transport system

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Abstract

China's Belt and Road Initiative, announced in late 2013, includes the construction of land-based transport connections between Asia and Europe, the creation of an economic belt for Eurasian cooperation, and maritime routes between China and all continents with which it may trade. Within the European Union, it will interact with infrastructure and services provided in the private sector, by the Member States, and by the European Union including through the Trans-European Transport Network programme. This paper focuses on the scope for rail services between China and Europe to attract freight currently travelling by sea and air, and the resulting changes in relative accessibility and competitive attractiveness of different maritime and landlocked regions of Europe. It estimates that, by 2040, 3 million TEU of freight between the Far East and Europe might travel by rail, comprising 2.5 million TEU from sea and 0.5 million TEU from air. While it concludes that it is not possible to predict whether and where these transfers will require changes to the Trans-European Transport Network programme, it describes recommendations on how the programme should take the Belt and Road Initiative into account.

Keywords: Belt and road initiative, BRI, Trans-European transport network, TEN-T, Rail freight, Capacity constraints, Maritime freight

Introduction

In late 2013, Chinese President Xi Jinping announced a plan to connect China to Europe through Southeast Asia, Central Asia and the Middle East. The initiative, often referred to as "One Belt, One Road", or "Belt and Road Initiative" (BRI) includes the construction of land-based transport connections between Asia and Europe and the creation of an economic belt for Eurasian cooperation. It also envisages maritime routes between China and all continents with which it may trade.

In June 2017, Steer (then known as Steer Davies Gleave), was appointed to carry out research for the TRAN Committee of the European Parliament on "The new Silk Route - opportunities and challenges for EU transport". In January 2018 the European Parliament published a Report and Briefing Note summarising the findings of this work (European Parliament (2018a); European Parliament (2018b)). In October 2018, at the European Transport Conference (ETC) in Dublin, Steer presented on "The "Belt

and Road Initiative: impacts on TEN-T and on the European transport system". This was based on the European Parliament report, but focused on two principal issues:

- how trade between China and Europe might be distributed between shipping, air and rail; and
- the implications for the Trans-European Transport Network (TEN-T) programme of the European Commission.

This paper expands on the ETC presentation but does not include all the information in the TRAN Committee report, which may be referred to for further information.

Distribution of BRI projects

Figure 1 illustrates the range of projects we identified as being associated with the BRI.

No official or generally accepted definition of the BRI exists, but it includes 65 countries which jointly account for some 60% of global Gross Domestic Product (GDP) and 30% of the world's population. We concluded that it is at least partly a branding exercise, with multiple projects labelled as BRI projects because they fall within its geographical scope. It is not subject to a clearly-defined development plan, programme or budget, and has no definitive list of projects. It has no clear geographic or economic boundaries, and appears to have evolved in response to individual countries' engagement with China, rather than being driven by an overarching strategy.

BRI's broad geographical scope means that its effects will not be limited to trade between the European Union and Asia, but will instead, as Fig. 1 shows, affect maritime, air and land transport across Eurasia and beyond.

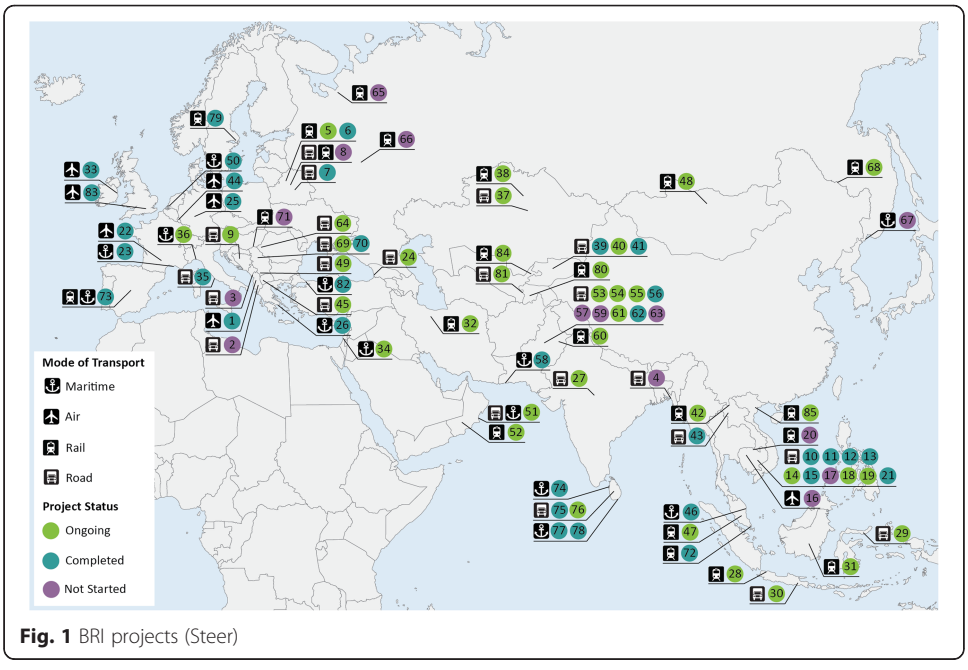

Fig. 1 BRI projects (Steer)

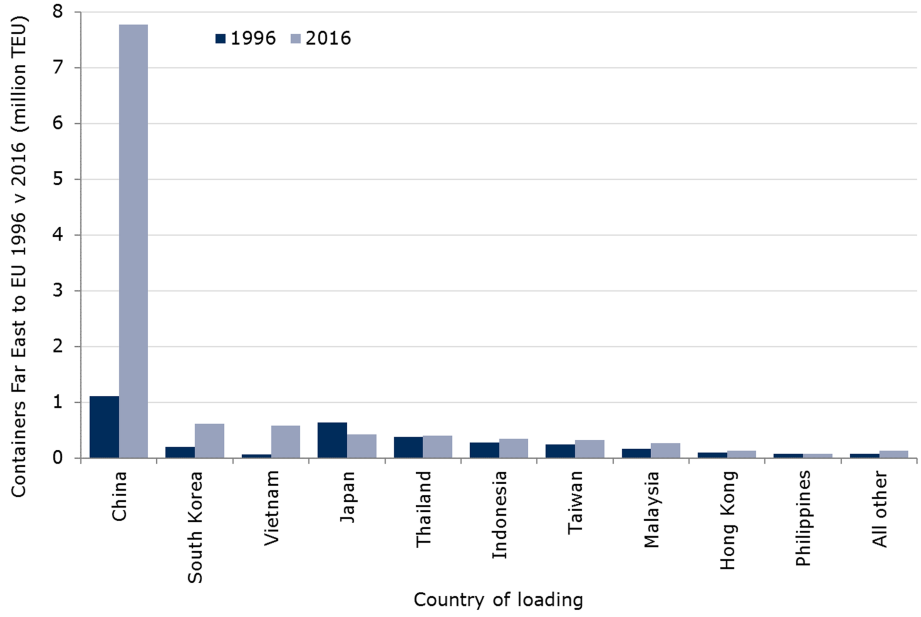

Fig. 2 Loaded containers from the Far East to Europe: country of loading (from Eurostat)

Maritime freight

Figure 2 and Fig. 3, based on Eurostat data, summarise the volumes of loaded containers which are loaded and discharged on flows between ports in the Far East and ports in the EU. However, the EU Member States in which containers are loaded and discharged may not be their final destinations.

Figure 2 illustrates the recent growth in loaded containers from the Far East to EU ports, from just over TEU one million in 1996 to about TEU eleven million in 2016. Other than China, no state loads more than one million containers to Europe.

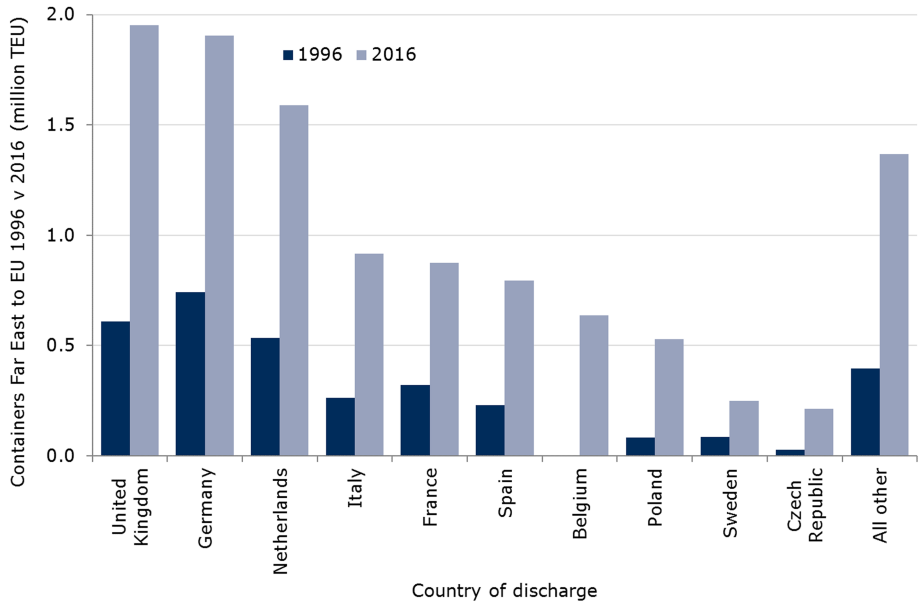

Fig. 3 Loaded containers from the Far East to Europe: country of discharge (from Eurostat)

Figure 3 shows the countries at which loaded containers are discharged in the EU.

A large proportion are discharged at ports in the United Kingdom, Germany, the Netherlands and Italy, before travelling onwards to the points at which they are stripped. Containers discharged in Rotterdam in the Netherlands, or Genoa or Trieste in Italy, for example, may continue by river barge, train or truck to other EU Member States or to landlocked and non-EU countries, such as Switzerland.

The volume of containerisable shipping traffic westbound from the Far East to the EU grew by 235% between 1996 and 2016, equivalent to an average annual growth of over 6.2% per year. Future freight flows will be affected by factors such as changes to markets, changes to transport and logistics facilities and services and capacity constraints, none of which can be predicted reliably at a detailed level, as discussed further below.

Air freight

Figure 4, using Eurostat data analysed by MDS Transmodal (MDST), shows the ten largest airports in Europe by tonnes of airfreight. The five largest are all in northern Europe and within a few hours' drive of each other.

A wide range of airports across Eurasia are used to carry air freight, whether in dedicated freighter aircraft or in the belly holds of passenger aircraft. Any investment in airports and air cargo attributed to the BRI in Fig. 1 must be seen in the context of the rate of growth in global aviation and the total investment in airports throughout Eurasia.

Air freight data refer to the volumes of cargo flying between individual airports, rather than their ultimate origin and destination. Furthermore, the actual route, airline and aircraft on which any item of cargo flies may be determined at short notice by the availability of space on a suitable flight or series of connecting flights. Some air cargo travels on direct flights between the Far East and the EU, with the most important airports in the Far East being Hong Kong, Beijing Capital and Singapore. Other air cargo

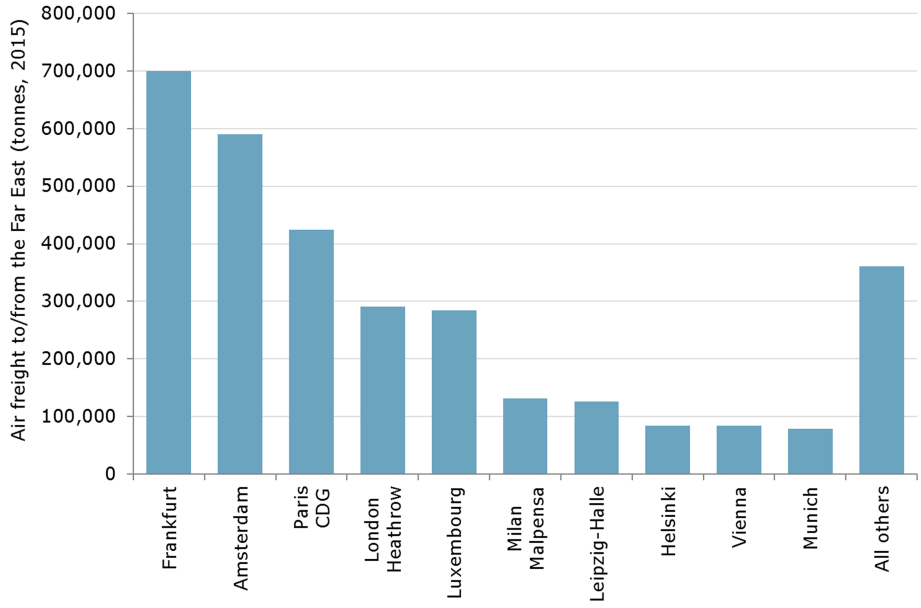

Fig. 4 Ten largest airports in Europe by tonnes of air freight to/from the Far East (2015, from Eurostat)

may connect via airports en route including Istanbul, Moscow, Doha, Abu Dhabi and Dubai. Connections available at these airports allow freight from many points in the Far East to reach many points in Europe with a single change of aircraft.

The study estimated that, in 2016, the total two-way volume of air cargo between the Far East and the EU was around 3.3 million tonnes, and that by 2040 it would grow by around 75% to 5 million tonnes.

As with maritime containers, air cargo arriving at EU airports may travel by road to other airports, in some cases crossing between EU Member States or to non-EU countries. For these reasons, we concluded that it is not practicable to predict which ports or airports will be used by any individual consignment of freight between the Far East and Europe.

Wider market dynamics

Transport providers – airlines, shipping companies and railway operators – have wide flexibility to link different airports, ports or freight terminals, either directly or indirectly, alone or in alliances, depending on their assessment of their relative commercial value.

Logistics companies have flexibility to use these air, shipping and rail networks, or to build their own to carry some or all of their traffic, depending on their assessment of how best to serve their customers.

Transport infrastructure and services, including those attributable to the BRI, also take place against a background of wider market trends:

- New products will emerge, and will result in new production sites in new locations.
- Trade will continue to grow, both globally and between Southeast Asia and Europe.
- Transport costs will fall, through operational efficiencies and larger ships and aircraft.
- End-to-end transit times will fall, through a mix of new direct services and higher frequencies on existing routes.

Trade is a dynamic process, reflecting the changing relative advantages of extracting raw materials, creating intermediate products, processing them into final products, and selling them to consumers, in different locations. Supply chains will evolve as producers, transport operators and logistics companies react to prices, opportunities and constraints. In the longer term, the raw materials and products being traded will continue to change.

The European Union's TEN-T network

One focus of the study was the implications for the TEN-T network within the European Union. TEN-T projects exist in every EU Member State and include all aspects of transport: road; rail; maritime; inland waterways; air; logistics; co-modality; and innovation (European Commission Innovation and Networks Agency (INEA) (2018); European Commission Mobility and Transport (2018a)). TEN-T is intended to establish and develop the key links and interconnections needed to eliminate existing bottlenecks to mobility, complete missing sections (especially across borders) on major routes, cross natural barriers and improve interoperability.

Like the BRI, the TEN-T programme consists of hundreds of projects, defined as studies or works, whose ultimate purpose is to ensure the cohesion, interconnection and

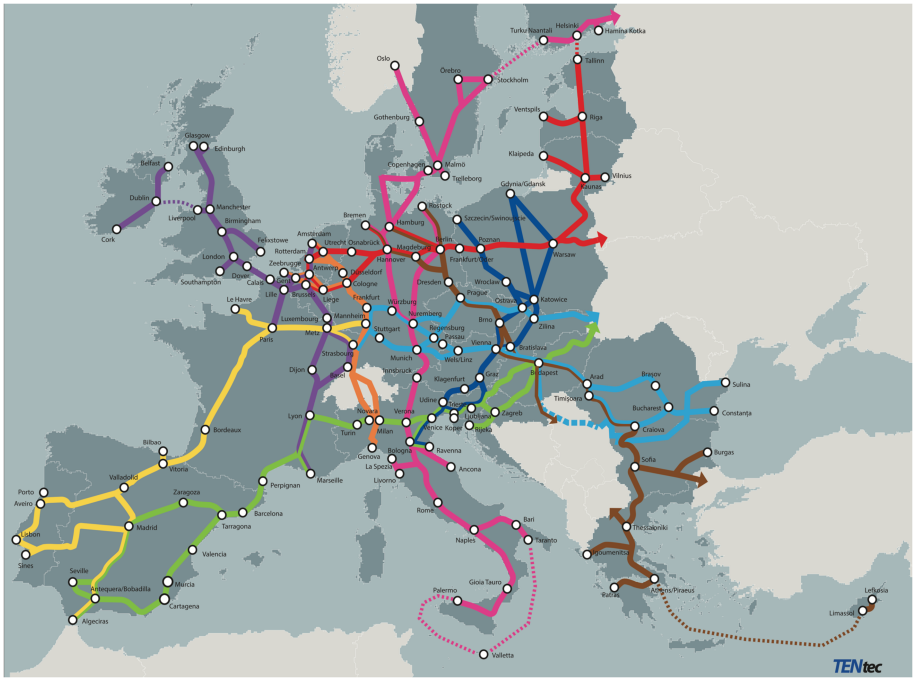

Fig. 5 TEN-T Core Network Corridors (European Commission)

interoperability of the trans-European transport network, as well as access to it. Unlike the BRI, however, the TEN-T programme has a clearly-defined rationale, budget, programme, project list and evaluation framework, and named coordinators for each core network corridor.

Figure 5 shows the TEN-T core network corridors for surface transport (European Commission Trans-European Transport Network (2018)).

One of the issues for TEN-T is whether and how projects will need to be modified in response to the effects of BRI, either to be scaled back because of potential duplication, or to be expanded to deal with BRI-related traffic.

The EU's maritime gateways

Figure 6 shows how the dominant shipping route from the Far East through the Suez Canal naturally favours the Mediterranean ports.

The first major EU port on the European mainland is Piraeus, the port of Athens, from where more urgent consignments may be transferred to rail or road for more rapid onward travel. The Orient - East Med TEN-T Corridor links Athens through Bulgaria and Romania to Budapest, Bratislava and Vienna (all on the Danube), Prague and Berlin, the Baltic port of Rostock and the North Sea ports of Hamburg, Bremerhaven and Wilhelmshaven.

Next come the major ports at the head of the Adriatic, Venice and Trieste and Koper, followed by Genoa, Marseille and Barcelona. Northern Europe is reached by the Atlantic Ocean, the English Channel, the North Sea and the Baltic or even the Gulf of Bothnia. This sequence means that the Scandinavian and Baltic States are the least accessible from the Indian and Pacific Oceans: shipping times to the North Sea are up to 1 week longer than to the Mediterranean.

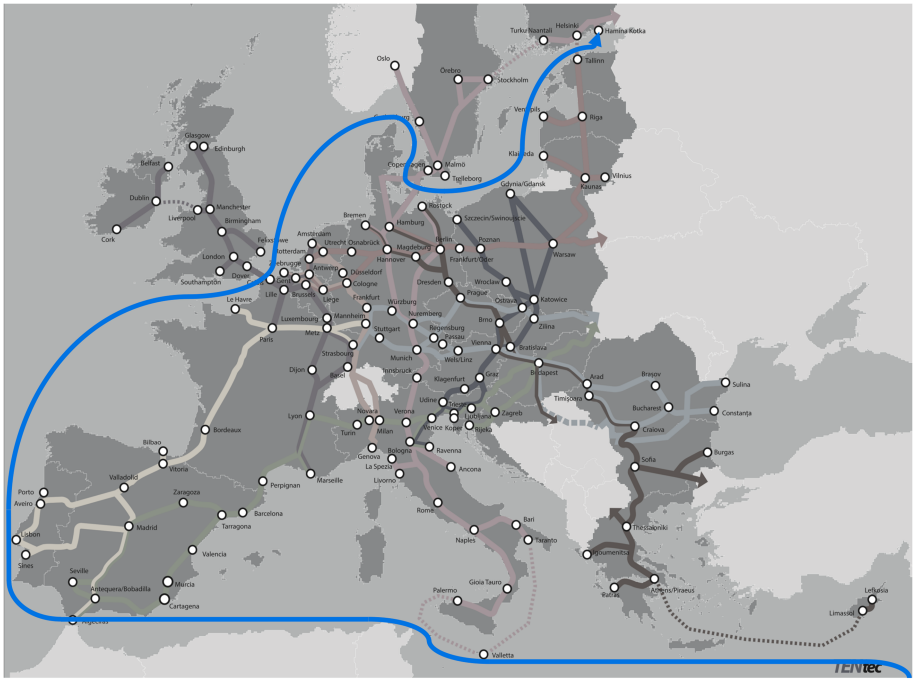

Fig. 6 Shipping routes from China and the Southeast Asia to Europe (Steer analysis)

In addition, four EU Member States – Austria, the Czech Republic, Hungary and Slovakia – are landlocked. All are on the Orient - East Med TEN-T Corridor and all but the Czech Republic also have access to the Danube. This gives waterborne access to the Black Sea and, via the Rhine–Main–Danube Canal, to the Rhine and the North Sea.

Future transport services

The BRI appears likely to contribute to increased infrastructure capacity, routes operated and service frequency at existing ports and airports, but without fundamentally changing the network available. In contrast, potentially major improvements are possible in rail, following the introduction and steady expansion of direct rail services between China and Europe. The study therefore focused on the specific issues of the scope for transfer of existing goods from maritime and air transport to rail and, as a secondary effect, for enhanced rail links to stimulate wholly-new trade along the rail route.

The study used MDST's World Cargo Database (WCD) to analyse:

- the scale and nature of freight flows in the area covered by the BRI;
- the scope for their growth, the potential impact of the BRI; and
- the EU transport system's readiness.

The study team considered a range of approaches to forecasting the growth in trade in the area covered by the BRI with sufficient accuracy to indicate the likely volume of trade and the resulting flows on each mode. It was assumed that trade between the Far East and the EU would further grow by 80% between 2016 and 2040, equivalent to an

average annual growth, slower than in the recent past, of 2.5% per year. This would mean that the total two-way traffic in 2040 would be around 40 million TEU including return empty containers.

MDST prepared estimates for the study of the extent to which cargo travelling by sea or air in 2016 might in future transfer to rail because of new and improved rail services, including those attributed to the BRI.

First, they provided indicative assumptions on the levels of service which would offered by each mode between typical points in the Far East and Europe, as shown in Table 1.

Second, they combined this data with evidence of the current trade-offs observed between transit time and price. From this they advised that, all other things being equal, it would be more cost-effective to shippers to send by rail:

- cargo sent by sea with a value higher than €85,000 per TEU; and
- cargo sent by air with a value lower than €550 per kilogram.

Third, they estimated an average value per TEU for each of the commodities currently traded between the Far East and the EU as maritime cargo, and assumed that commodities with a value higher than €85,000 per TEU could transfer to rail. This analysis suggested that, of the total projected 2040 two-way sea freight of 40 million TEU, around 2.5 million TEU could transfer to rail.

Fourth, they examined the values of commodities currently traded as air cargo, the average value of which is currently around €200 per kilogram. This analysis suggested that around 50% of current air cargo could transfer to rail, resulting in around 0.5 million TEU in 2040.

In summary, they estimated that, by 2040, 3 million TEU of freight between the Far East and Europe might travel by rail, comprising 2.5 million TEU from sea and 0.5 million TEU from air.

A 750-m long container train can carry around 100 TEU, or 90 TEU with a 90% load factor. An operation with one train per day each way, on 300 days of the year, could therefore carry a two-way volume of around 54,000 TEU per year. A two-way volume of an additional 3 million TEU shifted to rail from maritime and air transport would therefore require around 50–60 trains each way per day, or around 2–3 trains per hour throughout the operating day. While this would be a major traffic flow, it could be accommodated within the capacity of a single suitable freight rail corridor.

The choice of sea and rail routes

Rail services between China and Europe (along the "New Eurasian Land Bridge Corridor") have gradually been introduced over the last few years, and there are now around

Table 1 Assumed air, rail and sea levels of service (MDST)

Mode	Effective transit time	Unit transported	Transport price per unit
Air	5 days	One kilogram	€2
		10 t, or one 40-ft container (2 TEU)	€20,000
Rail	16 days	One 40-ft container (2 TEU)	€4250
Sea	35 days port to port		€2000

30 trains per week each way between Chongqing in China and Duisburg in Germany. Duisport, at the convergence of the Rhine and the Ruhr, is the world's largest inland port, and in 2016 handled 3.7 million TEU, of which 100,000 TEU were by rail from and to China. The services operate on:

- standard UIC gauge (1435 mm) track through China to Dostyk in Kazakhstan;
- Russian broad gauge (1520 mm) track through Kazakhstan, Russia and Belarus to Brest on the Polish border; and
- standard gauge track through Poland and Germany.

The study examined the corridor via Belarus and other rail routes from the Far East to the EU, as shown in Fig. 7.

With shipping times to the North Sea up to 1 week longer than to the Mediterranean, as noted above, it appeared that rail would be most attractive for transport to Europe north of the Alps, including to EU Member States bordering the Baltic Sea and the North Sea. From the established corridor from Belarus through Poland and Germany to Duisport:

- The Baltic States and Finland, which suffer from the longest shipping distances and times, could be reached either directly from the Russian network, with which they share the broad track gauge, or in future via the proposed Rail Baltica standard gauge rail line from Poland to Tallinn in Estonia, with ferry connections to Helsinki.
- Sweden could be reached using ferry services across the Baltic from Polish ports such as Gdansk, Gdynia and Swinoujscie.

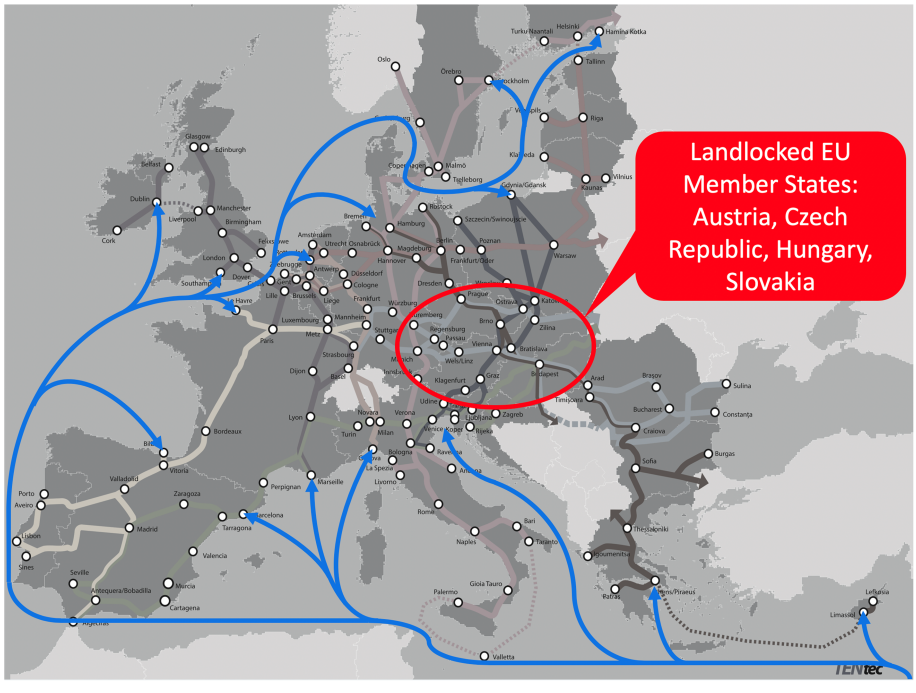

Fig. 7 The rail alternatives to shipping (Steer analysis)

- The Netherlands, Belgium and Great Britain could be reached by extension of services beyond Duisport and through the Channel Tunnel.
- The landlocked Member States, and other industrial centres such as Northern Italy and Switzerland, could be reached by services connecting with, or diverging from, this route.

Other potential rail routes are through Turkey and into Bulgaria, or across the Black Sea to ports in Bulgaria and Romania. However, the assessment suggested that these probably offer only a smaller end-to-end time saving relative to sea travel, and that the focus of China-EU rail services was likely to continue to be Northern Europe.

The wider impacts

Expansion of rail flows between China and Europe could have a range of impacts in the countries en route.

In the EU, the principal conclusions on the likely scale of effects on the ports, airports and railways are set out in Table 2.

In principle, all the Member States will be able to benefit from the faster transit times available by rail, whether to attract traffic from sea or air. In practice, however, the benefits of shorter transit times are likely to be greatest in Member States bordering the Baltic and North Sea, and least in the States bordering the Mediterranean. One specific possibility, if more urgent consignments travel by rail throughout, is that the demand for rail capacity from Piraeus on the Orient - East Med Corridor will decline.

In Kazakhstan, Russia and Belarus, increased through traffic may absorb capacity, and will have to pay its way through infrastructure access charges, but will create new opportunities. Local extractive and manufacturing industries may be able to export, and local consumers may be able to import, whether from China in one direction or Europe in the other.

In China, use of rail from inland cities would help reduce the poor connectivity of cities in China's interior relative to coastal areas such as Shanghai and Guangzhou. This could help to rebalance China's economy and aid the development of landlocked regions.

In all countries served by rail routes, there are likely to be new opportunities for transport in both directions, as markets find uses for otherwise unused capacity in the

Table 2 Potential impacts on EU ports, airports and railways

Infrastructure	Location	Potential impact	Net change
Ports	Baltic and North Sea	Loss of up to 15% of China-related traffic.	Down
Airports and onward "air freight" by road	EU-wide	Minor loss of traffic, but undetectable against background growth.	Down
Ports	Mediterranean and Atlantic	No material change, but if sea loses the most urgent traffic, this may favour northern Mediterranean ports over "first landfall" ports such as Piraeus.	Redistributed
Railways	Via Black Sea and Turkey	Potential gain of some traffic, but with less time saving than via Belarus.	Up
Railways	Via Belarus	Potential main route for mid-value goods to northern and landlocked Europe, including Baltic States and Finland (via Rail Baltica). Onward travel to Sweden and Norway (via Baltic) and Great Britain and Ireland (via North Sea) offsets some loss of direct sea traffic.	Up

less-loaded direction and, while the overall scale of BRI-related effects may be small compared with total trade, there will be potential net winners and losers across Eurasia.

If the absolute size of the total transfer from sea to rail is 2.5 million TEU by 2040, then the study modelling suggested that the largest percentage change in traffic would be to ports in the North Sea and Baltic. These might lose around 15% of their China-related traffic, and hence a smaller proportion of their total traffic. This suggests that loss of traffic to rail is unlikely to be a major threat to existing ports and airports.

However, the study noted that even these projections were likely to be sensitive to a several assumptions, discussed in turn below.

First, while existing volumes of trade are known in considerable detail, and broad trends are clear, the exact patterns of future trade are less predictable, particularly given the feedback between transport accessibility and price and decisions on where to locate processing and manufacturing relative to suppliers and consumers.

Second, the actual mix of commodities being transported is difficult to predict. For example, successive waves of consumer electronics have required different inputs and been manufactured in different locations. In the 1980s, a major consumer product was a video recorder, often manufactured in Japan. Now, for less than $1000, it is possible to buy either a high value-to-weight smart phone, often made in China, or low value-to-weight flat screen television, often made in South Korea. The study noted that, by 2040, products which have not yet been invented will be manufactured in factories which have not yet been built at locations selected by companies which do not yet exist.

Third, the relative attractiveness of different modes of transport will depend not only on general efficiency improvements in each mode, but also in specific factors:

- Higher fuel and energy prices will, all other things being equal, tend to favour sea over rail and air.
- Higher interest rates will, all other things being equal, tend to favour air and rail over sea.

Fourth, much will depend on the availability of capacity, and hence effective transit time at short notice, by route. For the owners and managers of rail infrastructure, it is rational to sell spare capacity at marginal cost, which may be very low when there is spare capacity but very high when the network is full and expansion is required. Similarly, for operators of rail services which need to return locomotives and wagons to their origin, it is rational to carry freight at marginal cost, which may be limited to the costs of loading, unloading and additional fuel.

As at present, logistics providers will fine tune supply and pricing, and shippers will adapt to the emerging market, but the exact market outcomes cannot readily be predicted in detail. One issue will be the scope for rail to offer low prices to back loads carried in otherwise empty eastbound containers, and the extent to which new business models emerge to take advantage of this. Figure 8 shows how EU Member States such as Sweden and Germany have relatively balanced container flows, while the United Kingdom has a very large imbalance.

The cost and price of rail transport

Rail operators will typically expect to recover their costs, at least in the longer term. However, there is no simple relationship between the total cost of providing railway

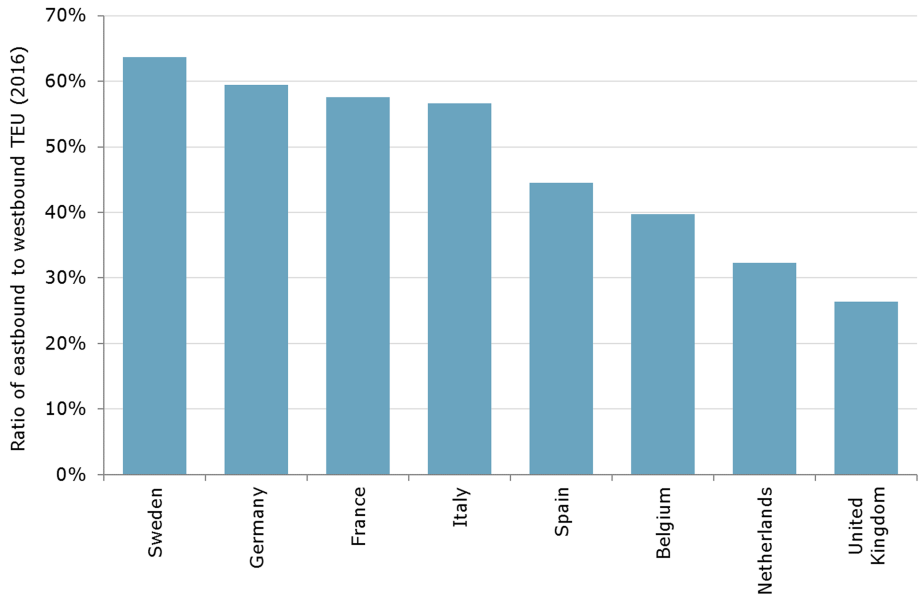

Fig. 8 Balance in loaded container flows for selected EU Member States (MDST)

infrastructure and services and the price of carrying a specific item on a specific train, for several reasons.

First, trains between China and the EU will be charged transit tariffs by operators such as KTZ and RZD. There is no uniquely correct basis for setting such transit tariffs, although the principle applied in the EU is that they should be based on marginal costs. From the perspective of these transit railways, however, transit traffic is an opportunity to profit from third parties. The incentives on the transit states are typically to maximise their profits, rather than to maximise the economic, social and environmental value of the railway operation as a whole. For both the EU and China, however, there is the potential risk that a growing and successful rail service will be seen as a potential source of profit by the transit railways.

Second, there is no uniquely correct way of allocating costs within a railway operation, particularly between the more and less loaded directions of operation, which Fig. 8 shows may have very different average loads. The allocation of costs is ultimately a decision for management, and the prices that can be obtained in the market in each direction may be widely different. From the perspective of the operator, a service is commercially viable if, in the longer term, the revenues obtained in both directions exceed the total cost of providing the service.

Third, it is not unusual for operators to choose to subsidise services in the early years of operation, when start-up costs may be high and demand may be low. New rail operators in the EU often plan to be loss-making for several years while they grow their market and fill their capacity. There is no reason why Chinese or other parties planning a long-term rail cargo business should not also do so.

The preparedness of the EU

Transport, logistics and industry throughout the area covered by the BRI, including the EU, have already begun to adapt to the existence, and growth, of trade flows with China.

Within the EU, ports and shipping companies, and airport and airlines, already deliver freight and cargo around the world using standard systems and processes. Many EU ports and airports are already handling growing volumes of cargo between China and the EU with no great difficulty. The arrival of the first Chinese container or ship at an EU port, or the first Chinese air cargo or aircraft at an EU airport, may be noted as a local milestone, but is unlikely to require any material change in equipment or processes.

The EU's railways are less well-prepared for rail services operating all the way between China and the EU. Infrastructure managers in Poland and Germany are already involved in the provision of regular rail services between China and Duisport. Through services from China have also operated across other networks as far as London in the United Kingdom.

However, for other infrastructure managers and rail and terminal operators, the first links with China may require adaptation to new systems, such as applications for railway capacity, timetable planning, real time information, and dealing with infrastructure charges and customs. In some cases, this may mean dealing with documentation in Mandarin Chinese, Russian or other languages. Some initial changes in equipment and processes may be necessary, but this is unlikely to be materially different from dealing with an additional official EU language to serve intra-EU freight.

The impacts on TEN-T

From an EU perspective, a particular concern is the potential interaction of the BRI with the TEN-T networks which, as Table 2 shows, might be in either direction:

- Some airports, ports and other facilities may be net losers of business because of the BRI.
- Other TEN-T infrastructure may attract material extra BRI-related traffic.

The analysis suggested that loss of China-related maritime and air traffic from individual airport and ports was likely to be small compared with background growth, and unlikely to be critical to their viability. It might, however, mean a slightly slower build-up of traffic and, in some cases, allow investment in expansion to take place later than would otherwise have been the case.

In contrast, growth in China-related rail traffic might result in more rapid exhaustion of available capacity and, in the absence of sufficient forward planning of capacity expansion, result in congestion and the associated costs of delayed or diverted traffic. The infrastructure on which this appeared most likely to be an issue was the North Sea - Baltic rail corridor from Brest in Belarus through Poland and Germany.

Rail capacity is not readily defined, as it depends not only on the number of trains operated but their relative speeds, stopping patterns, scope for them to pass each other en route and, in some cases, the availability of alternative or diversionary routes. In addition, except when planning wholly new infrastructure, it is rare either to make long-term forecasts of rail demand or to devise the passenger and freight timetables required to serve it. Except where there is no further scope to increase capacity, or where higher speeds require a wholly new alignment, there is a tendency to plan infrastructure on an incremental basis, either to enable the operation of a planned new timetable, or to permit an existing timetable to be operated more reliably.

One issue is that, while a future increase in traffic from China will result in additional trains, their exact routings and preferred timings cannot yet be predicted. In contrast, a decision to expand a passenger rail service is likely to involve specific proposals on exactly what timetable will be operated, with what service frequency, and over how many hours per day. A decision to operate a new suburban service, for example, might mean a train every 15 min over up to 20 h per day, or 80 trains each way per day.

The European Court of Auditors has identified how lack of coordinated planning along rail corridors can result in a patchwork rather than an effective network (European Court of Auditors (2018)). Rail is particularly exposed to the risk that short-distance services, particularly for passengers, absorb capacity which might better be used to provide long-distance ones, particularly for freight.

Constraints may emerge round cities if there is growth in local commuter services. Vienna opened a new main station in 2014 and London has expanded Thameslink from 2018 and is opening Crossrail in 2019. Stockholm added a second pair of tracks for suburban services in 2017 and Munich is planning to do so in 2026. In each case, expanded suburban or regional services will consume additional capacity on lines radiating from the city centre which are often also used by rail freight. Once passenger services have been introduced, it may be politically difficult either to remove them or to obtain planning and environmental approvals, and additional funding, required to add further capacity.

Constraints may also arise away from the cities, if passenger services limit the capacity available for freight. The port of Felixstowe in the United Kingdom is the seventh busiest container port in the EU and on the TEN-T core network. It handles around 3.7 million TEU per year, over 0.9 million of them by rail on up to 32 trains per day. However, its only rail access is by a single-track line shared with local passenger services to the county town of Ipswich.

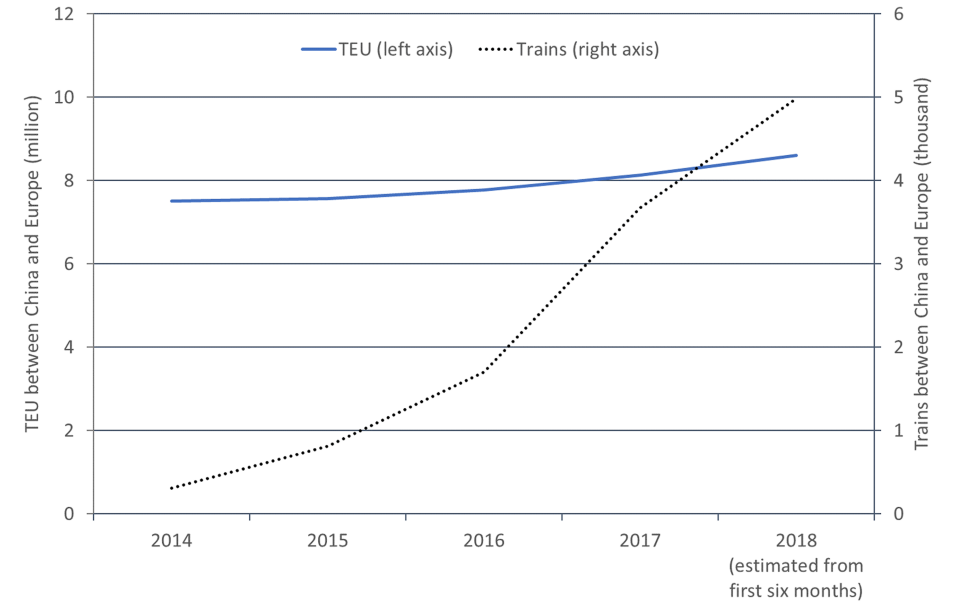

Fig. 9 Trends in TEU and trains between China and Europe (MDST, China Railway Corporation)

Update

As of January 2019, rail market share between China and Europe has continued to grow strongly. Figure 9 is based on MDST estimates of loaded container TEU between China and Europe and China Railway Corporation reports of freight trains between China and Europe.

In the first half of 2018 2490 freight trains were reported, an average of nearly seven trains each way per day. If it is assumed that that a typical freight train carries around 80 TEU, then this suggests that the rail market share of TEU between China and Europe had, by 2018, grown to around 4%. This confirms that there is a significant market for the reduced journey time offered by rail relative to sea freight.

Conclusions

The report to the European Parliament made several detailed recommendations relating to the scope for coordination of TEN-T and BRI and the identification of emerging capacity bottlenecks.

The geographical and project scope of the BRI are not clearly defined and continue to evolve. To some extent, this is an inevitable consequence of the stated aim of the Initiative, which is intended to invite dialogue and cooperation between China and any of 65 countries. Engagement with China at the EU level is at an early stage, and further work to support the coordination of TEN-T and BRI policy is required.

Better coordination of TEN-T and BRI policies will only be possible with greater clarity on the definition of the BRI. There are no definitive maps of the various BRI corridors analogous to those published by the European Commission showing the various TEN-T Core Network Corridors, and no corridor studies for the BRI providing detailed information on route characteristics, capacity and investment priorities. Such maps and studies could be prepared for a limited number of priority corridors connecting with TEN-T routes and the wider European transport network.

There is uncertainty in the availability of future capacity at and between airports, ports and rail terminals across Eurasia and other areas covered by the BRI and, where capacity is constrained, in how it is allocated in the short term and expanded in the long term. Investments attributed to the BRI are only a small part of the overall investment which will in any case be made by the owners and managers of air, sea, rail and road infrastructure across Eurasia. While some infrastructure managers have detailed and long-term plans, others can and do respond to rising demand at short notice through relatively small or cheap increases in capacity. In the absence of long-term plans, however, it is not possible to say either where specific capacity constraints will arise or where and how operators, logistics companies and customers will adapt to mitigate or eliminate the effects of any constraints.

Nonetheless, the TEN-T Corridor Studies can be reviewed and developed periodically as the BRI is defined more clearly. This would require TEN-T policy to become more outward-looking, with an explicit requirement to take account of major policy initiatives sponsored by countries outside the EU. It could also be facilitated by the development of periodic forecasts of BRI-related traffic, following the model of the European Commission's Reference Scenario, with forecasts jointly approved by participating countries (European Commission (2016)).

The geography of Europe (Fig. 6) fixes the sequence at which ports are reached from China through the Suez Canal. The BRI is not expected to change the overall pattern of

shipping traffic materially, but may reduce slightly the volume of freight entering the EU via the North Sea ports. This might in time be offset by a growth in the shipment of BRI-generated freight across the North Sea to the UK and Ireland (the availability and efficiency of rail connections from seaports to continental Europe will also play an important role in determining traffics). There is, however, potentially greater uncertainty in the future growth of rail traffic on the North Sea - Baltic Core Network Corridor between Athens and the landlocked States bordering the Danube.

In principle, commercially viable rail services between China and the EU are a major opportunity for operators, shippers and industry, particularly on railways dominated by long-distance or even transcontinental freight traffic. In much of the EU, however, railways are dominated by passenger traffic which is intra-EU, domestic, regional or even suburban. Capacity which appears to be available for rail freight, along a transport corridor or at junction, may be rapidly absorbed by a decision to introduce or expand urban commuter services in or around a city. Such services may be introduced at relatively short notice, depending on the growth in an urban area, the public transport policies of the competent authorities, and the extent to which these result in investments which reduce the capacity available to rail freight.

Within the EU, "Railway Recast" Directive 2012/34/EU sets out rules for the allocation of railway infrastructure capacity (Official Journal of the European Union (2012)). Section 3 of Chapter IV of the Directive requires that specific capacity allocation rules shall be laid down and that there shall be cooperation in the allocation of infrastructure capacity on more than one network. However:

- The Directive does not require that the capacity allocation rules prioritise freight. Capacity may be allocated to passenger services for up to 15 years, even if subsequent requests for capacity for freight would have greater economic, social or environmental benefits.
- The Directive does not apply to railways outside Europe across which BRI-related freight would need to travel, including those of China, Kazakhstan and Russia. Provision of rail capacity for BRI-related trains within the EU does not guarantee that suitable capacity will be available over the entire route on which the trains would operate.

Analysis suggests that a priority for more detailed study should be the New Eurasian Land Bridge Corridor connecting with the North Sea - Baltic Core Network Corridor of the TEN-T. This would require dialogue with other organisations already engaged in the development of rail transport routes in Eurasia, in particular the Central Asia Regional Economic Cooperation (CAREC) Program.

At the time of writing in January 2019, the European Commission is consulting on an ex-post evaluation of the Trans-European Transport Network (TEN-T) programme 2007–2013 (European Commission Mobility and Transport (2018b)). The Commission's TEN-T policy continues to evolve, and it will be increasing important for the Commission to consider BRI as part of its broader assessment of future needs.

Abbreviations

BRI: Belt and Road Initiative; CAREC: Central Asia Regional Economic Cooperation; CDG: Charles de Gaulle; ETC: European Transport Conference; EU: European Union; GDP: Gross Domestic Product; INEA: Innovation and Networks Executive

Agency; KTZ: Kazakhstan Temir Zholy (Kazakhstan Railways); MDST: MDS Transmodal; RZD: Rossiyskie Zheleznye Dorogi (Russian Railways); TEN-T: Trans-European Transport Network; TEU: Twenty-foot equivalent unit; TRAN: European Parliament's Committee on Transport and Tourism; WCD: World Cargo Database

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Competing interests
The authors declare that they have no competing interests.

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