

Connecting Sweden to Europe

Making international rail travel a reality

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Summary

2021 will be the European Year of Rail. It is high time to lay the foundation of how to increase international rail travel in Europe. The purpose of this report is to present facts that point to the shortcomings that exist within the EU when it comes to cross-border rail services as well as to identify the low hanging fruits that may exist concerning "missing links" across borders within the EU. The report focuses on the northern part of Europe which is defined as Scandinavia and Germany, and to some extent the neighbouring countries of Germany.

The report concludes with six policy suggestions, concerning track fees, availability of tickets, passenger rights, and missing links.

The overall picture is that many administrative and technical obstacles nevertheless are being addressed. There are, however, areas where more changes are needed. This report outlines six areas that need to be addressed for improved international long-distance rail services. These aspects concern infrastructure, the convenience of buying tickets and passenger rights, better market conditions for night trains, expanded cooperations of operators on an open market, and speeding up the internationalization of rolling stock.

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Forword

It is hard to remember the time before the pandemic, when interest in rail travel was growing by the day. When more and more people were realizing the appeal of skipping the detour to the airport, endless security checks and tedious baggage rules.

But hard as it may seem now, there will be a time after covid-19. And as things return to normal, we need to make sure that even more people can access the smarter and more sustainable way to travel.

To make rail the first choice of Europeans, we need to overcome a range of challenges. To me, the most obvious ones are about cutting travel times, promoting night trains and making it easier to book international tickets through one-stop-shops.

In a Swedish perspective, we have our work cut out for us. If rail is to compete with aviation we need to construct high-speed rail from Gothenburg and Stockholm to Malmö. We also need to improve the connections across Öresund. As rail gains a bigger market share of both passenger and freight transport, the double tracks of the Öresund bridge will soon be insufficient. We will need to construct new links between Malmö and Copenhagen in order to increase the capacity of this all-important bottleneck. We must also speed up the completion of the Fehmarn belt fixed link and make sure that the railway infrastructure in northern Germany is up to size for a railway boom.

The high-speed rail links in the Malmö, Göteborg and Stockholm triangle are crucial in achieving significant cuts to the travel times from Sweden's largest cities. An imperative condition in increasing the appeal of international rail for a majority of the Swedish population.

Furthermore, every international train service from Sweden to continental Europe has to go across the Danish straits. Improving the connections between Malmö and Hamburg is therefore absolutely necessary to make international rail from Sweden viable.

If the Danish straits are the first bottleneck, then the railway connections from Hamburg is the second. We need to significantly expand the networks from Hamburg, in order to get better connections and shorter travel times between that city and the rest of continental Europe. Today, there is a notable lack of high-speed links between Hamburg and western Europe in particular, making any services from Sweden to cities such as Paris or London untenable for the wider public.

During 2021, I will start work on many railway-related EU initiatives. I aim to ensure that these proposals are designed to meet Swedish needs, while contributing in making rail the cheapest, fastest and easiest way to travel. As the pandemic recedes, we need to lay the foundation for a boom in train travel, and make rail the smartest way to travel.

Jakop Dalunde

Member of the European Parliament

Swedish Greens / Miljöpartiet de gröna

Background and Scope

The purpose of this report is to present facts that point to the shortcomings that exist within the EU when it comes to cross-border rail services, holding their market share down, and to identify the low hanging fruits that may exist concerning "missing links" across borders within the EU. The report focuses on the northern part of Europe which is defined as Scandinavia and Germany, and to some extent the neighbouring countries of Germany.

The questions to be addressed concern how the EU can contribute to creating more attractive railway connections between EU states, with special emphasis on northern Europe and long-distance services. Today, railways are mostly a national matter and cross-border connections are often given lower priority, even if there are exceptions.

The following questions are addressed in the report:

- ▷ Where are decisions made?
- ▷ Why is there no/little interest in cross-border services?
- ▷ Which connections should be prioritized - missing links?
- ▷ Is there a need for investment support?
- ▷ How to get market access in different countries?
- ▷ Safety systems and regulations?
- ▷ Technical solutions?

For the purposes of this report, the last two questions are the least important. As the example of freight and passenger traffic shows, technical obstacles are solved by the rail vehicle industry.



Lübeck Hbf



Existing Market

Day Trains – Most Frequent International Train Lines

In this case, a frequent line is defined as at least one train in both directions every second hour. This means approximately 6 or more daily connections per direction. Furthermore, the overview is limited to Scandinavia and Germany, and connections to the neighbouring countries of Germany. The connections are listed in the table below and show the relation (terminal stations), frequency (approximation), and travel time (between the terminal stations). For a better understanding, the flight time for the same connection is shown as well. The flight time consists of the actual flight time, travel times to and from the airports (2 x 30 minutes), and the time for check-in, security, and the airlines' requirements (2 hours) – in total actual flight time plus 3 hours. The travel time ratio (travel time by train divided by the travel time by flight) helps to understand the train connections' attractivity compared to flying the same route. The list shows the connections as planned before the COVID-19 pandemic.

The table shows the main international connections by train that are relevant for the northern part of Europe. In total there are 12 connections which are connecting major cities or capitals in the respective countries. The typical interval of a high-frequency international train connection is every second hour, and the travel time between the terminal stations varies between 3-7 hours.

Going deeper into the timetables, it is common that the international connections are integrated with national train services. This means that several international connections build hourly services on parts of the route (e.g. Berlin/Hamburg – Basel connections are interconnected) or that national services on parts of the line are complementing the services. When accepting one interchange the number of possible international connections is higher.

Scandinavia only has one high-frequency international connection between Stockholm and Copenhagen. This also means that there are no high-frequency connections between Scandinavia and the rest of northern and central Europe. Between the Scandinavian countries there are a few connections – Gothenburg-Oslo approximately every 4th hour and Stockholm-Oslo one to two connections per day.

There is a connection between Copenhagen and Hamburg every four hours, with a travel time of around 4:30h. Even though the distance in time and the importance of the terminal cities are typical compared to high-frequency international connections, the frequency is bad. The travel time ratio is calculated to 1.1 (1h flight + 3 hours for flight-specific time consumption).

Area	Connection	Frequency (app.)	Travel time (app.)	Flying time (best case + extra time)	Travel time ratio
Scandinavia	Stockholm – Copenhagen	Every second hour	5h	4:15h	1.2
Germany to/from neighbouring countries	Hamburg – Basel and further to Switzerland	Every second hour	6:30h (to Basel)	4:30h	1.45
	Hamburg – Prag	Every second hour	6:45h	6:30h	1.05
	Frankfurt – Amsterdam	Every second hour	4h	4:15h	0.95
	Frankfurt – Brussels	Every second hour	3h	4h	0.75
	Frankfurt – Paris	Every second hour	4h	4:15h	0.95
	Frankfurt – Vienna	Every second hour	6:30h	4:30h	1.45
	München – Vienna (- Budapest)	Every second hour	4h	4h	1.00
	München – Innsbruck (- Italy)	Every second hour	1:45h	-	-
	Stuttgart – Zürich	Every hour	3h	6h	0.5
	Berlin – Amsterdam	Every second hour	6:30h	4:30h	1.45
	Berlin – Basel	Every second hour	7:15h	4:30h	1.6

Night Trains

Night train connections cannot be sorted by frequency. There can only be one during the night with different levels of comfort on the train – sit coaches, couchette or sleeping coach. Until 2016, CityNightLine was the largest night train provider in central Europe, operated by the German Deutsche Bahn (DB). DB withdrew all night trains in 2016 and Austrian ÖBB restarted many of the connections that the CityNightLine already served – now under the name NightJet. At the same time, DB instead started long-distance night connections with usual rolling stock mainly on domestic routes. On top of the NightJet services, there are further domestic and international night train connections. The recently presented network goal 2024 (Zielnetz 2024, presented in September 2020) for the NightJet product does not contain any connections further north than Hamburg.

In Scandinavia, there are mainly domestic night train connections still in use. Current international connections include services between Sweden and Norway (from/to Narvik) and by Transdev-owned train company Snälltåget which serves Berlin and, from 2021, Austrian skiing areas. Both the so-called “BerlinNightExpress” and the night trains to Austria are seasonal which means that the train to Berlin is in service during the summer months, and the Austrian connection during the winter. Until CityNightLine stopped its service in 2014, there were also daily connections from Copenhagen to Amsterdam/Prague/Basel and vice versa. The Swedish government has recently (July 2020) commissioned the Swedish Transport Administration (Trafikverket) to tender night train connections from Malmö to Brussels and from Stockholm to Hamburg. The government has set the start of the services to August 2022.

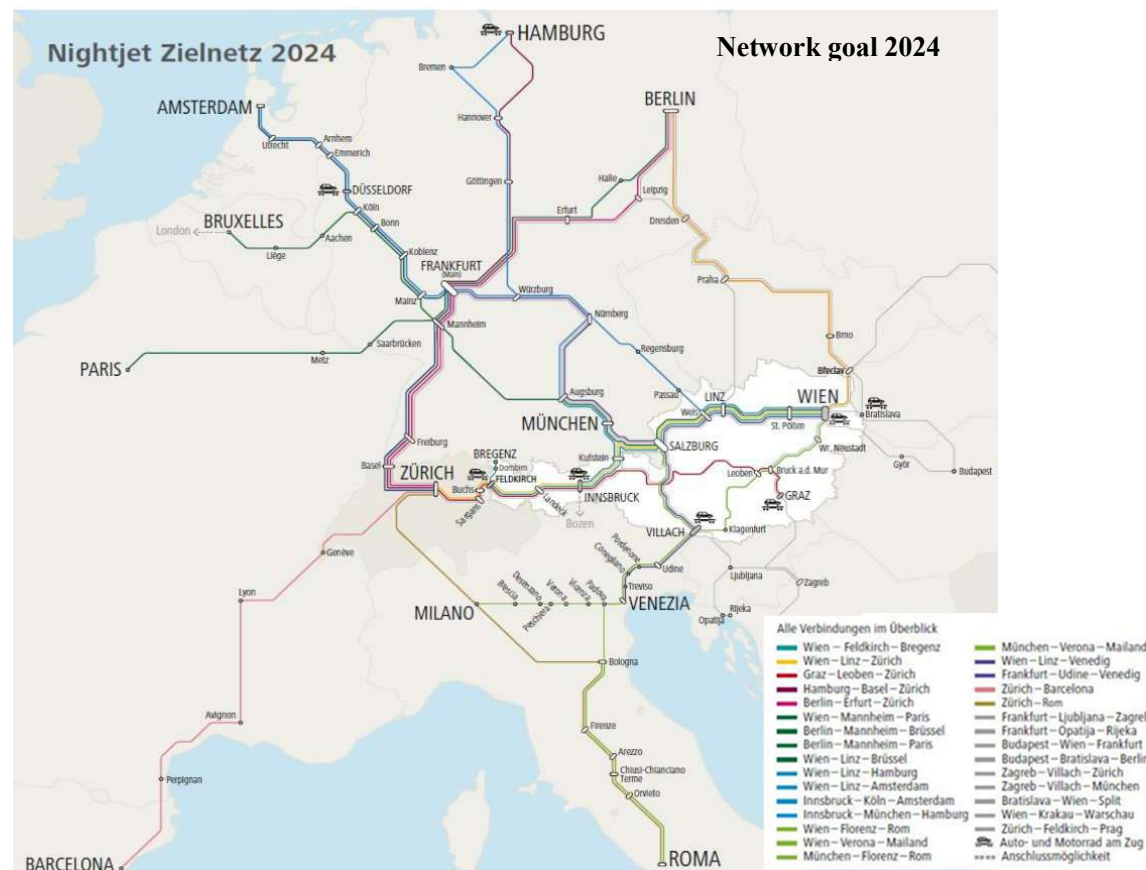
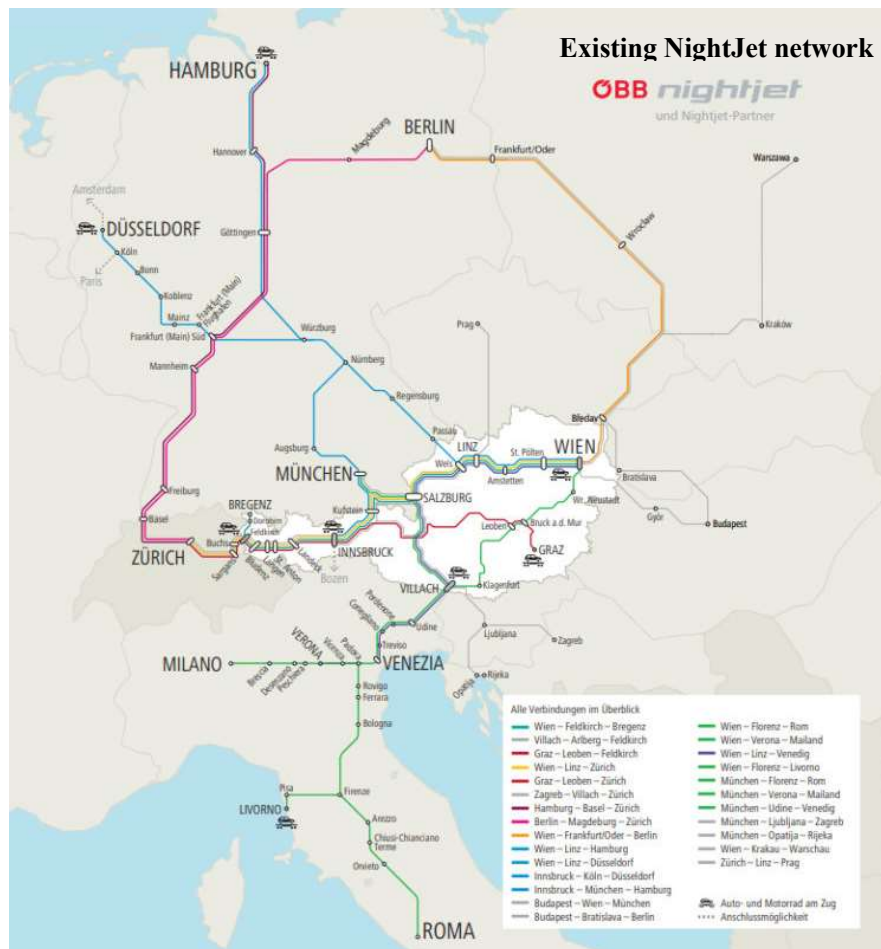
In general, international night trains serve distances longer than 7 hours which is related to the shortest amount of sleep acceptable for travellers. In other words, night trains can service connections that are otherwise not appealing for

travellers. As was listed before, the most frequent day connections have a travel time of between 3 and 7 hours.

Near Future

TEE 2.0 (Trans Europ Express, former international trains in Europe) is a joint project of the big national operators in Germany (DB), Switzerland (SBB), Austria (ÖBB), and France (SNCF). TEE 2.0 includes the NightJet night trains as already described and several day train connections throughout Europe including the named countries as well as Italy, Spain, the Netherlands, Belgium, and Poland.

Scandinavia is outside the scope of TEE 2.0. A more pro-active attitude in Scandinavian countries to international partnerships for better international long-distance rail services to and from Scandinavia could be an important step.





Missing Links

Method – How to Find Missing Links

There are several good international rail connections throughout Europe, but there are also parts where there are missing links. How can a missing link be defined? – We have studied three parameters:

- ▷ number of departures
- ▷ travel time
- ▷ average speed for day trains.

The *first* parameter, the number of departures, entails that there is at least one departure every second hour, in order for a connection to be considered appealing, meaning 7-8 departures per day and direction.

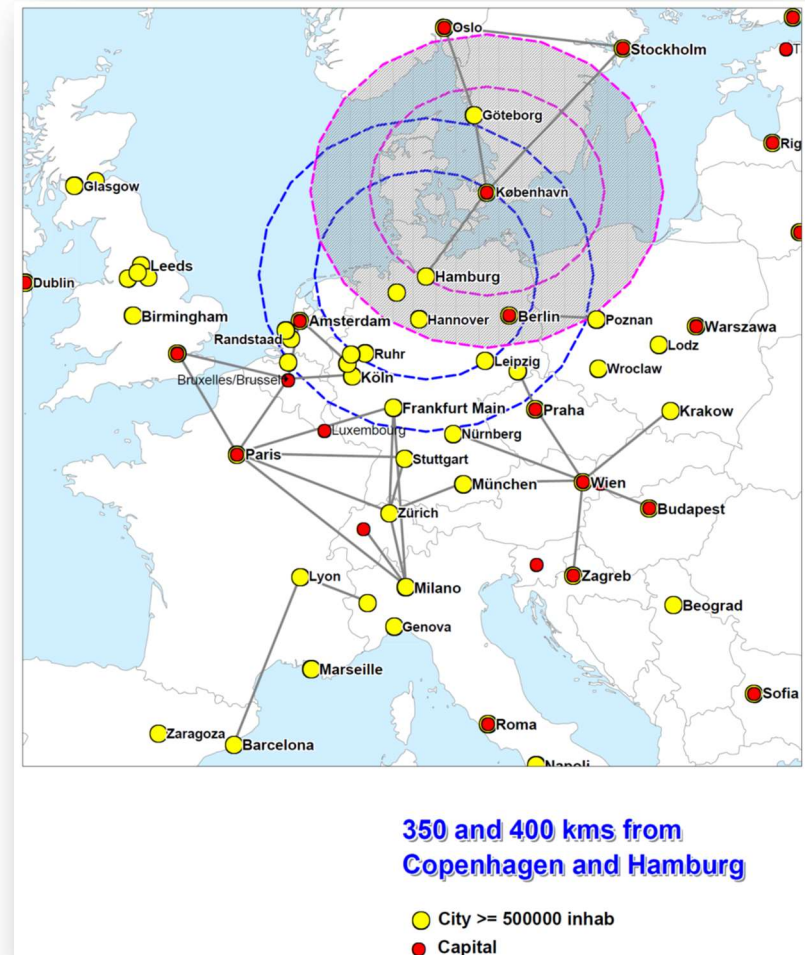
The *second* parameter is travel time. Day return trips are possible if the one way travel time is no longer than 4 hours. If it is under 3 hours it is an attractive connection and the modal split is often more than 50% for train trips.

The *third* parameter, speed, we calculated based on the linear distance. This figure gives a measure of how straight a connection is – low speed based on the timetable and linear distance means that the connection contains detours of some kind. The average speed based on the linear distance shall be over 100 km/h.

If all three parameters are on an attractive level the connection is very good. If one parameter is bad the connection needs to be upgraded and can be addressed as a missing link.

Real missing links are connections that do not exist between metropolitan areas. We have studied metropolitan areas with more than 500 000 inhabitants in Europe. In addition, all capitals in Europe are defined as metropolitan areas even if they have less than 500 000 inhabitants.

In a north European view, the rail connections from Copenhagen and Hamburg are of great interest. To identify real missing links we have checked for metropolitan areas within 300 kilometres and 450 kilometres distance.



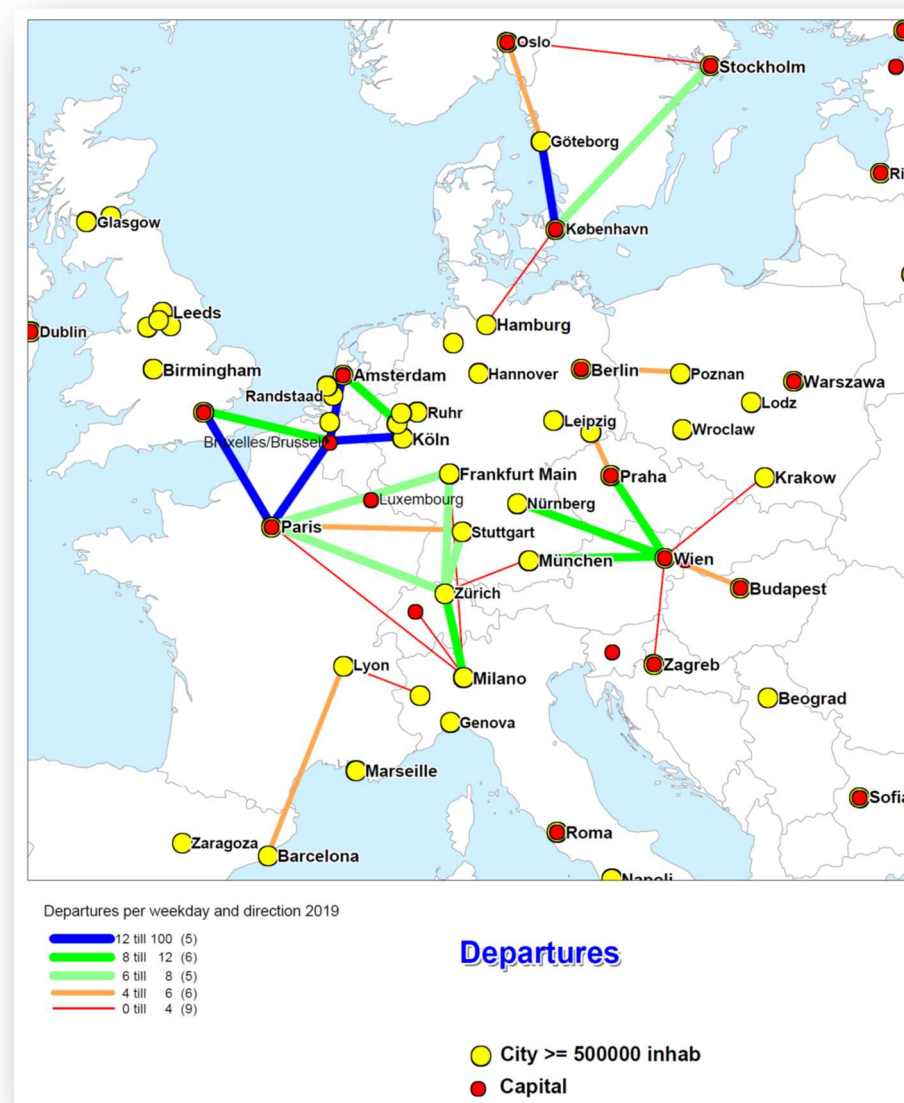
Looking at Copenhagen, there are missing direct rail connections to the metropolitan areas of Bremen, Hannover, Berlin, Poznan, and Oslo. Looking at Hamburg the missing rail connections are to the metropolitan areas of Amsterdam, Randstaad, Brussel, and Prague.

Generally, the two cities of Copenhagen and Hamburg are of great interest in a north European view. They serve as points of attraction and act as main interchange points. Whereas Copenhagen can be reached by day trains from other destinations in Scandinavia, Hamburg has connections to and from central Europe. The Fehmarn-Belt-connection, which will be opened in 2029, will accentuate the important role of these two cities as points connecting central and northern Europe.

1st Parameter – Number of Departures

The *number of departures* (first parameter) to travel from Scandinavia to main metropolitan areas in Europe is insufficient. Between Copenhagen and Hamburg we count only three trains per day. From 2021 there will also be a commercial night train from Malmö and Copenhagen to Hamburg and Berlin operated by Transdev under the brand Snälltåget. However, this train will operate only during the summer months and other main holidays. Further, this night train will only offer seats and couchette.

Compared with other international train connections, the services between Scandinavia and Hamburg are underperforming. Between Germany and other neighbouring countries such as the Netherlands, Belgium, and France to the west, and Switzerland and Austria to the south, there are often hourly services. There is also a frequent connection between Prague and Vienna as well as between Bern and Milano. Connections from Germany to the east, i.e. Poland, are almost as underperforming as to Scandinavia (only four times a day to Warszawa).



2nd Parameter – Travel Time

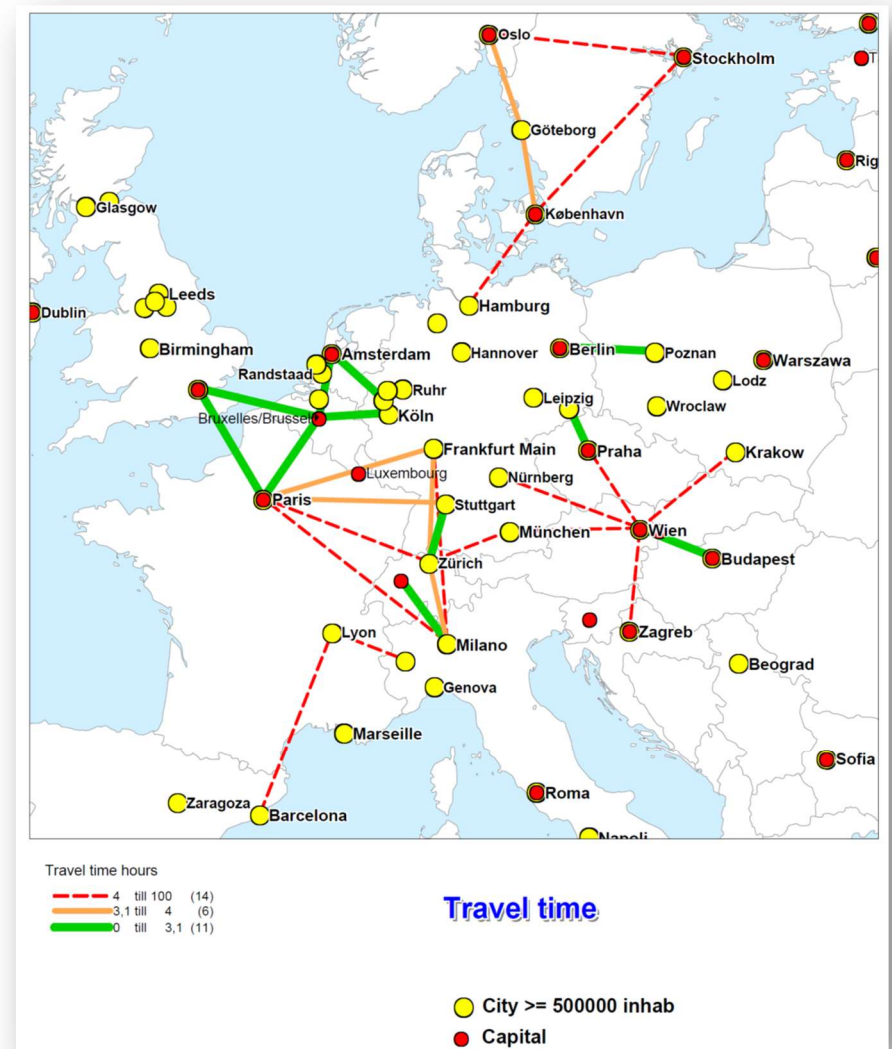
Even if the frequency is sufficient the *travel time* (second parameter) must also be attractive to make the connection appealing.

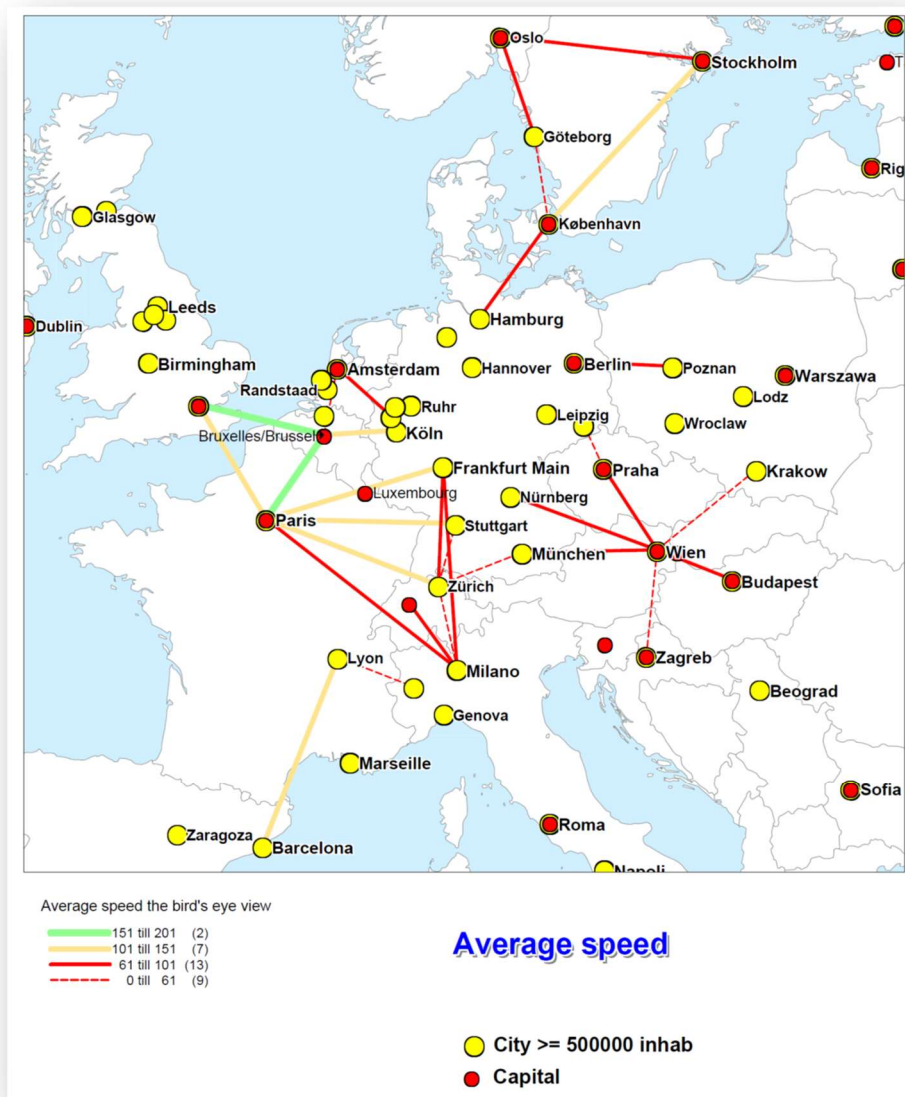
Travel times under 3 hours are found from Brussels to Amsterdam, Cologne, Paris and London. It is also possible to travel between Paris and London, and Amsterdam and the Ruhr area in less than 3 hours. Other attractive connections are Stuttgart-Zürich, Bern-Milano, Dresden-Prague, Vienna-Budapest, and Berlin-Poznan. Traveling from Hamburg to Copenhagen as well as between Italy and France takes far too long compared with the distance.

Within Scandinavia, the connections between Gothenburg and Oslo or Copenhagen are less than 4 hours. The 4-hours limit is also reached between Frankfurt-Paris, Stuttgart-Paris, Frankfurt-Zürich, and Bern-Milano.

3rd Parameter – Average Speed

The last parameter, the average speed in respect to linear distance, is less than 100 km/h in the eastern and southern parts of Europe as well as between Copenhagen and Hamburg. The connection between Amsterdam and the Ruhr area also has an average speed under 100 km/h. The only well-performing connections regarding speed can be found in the west and southwest where the French high-speed lines can be used and between Copenhagen and Stockholm.





Summarizing the Parameters

If we summarize the three parameters, we find that the connection to Scandinavia from central Europe is the most underperforming and the only link that underperforms in all three parameters. All other connections at least have one parameter that is performing well.

Connection	Frequency	Travel time	Speed
Copenhagen-Hamburg	3	4,7	61
Berlin-Poznan	4	2,7	88
Dresden-Prague	5	2,3	53
Prague-Vienna	11	4,0	63
Nürnberg-Vienna	8	4,2	96
München-Vienna	8	4,0	90
Frankfurt-Zürich	7	3,8	80
Frankfurt-Paris	6	3,8	126
Stuttgart-Zürich	7	3,0	54
Stuttgart-Paris	5	3,5	143
Zürich-Paris	6	4,0	122
Paris-London	17	2,3	145
Paris-Brussel	24	1,3	201
Brussel-London	10	2,0	162
Brussel-Amsterdam	15	3,0	58
Brussel-Cologne	12	1,8	102
Amsterdam-Ruhr area	8	2,3	79
Milano-Zürich	8	3,7	59
Vienna-Budapest	5	2,7	80

What Actions are Needed?

Travel times need to be shortened mainly in only two connections – Copenhagen-Hamburg and Nürnberg-Vienna.

There is a need for more frequent departures in seven connections:

- ▷ Copenhagen-Hamburg
- ▷ Berlin-Poznan
- ▷ Dresden-Prague
- ▷ Frankfurt-Paris
- ▷ Stuttgart-Paris
- ▷ Zürich-Paris
- ▷ Vienna-Budapest

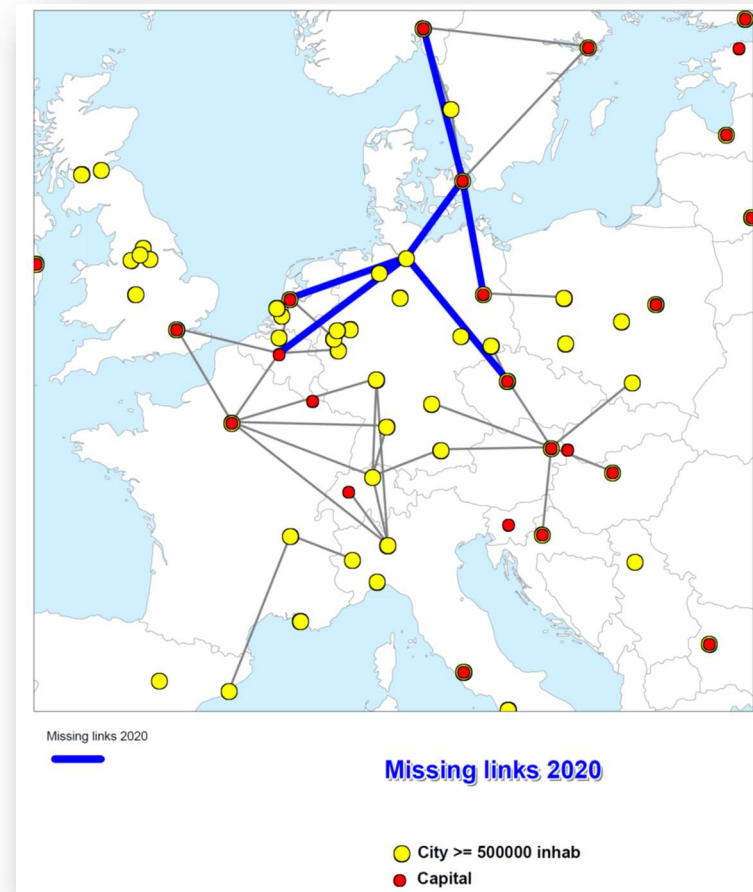
To increase the number of services, it is usually easiest to upgrade the train services between metropolitan areas as this often does not require any significant investments in new infrastructure.

To make train travel more attractive in northern Europe the following actions need to be taken to fill the missing and underperforming links:

- ▷ Night train Oslo/Stockholm-Hamburg
- ▷ Night train Copenhagen-Brussels
- ▷ Night train Copenhagen-Oslo
- ▷ Higher frequency Copenhagen-Hamburg
- ▷ Higher frequency Hamburg-Prague
- ▷ Direct connection Copenhagen-Berlin
- ▷ Direct connection Copenhagen-Oslo
- ▷ Direct connection Hamburg-Amsterdam
- ▷ Direct connection Hamburg-Brussels

To reach adequate travel times, upgraded infrastructure between Copenhagen and Hamburg is needed. This will be solved by the Fehmarn-Belt link that is planned to open in 2029. To take full advantage of this investment there is a

need for upgraded rail infrastructure between Hamburg and Cologne as well as between Hamburg and Amsterdam. In Scandinavia, the missing link between Öxnered (north of Gothenburg) and Sarpsborg (near the Swedish border in Norway) is needed to get attractive travel times between Copenhagen and Oslo.



Looking ahead, there are a number of projects going on that will improve the situation of missing links over the next 10 years. In 2029 the Fehmarn-Belt connection will be ready, including new railways from Copenhagen to Lübeck. At the moment the line between Hamburg and Lübeck is upgraded as part of the S-Bahn project to Bad Oldesloe. Before this DSB plan to put in new electric trains between Copenhagen and Hamburg from 2023. The number of ordered trains allows for a departure every second hour. The travel time will be almost as today.

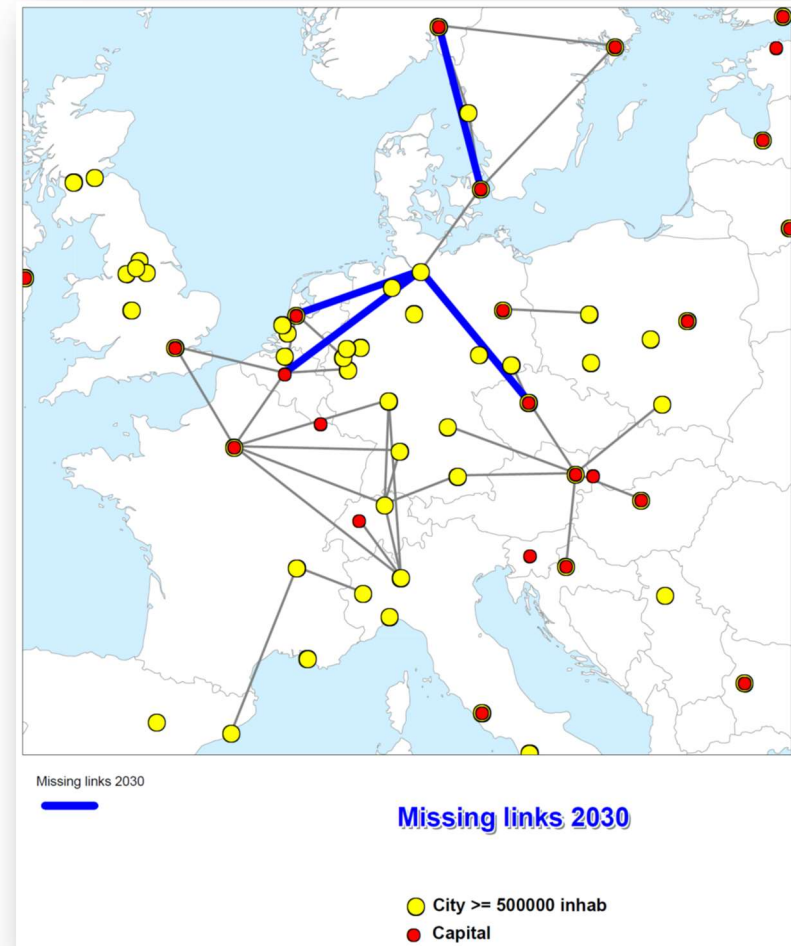
Between Berlin and Dresden, the upgrade to 200 km/h is almost finished and will help cut travel times between Hamburg and Prague. The last missing link is between Dresden and Prague.

In Scandinavia upgraded links will open on the Swedish West coast line between Helsingborg and Ängelholm (2023), a new tunnel through Varberg (2024), “Västlänken” under Gothenburg (2026), and “Follobanen” south of Oslo (2022).

In the latest Norwegian national plan “Nasjonal transportplan 2018-2029” double track to Fredrikstad shall be built in the first part until 2024 and the double track to Sarpsborg until 2029. The rest part of the railway to the Swedish border is not part of the plan before 2030.

In the Swedish national plan, “Nationell plan för transportsystemet 2018-2029” there is no money at all for the railway between Öxnered and the Norwegian border. In 2029 when the fixed Fehmarn link opens, there will be a high standard railway from Copenhagen to Öxnered and from Sarpsborg to Oslo. However, there will still be a missing link to get full high speed between Copenhagen and Oslo.

In Germany, there are no plans to upgrade the railway between Hamburg and Cologne and between Osnabrück and the border to the Netherlands.



A Closer Look at the Öresund Links

Infrastructure Conditions for Improved Connections between Scandinavia and Central Europe

Good railway infrastructure is an important condition for fast train connections between Scandinavia and central Europe. At present, the infrastructure is deficient, but there are decisions and plans for major improvements.

The Fehmarn Belt connection is under construction and includes a tunnel as well as an extension of the connecting railways for up to 250 km / h and a double track. With the Fehmarn Belt connection, travel time between Copenhagen - Hamburg will be reduced from 4.5 hours to less than three. The inauguration is planned for 2029.

In Sweden, a high-speed line Stockholm - Malmö is planned for up to 320 km / h, which would reduce travel time from 4.5 hours to less than 3 hours. On the West Coast Line (Malmö-Gothenburg), the worst single-track bottlenecks are about to be removed. There are also plans to upgrade the West Coast Line to 250 km/h and build a tunnel through the city of Helsingborg.

What remains is the lack of sufficient infrastructure between Malmö - Copenhagen, where train traffic is so dense that high-speed trains end up in a queue behind regional trains and, thus, cannot maintain a higher average speed than the latter. There are no expansion plans for high-speed trains across the Sound. Another weakness with the current infrastructure is that trains between

Sweden and Europe cannot reach Copenhagen Central Station without changing direction, which is time-consuming and risks leading to disruptions.

The table below shows the most important railway links within Scandinavia and to Hamburg.

	Distance	Travel time today	Average speed today	Travel time planned ¹	Average speed planned
Stockholm – Malmö	613 km	4h 25min	139 km/h	2h 45min	223 km/h
Gothenburg – Malmö	272 km	2h 20min	117 km/h	1h 55min	142 km/h
Malmö – Copenhagen	43 km	45min ²	57 km/h	45min ³	57 km/h
Copenhagen – Hamburg	335 km	4h 40min	72 km/h	2h 40min	126 km/h

On the Swedish coast in the province of Scania, there are several plans for a new connection across the sound. For many years, the city of Helsingborg has been working on a connection to Helsingør in Denmark (the so-called HH-tunnel), the city of Landskrona advocates for a tunnel between Landskrona and Copenhagen (“Europaspåret”, Europe link), and the city of Malmö favours a metro connection between Malmö and Copenhagen (Öresundsmetro). All these plans have grown from a municipal perspective but none of the plans lead to cut travel times for long-distance trains.

¹ Planned infrastructure investments are: high speed line Malmö – Stockholm for 320 km/h, development of the West Coast line to full double track and 250 km/h, Fehmarn Belt-link for 250 km/h.

² 35 min + 10 min extra for direction change at Copenhagen central station.

³ 35 min + 10 min extra for direction change at Copenhagen central station.

For long-distance train services, there are four important nodes to be reached in the Öresund region – Copenhagen, Copenhagen Airport, Malmö, and Lund. After these, Helsingborg follows. This regional hierarchy can be supposed to be valid in the long term. It is also of importance that all these stations are located in the city centres which makes it possible for long-distance night and day trains to compete with the airlines.

The suggested HH-tunnel from Helsingborg to Helsingor with a new railway line via Høje Tåstrup in the outskirts of Copenhagen covers none of these four places of importance in the Öresund region. Further, none of the recent Danish governments, independent of political colour, has shown interest to invest in railway infrastructure in the northern part of Sealand. This, however, would be a condition for a meaningful HH-tunnel. Europaspåret, the suggested connection between Landskrona and Copenhagen, reaches central Copenhagen but misses the rest of the most important nodal points in the region. From a national point of view, the Öresundsmetro between Malmö and Copenhagen is not of importance, except for its contribution to relieving the Öresund Bridge.

An adequate goal for a new Öresund link can be described as followed:

- ▷ Reaches the four to five most important places with centrally located stations in the Öresund region.
- ▷ Enables faster international long-distance train services (regional needs are already well met).
- ▷ Improves capacity for regional, long-distance, and freight trains.
- ▷ Reduces vulnerability in the railway system

Considering these goals, creating a new railway link for fast passenger trains connecting Malmö, Copenhagen Airport and Copenhagen should be prioritised. This connection would free capacity on the existing Öresund Bridge. The question about the exact nature of the infrastructure solution is of minor interest in the early stages.



A new high-speed connection between Malmö and Copenhagen would cut the travel times between these cities by half, not least because a direction change in Copenhagen would no longer be needed. Furthermore, it would be possible to reach the four most important population centres in the region from Stockholm. While Helsingborg would also be accessible from Gothenburg and Oslo.

From a regional point of view, travel times can be cut – even for Landskrona and Helsingborg – and travel times would be shorter between Malmö and Copenhagen compared to the Öresundmetro.

On both sides of the sound, the link can be connected to existing railways which reduces infrastructure costs. With two railway links, the vulnerability of the Malmö – Kastrup – Köpenhamn connections can be reduced.

3

Ankomst 22.08

DSB Lys

Sti	Station	Arriv
61-62	E	
71-72	D	
81-82	C	

Next train: Toke to Østerport
Service: D



Spørre
Track

26 ↑

Rejs ikke uden billet eller kort,
det koster 750 kr. i kontrolafgift.

Passengers without a valid ticket
are liable for a 750 DKK fine.

DSB

4

DSB Re

Tog til
Hellerup

Næste tog
22.27

Tog til
Halmstad C

Afmit
C



Policies today

Fourth Railway Package

The 4th Railway Package is a set of 6 legislative texts designed to complete the single market for Rail services (Single European Railway Area). Its overarching goal is to revitalise the rail sector and make it more competitive vis-à-vis other modes of transport.

It comprises two ‘pillars’ which have been negotiated largely in parallel: The ‘technical pillar’ and the ‘market pillar’

The market pillar will complete the process of gradual market opening. It establishes the general right for railway undertakings established in one Member State to operate all types of passenger services everywhere in the EU, lays down rules aimed at improving impartiality in the governance of railway infrastructure and preventing discrimination, and introduces the principle of mandatory tendering for public service contracts in rail. Competition in rail passenger service markets will encourage railway operators to become more responsive to customer needs, improve the quality of their services and their cost-effectiveness. The competitive tendering of public service contracts will enable savings of public money. The market pillar is expected to deliver more choices and better quality of rail services for European citizens.

The technical pillar is designed to boost the competitiveness of the railway sector by significantly reducing costs and administrative burden for railway undertakings wishing to operate across Europe. In particular, it will:

- ▷ save firms from having to file costly multiple applications in the case of operations beyond one single Member State. ERA (EU agency for railways) will issue vehicle authorizations for placing vehicles on the market and safety certificates for railway undertakings, valid throughout the

EU. So far, railway undertakings and manufacturers need to be certified separately by each relevant national safety authority.

- ▷ create a “One stop shop” which will act as a single entry point for all such applications, using easy, transparent, and consistent procedures.
- ▷ ensure that European Rail Traffic Management System (ERTMS) equipment is interoperable.
- ▷ reduce the large number of remaining national rules, which create a risk of insufficient transparency and disguised discrimination of new operators.

The fourth railway package is, thus, forming a framework concerning regulations and rules. It does not address infrastructure needs. The package is being implemented and many of the areas are already in place.

TEN-T

The Trans-European Transport Network (TEN-T) policy addresses the implementation and development of a Europe-wide network of railway lines, roads, inland waterways, maritime shipping routes, ports, airports, and railroad terminals. The ultimate objective is to close gaps, remove bottlenecks and technical barriers, as well as to strengthen social, economic, and territorial cohesion in the EU. If we call the fourth railway package the administrative framework, TEN-T is the infrastructural framework.

TEN-T comprises two network ‘layers’:

- ▷ The **Core Network** includes the most important connections, linking the most important nodes, and is to be completed by 2030.
- ▷ The **Comprehensive Network** covers all European regions and is to be completed by 2050.

The backbone of the Core Network is represented by nine Core Network Corridors, which were identified to streamline and facilitate the coordinated development of the Core Network. One of the two horizontal priorities is the European Rail Traffic Management System (ERTMS).

As can be seen on the map, the nine core corridors are a giant project of its own – and severely delayed. From a north European perspective, the network covers the missing links as described above. From this point of view, the network is satisfying.

However, there is no clear prioritization of projects within the corridors. In addition, many projects are underfunded (EU funds can at most contribute 40% of the total cost). Therefore, the core network is at great risk of being incomplete and unoperable by the 2030 deadline.

In any federal system, the interests of the member states and the supranational authority (in this case the EU) can be diverging. To have a clear picture of the priorities from a federal point of view, and the economic strength to succeed with the prioritized missions/projects is of importance to meet the infrastructural needs.





Market Access

Train Paths and Technical Regulations

Applications for international train paths are well organised. The organisation RailNetEurope consists of a majority of the European authorities responsible for railway infrastructure and capacity distribution. In 2004, a network of One-Stop Shops representing the infrastructure authorities in international traffic was established. They constitute a single point of contact for the entire international route of rail service. Certainly, this simplifies the application process. However, it is still difficult to get attractive train paths. This circumstance explains the common cooperation between the countries' market leaders where frequent international connections are combined with national long-distance services. For new operators, this can be a disadvantage, for the society in general, however, the efficient use of infrastructure and the importance of stable pulse timetables are important for an attractive rail system.

To be able to apply for train paths internationally, every country's regulations as described in their network descriptions have to be fulfilled. An important condition of fulfilling the national regulations is the equipment of the vehicle (electrical system, safety system, signalling, etc). Vehicles used in different countries must be approved by the national authorities in each country – with the safety system as an Achilles heel. In the last decades, this has led to a standardization of locomotives in the freight train sector. The big railway industry players as for example Siemens and Bombardier offer products that are approved in several countries (locomotive families as TRAXX by Bombardier or Vectron by Siemens).

The passenger train sector has in the same period developed from the traditional locomotive with coaches to more and more multiple unit trains. Even though most of the sold products are built on a standardised platform, it is far less usual

that the products already are approved for several countries. This leads to expensive approval tests in the countries where the vehicles will be used. If there are not far-reaching plans for international services at the moment of purchase, the costs for the approval process might be an obstacle for future international services. There are, however, examples of railway companies that are choosing a traditional locomotive and coaches set-up. The Danish railway DSB ordered Siemens Vectron locomotives that, besides national services, will be used for services to Hamburg, together with new Talgo coaches (max. speed 200 km/h; the trains will be used from 2023). The Austrian RailJet is another example of international trains using locomotives (Taurus) and coaches. Night trains also use this more traditional set-up, in some cases with a change of locomotive at the borders. The ERA has furthermore begun issuing single safety certificates and vehicle (type) authorisations valid in multiple European countries and to ensure an interoperable European Rail Traffic Management System, in the development and implementation of the Single European Railway Area. Their first vehicle authorisation was implemented in mid-2019 and might be the cornerstone for more internationally operatable vehicles.

Track Fees

The fees aim mainly to charge for wear and tear (in some cases including reinvestments in infrastructure), or to control capacity utilization. However, fees for "soft variables" such as noise, accidents, and pollution are uncommon. Fees per train kilometre are most common, sometimes combined with a fee per ton kilometre. Fixed fees for example per operator or per traffic month have been used in some countries but have been removed, in some cases following criticism from the European Commission. The coverage ratio, meaning how much of the infrastructure costs are covered by the track charges varies from 5% to more than 60%.

How charges are collected and at what level varies significantly.

As the many day train connections in Europe show, this does not appear to be an obstacle for international train services. Concerning night trains the situation is different. The price sensitivity is larger which can be explained by the differences in usage of the vehicles and the vehicles' special equipment. In general, a train set for night train connections can only be used once per day. Every seat (or bed) can, thus, only be sold once a day as well. Together with lower capacity in sleeping and couchette coaches, and with expensive track fees, this can lead to high ticket prices that are difficult to uphold on a market with low price airline connections. The difficult market situation led to an insecure future for this type of train service. In 2016 the former "CityNightLine" services throughout Europe disappeared and, approximately at the same time, many night train connections in Sweden were threatened. The CityNightLine network was partially saved by the new NightJet and the Swedish night trains continued their services as well. However, this period left Scandinavia with almost no night train connections to central Europe (except Snälltåget night train to Berlin during the summer months). Fortunately, the interest in night train services has grown again, likely due to more public awareness concerning climate change.

Ticketing and Passenger Rights

Tickets for international train services are often difficult to buy. Most railway companies sell tickets online for their domestic market, in some cases (e.g. German DB, www.bahn.com) they also sell international tickets, but not for all connection, railway operators, and countries. "One stop shops" for buying tickets are plentiful when it comes to air travel. These air travel search engines combine possible travel options for the chosen departure and arrival airport – independently of where and which airline. One stop shop search engines are still rare for travels by train. The search engine Trainline (www.thetrainline.com) is one of these rare examples. However, Trainline can only sell tickets to trains they get access to and are in need of bilateral agreements with every railway

company. The reason for this situation is that railway companies are not obliged to share all data. One stop shops for train tickets are, thus, unattractive for one stop shop solutions.

For international train connections, it is common to have a multi-leg connection which often includes several operators. If there are no agreements between the operators of the chosen connection (no obligation), every company is responsible only for its own part of the journey. The customer hence bears the risk of missing connections due to delays in one leg of the travel chain. From the customer's point of view, "Through tickets" would be the solution to this problem. Through tickets mean that the customer only has one contract, independently of how many operators that are involved in the journey. They include assistance, re-routing, and compensation.



Six Policy Suggestions

Even though many aspects concerning the development of international long-distance rail services are heading in the right direction, the changes are slow and some fields can be covered in a better way. Despite this report's focus on northern Europe, the following suggestions are of general nature. The suggestions are as well in line with the "Sustainable and Smart Mobility Strategy" (COM(2020) 789).

Reduced Track Fees for Night Trains

Track fees vary across Europe. Despite that, there are many international connections, at least in central Europe. Infrastructure gaps and ticketing appear to be of greater importance in enabling international rail services.

However, concerning passenger trains, for night trains with their special conditions concerning rolling stock and the resulting limitations, track fees can be an obstacle. A reduction of track fees for night trains can therefore be a solution for improving the competitiveness of rail vis-a-vis other, less climate-friendly, modes of transport.

One Stop Shops for International Train Tickets

Buying international train tickets can be very complicated and is a big obstacle for convenient journeys by rail. One stop shops, as known from air travel, are rare, and the few that exist need to conclude separate agreements with every rail operator.

A mandatory sharing of data concerning times and prices as well as mandatory permission for third party ticket sale can change this situation. In this case, air travel can be seen as a good practice.

Strengthened Passenger Rights

Passenger rights are connected to the overall availability of tickets. Even if a client managed to buy a multi-leg train journey, it is likely that every part of the journey is a separate agreement which leaves the client with the risks at nodes where changes between different operators are made.

One journey, one ticket, one contract for the passenger helps to secure the clients' journey even with several changes of operator. This is called "through traffic" and is for example practiced on a national level in Switzerland. With the principle of "through traffic", the client will be helped in situations when re-booking, compensation, or stay-overs are needed.

Higher Priority to Missing Links

The TEN-T network is large and needs better prioritization for economic resources to be used strategically. The identification of missing links can be used as a basis for such prioritization. From a north European perspective, this includes for example the link between Hamburg and Köln, a new Öresund link, intra-Scandinavian links such as Oslo/Stockholm-Copenhagen, and the Fehmarn Belt link. These important links can be higher prioritized.

It is of importance to better prioritize between railway projects and to support those of large impact from a European point of view (international, long-distance rather than regional focus, even though these two often are tightly interconnected) with more financial resources.

Facilitate Fast Internationalisation of Rolling Stock

Vehicles for passenger trains need to get more international. The freight sector appears to be better internationalised than the passenger train sector, which is a problem that needs to be addressed. ERA (EU agency for railways) nowadays is mandated to issue single safety certificates and vehicle (type) authorisations

valid in multiple European countries and to ensure an interoperable European Rail Traffic Management System, in the development and implementation of the Single European Railway Area. It is of importance that internationally operable rolling stock is becoming a standard solution. Here, the road vehicle sector is a good example. Even though the rail sector has different conditions and challenges, the EU should seek to establish a common European authorization process. The more vehicles that can be used in more than one country, the faster railway operators can react to market changes and start operating international connections.

Proactive Coordination and Facilitation of Cooperations on an Open Market

The European railway market is slowly opening up, paving the way for more competition and operators. At the same time track capacity in the heavy corridors is limited. As already done today in most of the international connections, national services as part of high- frequency timetables are woven together with international trains by extensions over borders. This saves capacity and grants for high-quality national services but requires cooperation between operators.

The TEE 2.0 is, thus, a good example of more international cooperation. However, more operators should be included in similar initiatives. The EU can serve a role as coordinator and facilitator for cooperations. This can be done by ERA as an authority, or by the commission on a political level. Both levels have advantages. Whilst a coordinating and facilitating role on a political level can lead to fast decisions even concerning economic aspects, the authority solutions can be assessed to be more stable over time and less depending on political majorities with different agendas.



