

Van: Frank Menger

Onderwerp: Lobby Lelylijn waar een belangrijke speler onbenut blijft

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Geachte leden van de staten en gemeenteraden,

Intussen blijkt dat Noord-Nederland niet de secundaire netwerken gebruikt om haar punten te maken. De recente publicatie die u als bijlage vindt is opgesteld door de vereniging Deltametropool met als stedelijke partners Amsterdam, Den Haag en

Eindhoven: <https://deltametropool.nl/projecten/a-economic-strong-just-and-climate-proof-eurodelta/>

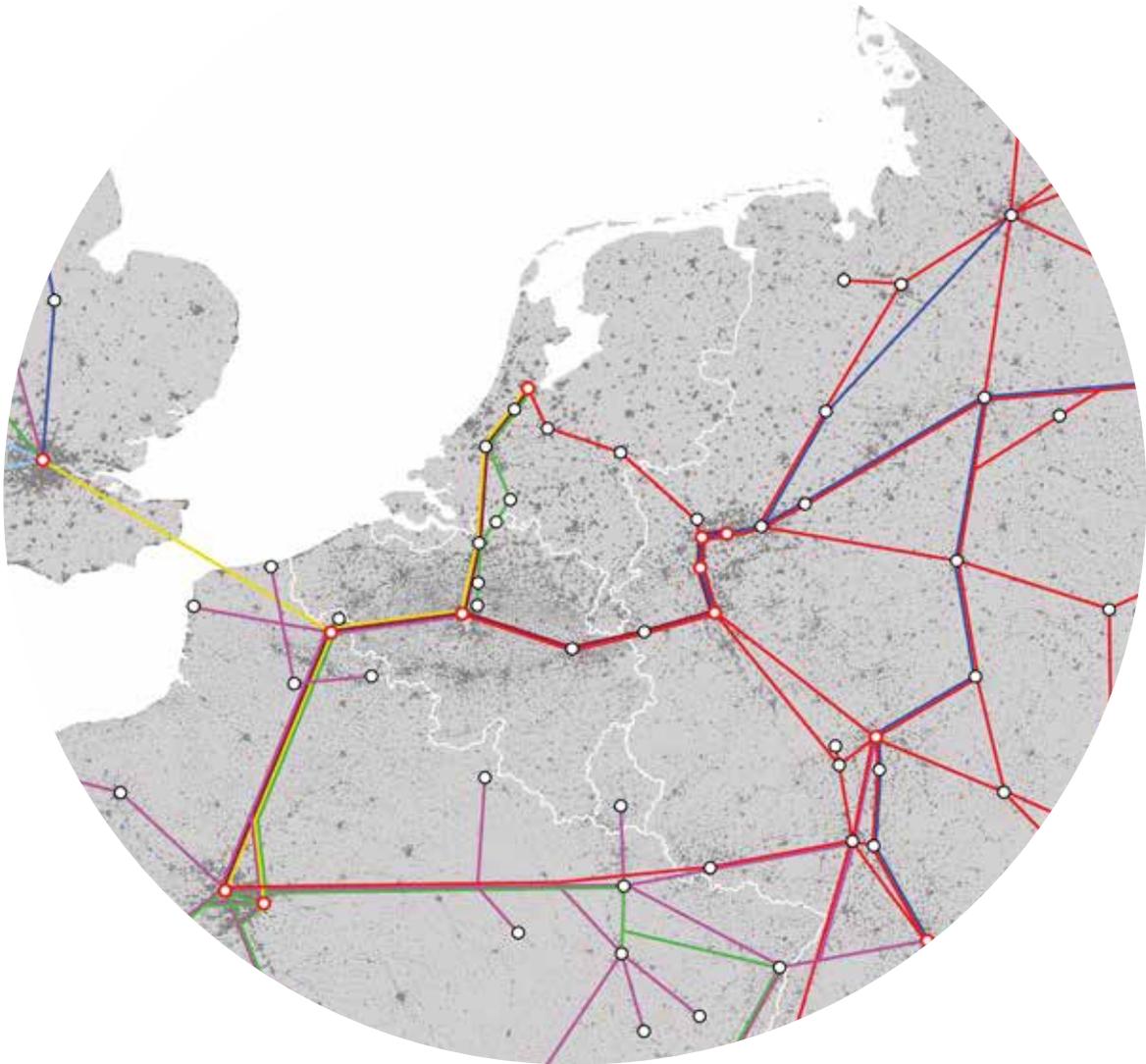
Dit is de uitkomst van een eerder project dat bijna een jaar gedraaid heeft. Door niet structureel onze eigen agenda ook binnen Nederland in andere relevante netwerken uit te dragen zijn we weer in staat om de aansluiting te missen. *Als je niet meedoet wordt je ook niet gevraagd.* Dit is een van de lessen die sinds het afserveren van de Zuiderzeelijn niet geleerd is zowel bestuurlijk als zeker ambtelijk. Bij dit project hoorde de gemeente Groningen wegens zwaarwegende stedelijke belangen Noord-Nederland te vertegenwoordigen namens Noord-Nederland. Zoals Eindhoven dus doet namens Zuid-Nederland.

Doordat de agenda niet op orde is lopen we voor de **Lelylijn** intussen al weer achter de feiten aan in plaats via een andere route ons punt duidelijk te maken? Overleggen met het Rijk met betrekking tot het BO-MIRT is maar een onderdeel van het verhaal. Blijkbaar voor de bestuurders van Noord-Nederland het enige verhaal dat ze kennen? Want via dit soort projecten kan je ook meer partners voor je project krijgen buiten het Rijk om.

Hoop dat u deze informatie gaat lezen en uw eigen conclusie gaat trekken.

Met vriendelijke groet,

Frank Menger



Redesigning the Eurodelta

how to strengthen the EU economy and
create a just and climate proof
Eurodelta

SURE

SURE, the Strategic Urban Region Eurodelta is an offspring of METREX: Network for European Metropolitan Regions and Areas.

The SURE group constitutes of a broad network of spatial and policy practitioners and contributes to stronger partnership between the cities and regions in the Eurodelta, this by the exchange of knowledge, experience and projects on the Eurodelta scale.

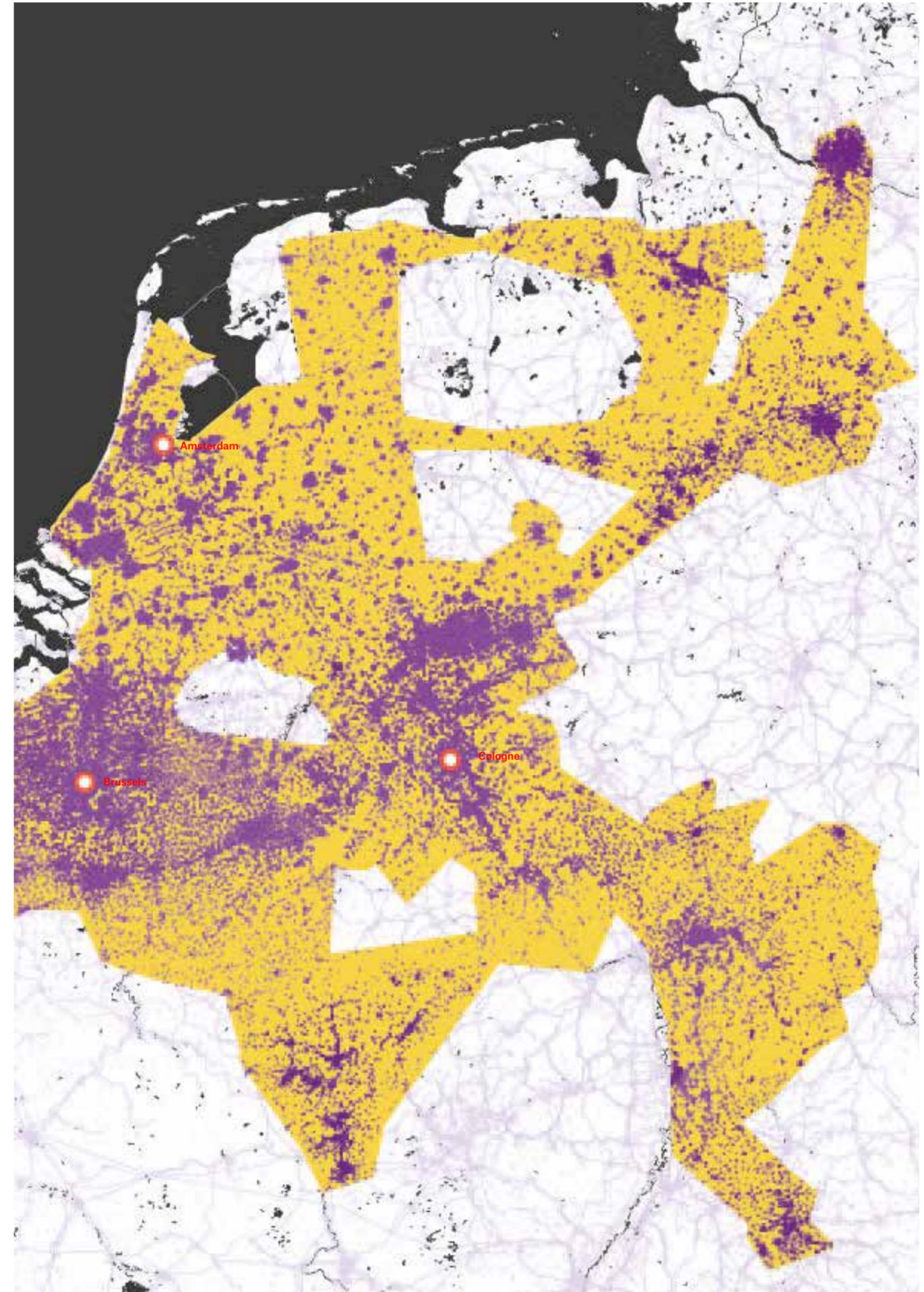
The territory of the Eurodelta consists of the river delta from the Rhine, Scheldt and Meuse and the urban polycentric network of smaller, medium and larger sized cities, such as:

- in the Netherlands: Metropolitan regions: North-, South-Holland and Brabant; the cities: Amsterdam; The Hague; Rotterdam; Eindhoven
- in Germany: Metropolitan region Rhineland and cities: Cologne; Düsseldorf; Aachen; Bonn
- in Belgium: Metropolitan region Brussels and the cities: Brussels; Antwerp; Gent
- in France: the Metropolitan region Lille, and Paris (Paris is only participating).
- furthermore, the Dutch Deltametropolis Association, a think-tank on metropolitan development in Northwest of Europe is a partner.

Jointly, we looked at the benefits of a high-speed network for a mega region, as improving the international high-speed network in European mega region is important to:

- improve or at least maintain the EU global economic position, post Brexit
- strengthen the European network of mainly mid-sized cities
- switch to a more sustainable economy and thus also sustainable transport.

the Eurodelta,
the combined potential reach within 2 hours train
travel of Amsterdam, Brussels and Cologne



Go Europe, Go Rail

Introduction

Never waste a crisis and we are hopeful that the COVID 19 crisis will push forward the European Green Deal (EGD). However, the proposed deal lacks the needed support for a trans-European high-speed passenger train network. Even though the benefits of such a network will favour several actions of the EGD, them being the European Union (EU) as a global leader, a just transition and investing in a climate neutral economy.

Challenges

The European Union has several challenges on the front burner, such as the Paris Agreement, Brexit and COVID 19. Where in retrospect the Paris Agreement and Brexit seemed only preludes, with COVID 19 the vulnerability of our economic system has become tangible for all. Non-surprisingly this has sparked the debate on how to move forward. All these challenges demand a substantial change of our economy and moreover our urban areas and infrastructure. The EU economy is large and is based on long legacy; especially the latter could become a dialectics of lead as the economies of Asian countries are using the newest technology in their rapid growth. As a result, the EU members have to reinvent themselves if we want to, at least, consolidate the EU position in the global economy.

European Green Deal

The EGD could be our big leap forward as it is positioned as the European "roadmap for making the EU's economy sustainable. This will happen by turning climate and environmental challenges into opportunities across all policy areas and making the transition just and inclusive for all." Yet, looking at the actions described in the EGD so far, we wonder if they are sufficient for a sustainable EU, and not just its economy? The time is now, as we see that the current crisis also has created opportunities to speed up the EGD agenda and implementation, for instance several European national

governments have set sustainable terms to companies, in order to get financial support. France could push its short haul flights to rail, as it has the needed high-speed passenger train network to do so. The absence of the trans-European high-speed train network in the EGD contrasts in particular with earlier set EU ambitions for such a network. Two highlights of those ambitions are as follows. In 1996, the decision of the European Parliament and of the Council on the community guidelines for the development of the trans-European transport network (TEN-T) stated that such a network plays a key role in the Europe 2020 strategy for smart, sustainable and inclusive growth. TEN-T's objectives include the interconnection and interoperability of national transport networks, the optimal integration and interconnection of all transport modes, and the efficient use of infrastructure. By doing so the TEN-T programme serves the goals of economic development, regional competitiveness, regional and social cohesion, and environmental sustainability.

In the Roadmap to a Single European Transport Area – Towards a competitive and resource-efficient system (2011), the European Commission has set the following specific passenger traffic targets for high-speed rail: By 2030, the length of the existing high-speed rail network should be tripled so that, by 2050, most medium-distance passenger transport, about 300km

and beyond, should be by rail. High-speed rail should grow faster than air transport for journeys of up to 1 000 km, and by 2050, all core network airports should be connected to the rail network, preferably by high-speed services.

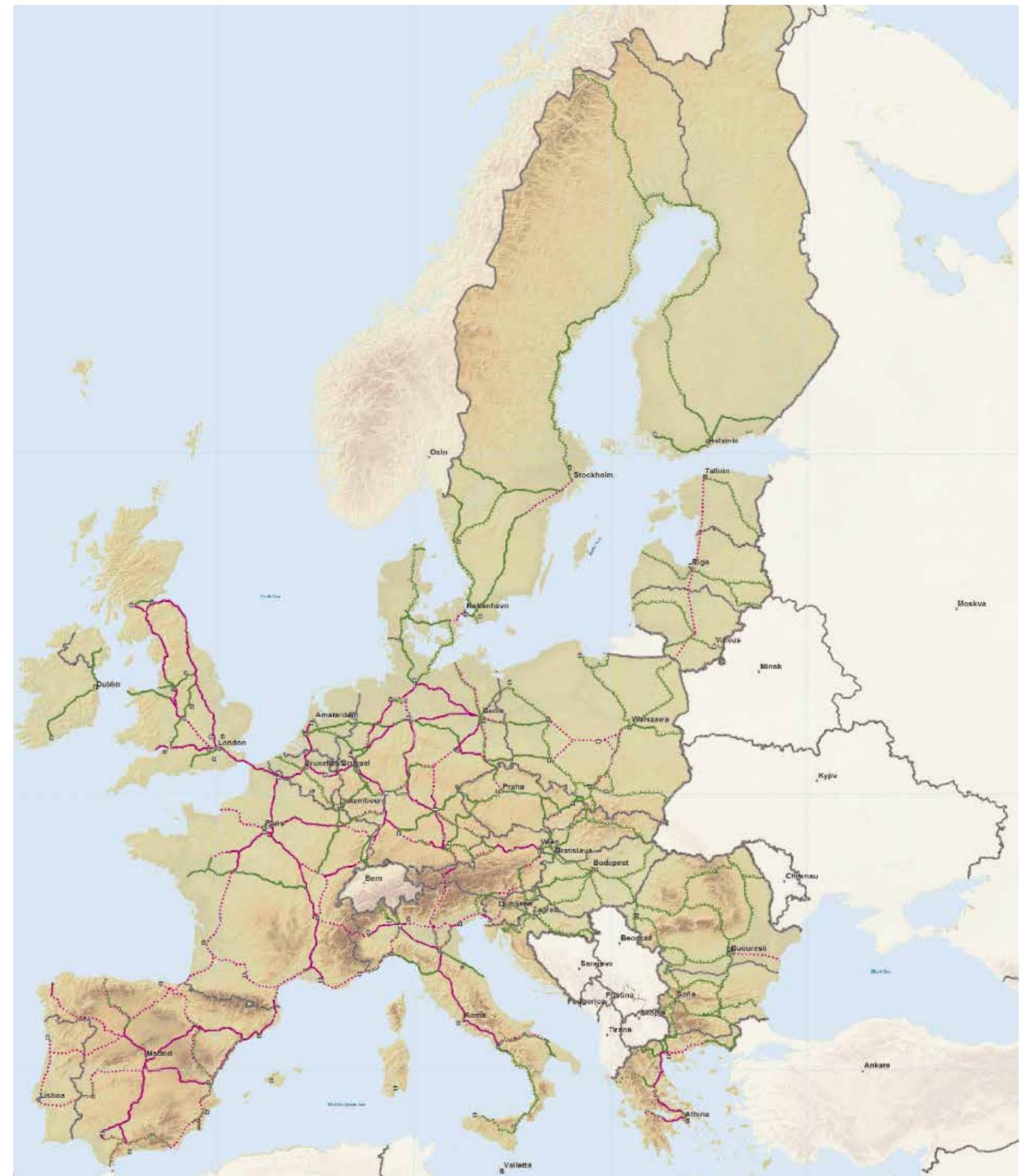
From these ambitions, one could conclude that a trans-European high-speed train network is well positioned in the EU's future ambitions. However a recent research of the European court of Auditors (ECA, 2018) shows: the European high-speed rail network is not a reality, but an ineffective patchwork. "Although the length of the national high-speed rail networks is growing, the Commission's 2011 target of tripling the number of kilometres of high-speed rail lines by 2030 will not be reached." To this conclusion, the Commission responded that: "The Commission considers that the deadlines for the development of the TEN-T set out in the Regulation are binding and it makes every effort to ensure that the deployments of the high-speed railway infrastructure concerned are made in a concerted and synchronised way across the EU. The tool of the core network corridors has been specifically designed to maximise synergies between the efforts made by different Member States and their infrastructure managers."

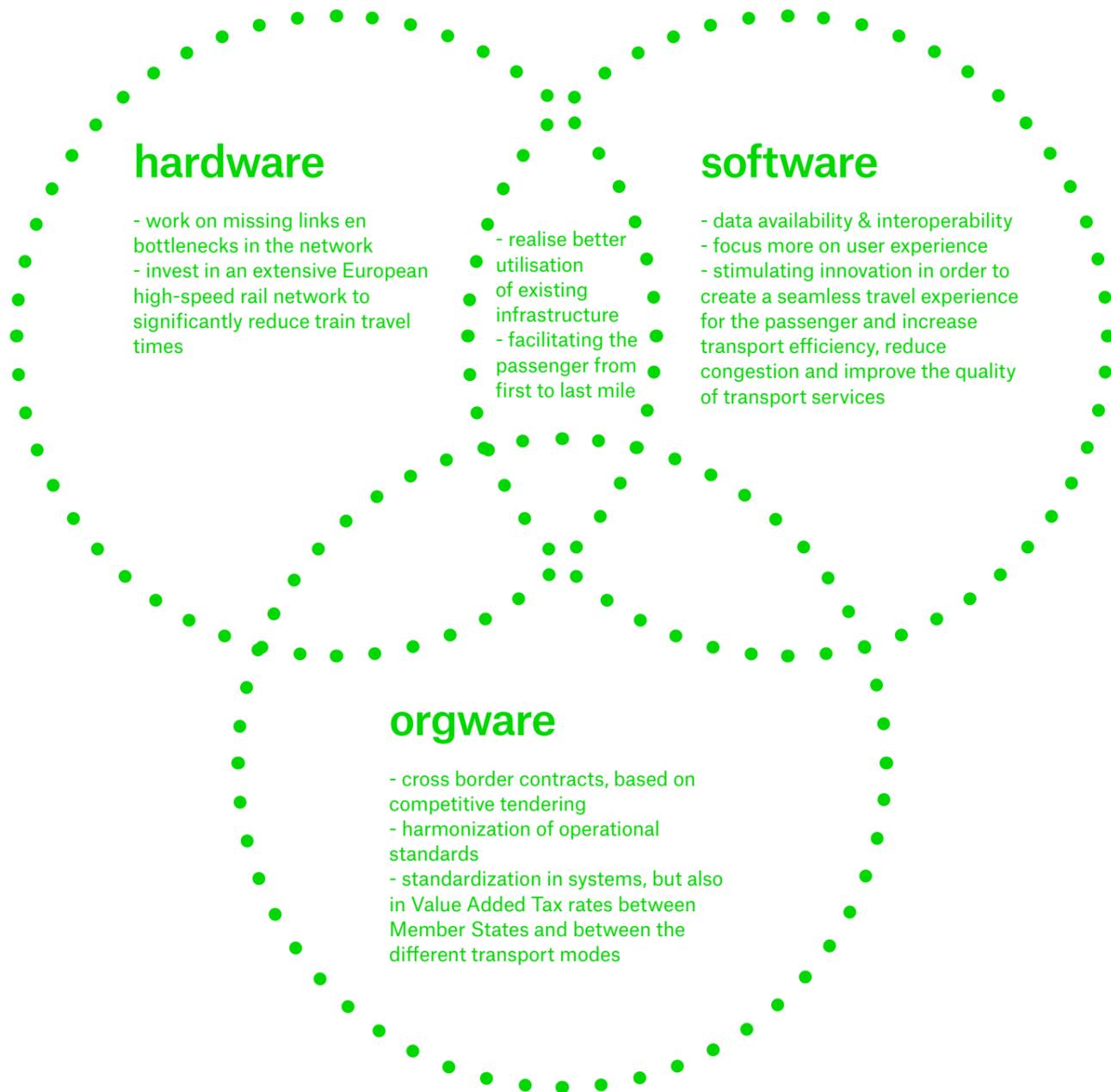
We understand the point of view of the EC, however the conclusion of the European court of Auditors is clear. We hope that a direct mentioning of the advantages of a high-speed

Legend

- Core Network conventional rail
 - completed
 - to be upgraded
 - planned
- Core Network high speed rail
 - completed
 - to be upgraded to high speed rail
 - planned

European Core Network as set up in 2011 by the European Commission





hardware, software and orgware, overview from some tthree recent Dutch reactions on the EGD

network in the EGD can speed up the needed investments from the Member States and their infrastructure managers.

Shared Concerns

Other actors are expressing similar concerns. Nevertheless, they are positive towards the sustainability shift, initiated by the EGD. Briefly, three recent Dutch reactions on the EGD. Together with their concerns, these actors offer short and long term actions, concerning hard-, soft- or orgware, for the future development of a trans-European high-speed passenger train network.

In the position paper of the Dutch Ministry for Infrastructure and Water Management: towards an European agenda for international railway passenger transport (IENW/BSK-2020/2302), they give some points why actions are needed, such as: climate change or the contribution of a rail network to spatial planning and quality of living in dense European cities. Moreover, they focused on what the rail community (including the new European Commission) can do concerning international rail passenger services. They propose actions on hardware (continue to work on missing links and bottlenecks in the network), software (data availability & interoperability) and orgware (cross border contracts, based on competitive tendering).

In their letter, Prorail¹ calls on the EU "to include passenger trains – in addition to freight trains – in the European Green Deal. An independent study commissioned by ProRail shows what an optimal European rail network could deliver in terms of CO₂ reductions: if travellers choose to go by train instead of flying, between 2 to 8 million tons of CO₂ emissions could be spared (REBEL, 2019)." Prorail considered distances up to 800 kilometres and potentially even further.

They proposed actions for the short term (realise better utilisation of existing infrastructure or focus more on user experience) and long term (invest in an extensive European high-speed rail network to significantly reduce train travel times).

Lastly the position paper of the Dutch Railways (NS) to the EU institutions positions the railway sector as the

backbone of the EU's internal market, since efficient railway connections have facilitated the creation and deepening of the internal market. However, global trade disputes, Brexit and China's growing presence in Europe exert pressure on the internal market.

Next, they state that the railway sector is part of the climate solution, being intrinsically sustainable.

Lastly the NS believes in rail as a first-choice mode of transport in terms of price and service for passengers. In order to contribute to the European Green Deal and meet the climate objectives as set out in the Paris Agreement. Decarbonizing transport requires a shift to rail as the greenest mode of transport. With mobility set to increase significantly in Europe in the coming decades, railways play a key role in creating liveable cities. High-speed train connections between European capitals and major cities play a key role in achieving a sustainable transport sector and should be a top priority for the European Green Deal. Ultimately, the train should become not only an addition to, but also a hassle-free substitute for short distance flights (700 km) and car travel with higher quality of comfort.

The Dutch Railways puts forward four priorities that need to be addressed by the EU institutions in their 2019-2024 policy mandate. The first are harmonization of operational standards (i.e. service schedules that transcend national borders) in order to achieve seamless cross-border rail services and standardization, not only in systems (e.g the European Railway Traffic Management System) but also in Value Added Tax rates between Member States and between the different transport modes. The latter causes market distortions resulting in an unfair level playing field for rail passenger operators. The second priority is investment and co-funding in needed hard- and software and the third is stimulating innovation in order to create a seamless travel experience for the passenger and to increase transport efficiency, reduce congestion and improve the quality of transport services. The final priority is facilitating the passenger from first to last mile.

Where as the previous actors focuses on the benefits of a trans-European high-speed passenger train network from the operator or network perspective, the SURE network will add other benefits, related to the challenges metropolitan regions are facing and especially metropolitan regions in smaller East European or the Benelux countries. The benefits from metropolitan regions perspective are also strongly related to the goals of the EGD, them being the EU as a global leader, a just transition and investing in a climate neutral economy.

We are in times of crisis and several of our companies are suffering. Therefore we need anti-cyclical investments to give today the companies, we want for our future sustainable economy, a kick-start. These investments should come from multiple sources with a balance between local, national, European and international. A range of funding streams can ensure that redevelopment schemes are robust enough to withstand temporary economic problems. As the 2008 crisis have shown, at Bordeaux and King's Cross the involvement of a range of funding partners has helped these regeneration schemes to weather the financial crisis (ITC 2014).

¹ Prorail is responsible for the construction, maintenance and management of the Dutch rail network.

1. EU as a global leader

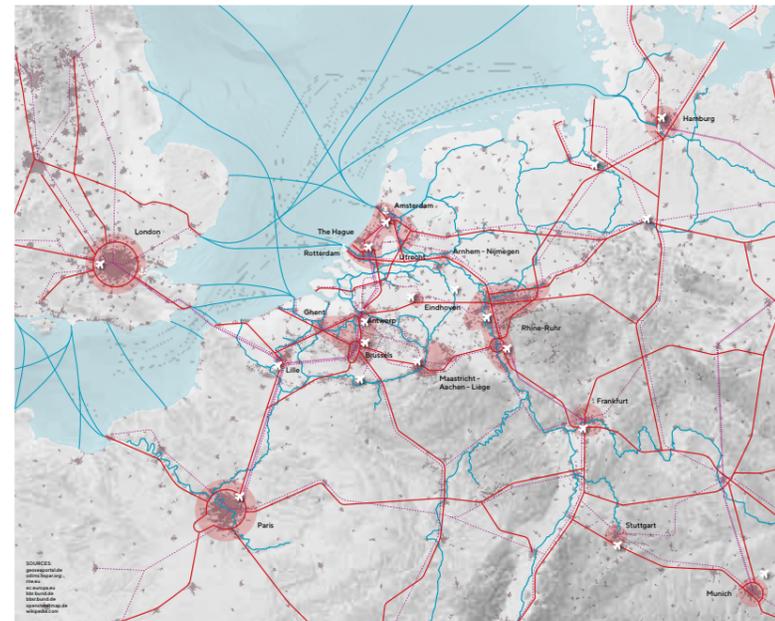
Increasingly mega regions play a key role in the global competitiveness between countries or even continents. We can find these regions in the USA, Asia and the EU. Next to the economic effect of COVID 19, Brexit is looming and as a result the EU will lose one of the eight European mega regions. A trans European high-speed rail network will strengthen the remaining EU mega regions and show the world that sustainable transport is key for a sustainable and successful exchange of knowledge and service in and between mega regions.

Mega region and Macroregional Strategies
 In their report OECD (Glocker, 2018) defines a mega region as an integrated system of cities and their surrounding region, which one can visit within a day using ground transport. UN-Habitat (2014, p. 36) looks at it from a wider perspective and defines a mega region as "several cities integrated with each other within the orbit of the overall region, surpassing mega- or meta-cities in terms of population, economic output and that further combine large markets, skilled labour and innovation". Sassen brings forward the advantages of a mega region and argues that, given their scale, mega regions have the potential to host a broad range of types of agglomeration economies that may complement each other. But even within smaller mega regions, a high connectivity may enable cities to borrow agglomeration economies from their neighbours and thus reducing the relevance of their own population sizes. Clearly, there is not a consensus yet on how to define a mega region and thus also not on how many there are or how big they need to be. However, it is a widely held view that they are there and that most of them are in the USA or Asia and some in Europe, as shown in the map: top 29 mega regions in the world. The Asian mega regions are especially interesting to look at from the perspective of a trans-European high-speed train network, as they are currently strengthening their mega regions by large investments in high-speed infrastructure.

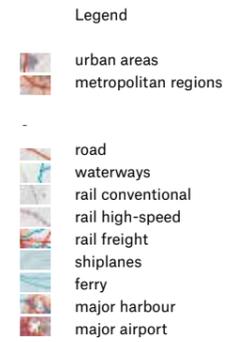
How the European Council (EC) defines Macroregional Strategies, shows aspects of what we earlier described while defining a mega region.

According to the EC a Macroregional Strategy is an integrated framework, which may be supported by the European Structural and Investment Funds among others, to address common challenges faced by a defined geographical area relating to Member States and third countries located in the same geographical area. These thereby benefit from strengthened cooperation, which contribute to achievement of economic, social and territorial cohesion.

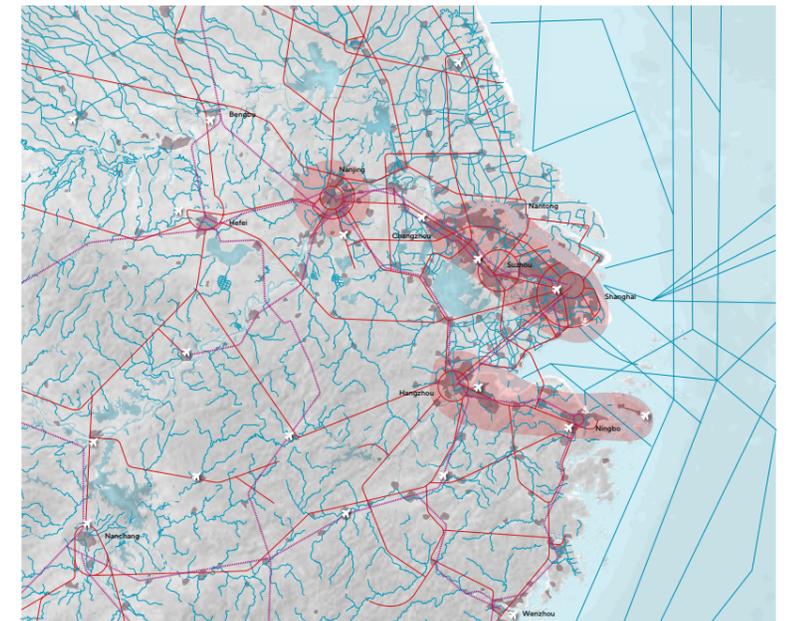
As the maps (p11) of the European mega regions or regions with a Macroregional Strategy illustrates: a large number of these regions are cross-border (a prerequisite for a Macroregional Strategy) and mega regions are smaller than Macroregional Strategy, as a mega region is loosely based what can be reached within a day using ground transport. Here we are touching upon a specific obstacle that smaller EU member states are facing: their mega region is cross-border, however their cross-border public transport options are scant. The map of high-speed operators in Europe illustrates this clearly. Larger EU countries such as France, Germany, Spain or Italy have a well-developed high-speed network and they continue to develop it further. Looking closer, we notice that the high-speed operators on those networks, mainly serve a national market. Smaller EU countries, such as several East European or the Benelux countries, are depending on a neighbouring operator, if such is even present. As a result, several highly populated metropolitan regions are not well connected to their other metropolitan regions in their own mega region or other mega regions at a distance.



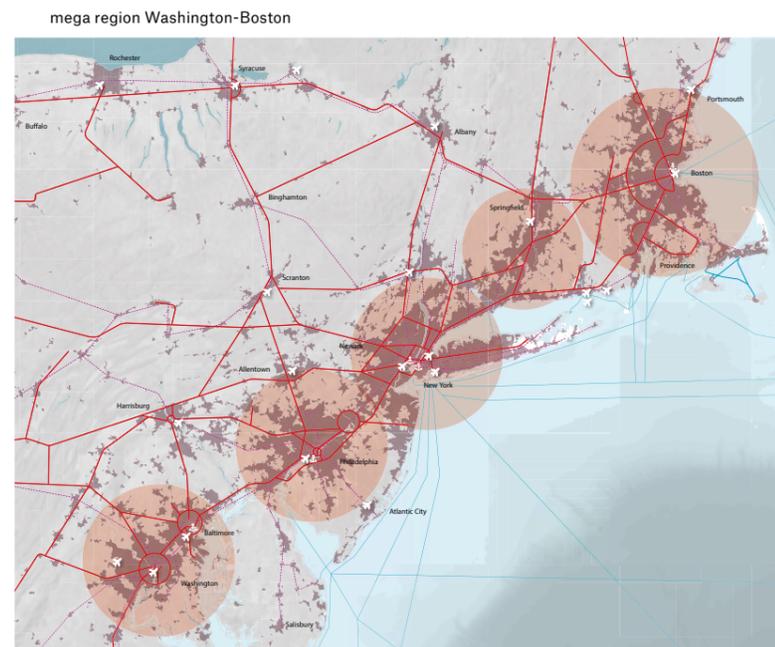
mega region Eurodelta



Sources: Must Urbanism

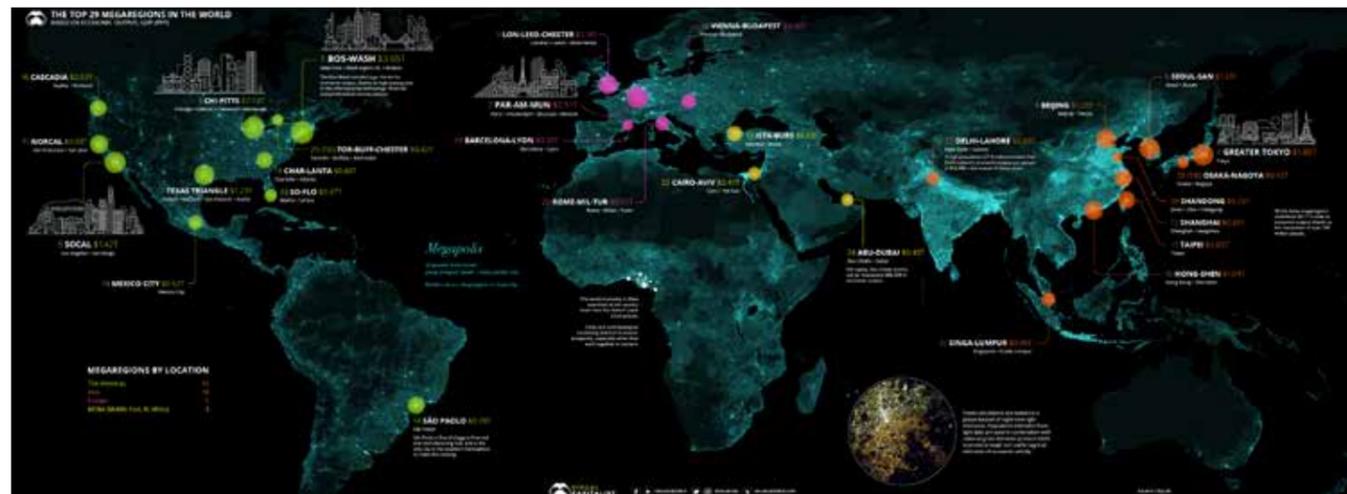


mega region Shanghai-Ningbo-Nanjing



mega region Washington-Boston

top 29 mega regions in the world, based on economic output (GDP), source Citylab



Benefits

How can the EU, as a global leader, benefit from a trans European high-speed rail network that connects all its highly populated metropolitan regions and mega regions? International well-connected nodes in a mega region, such as high-speed stations or hub airports, have the potential for the development of offices, leisure and cultural amenities and innovation districts, and thus support the EU-wide knowledge or service economy. For example Schiphol airport has focused on becoming a commercial node of the Randstad, with the terminals wrapped around the railway station. As a result, international businesses have located offices there, creating a vibrant new business district in the region. Consequently, it is vital to create the right climate for private sector investment if the full benefits from high-speed rail investment are to be captured (ITC, 2014). Due to the lack of a high-speed network, the earlier mentioned smaller countries in such a region are limited in the international well-connected nodes they can develop. This holds them back in their, and thus the mega regions, future development of a global competitive economic and service economy

Next to connectivity outside the mega region, we should not overlook the importance of a high-speed rail network for the internal connectivity, especially at short distance cross border. For neighbouring cities to integrate and function as a network in a region, efficient and affordable transport connections between cities are essential (Jenks, Kozak & Takkanon, 2008).

Even in an era of digitalisation, which increasingly allows services and knowledge to be accessed without the need for actual mobility, infrastructure is still a necessary requirement for creating and strengthening social and economic ties between people across places (Glocker, 2018).

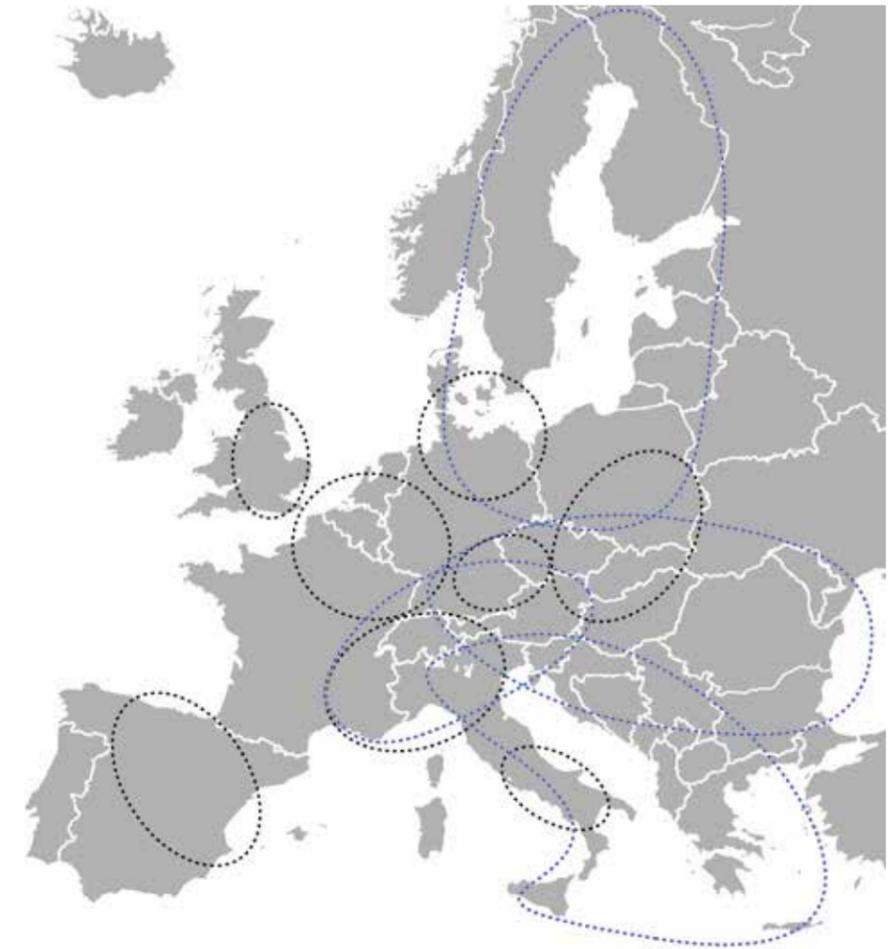
It does not stop at solely creating the needed hardware, as that entail long term plans. Further research showed that short-term actions such as increasing the frequency of trains could add even more to the functional integration of a network than efficient road and rail connections (Meijers, Hoogerbrugge & Cardoso, 2017). To increase the frequency between cities in a mega region, next to trans European high speed trains, also a cross border high-speed train at the scale of the mega region could be implemented, e.g. the high-speed intercity direct train between Amsterdam and Brussels, which is also using the high-speed network. Overall the user experience of a connection (availability, punctuality, quality, accessibility and prices) can in many cases already improved in the short term, as a first step towards a long-term investment.

Efficient and frequent connections can facilitate co-operation and pool resources between neighbouring regions and cities. Moreover the mega region as a whole can also increase international visibility and strengthen competitiveness at a global scale (Glocker 2018).

In sum, if the EU, post Brexit, wants to (at least) consolidate its position in the global knowledge and service economy, several of the remaining seven EU mega regions need high-speed rail investments so they can improve their trans European and internal mega region connectivity. Even if these are long-term investments, the first steps needs to be taken today.

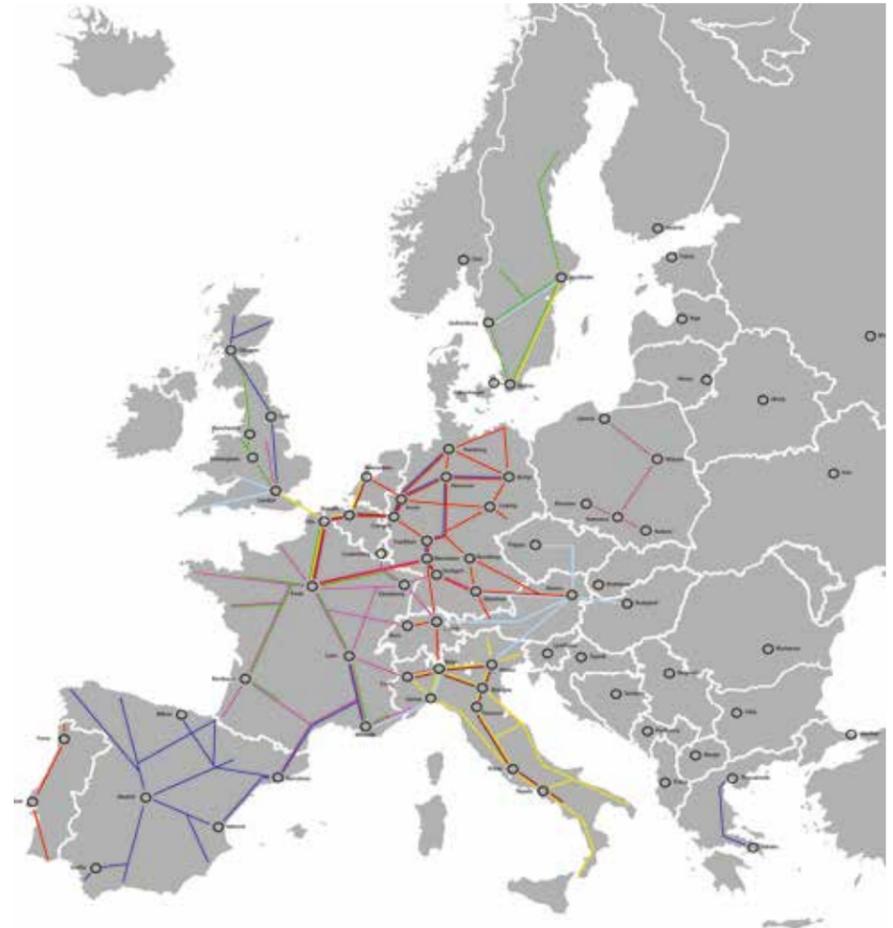
Also in the short term these regions can step up their game, by increasing frequency, improving user experience (availability, punctuality, quality, accessibility and price) and adding fast cross border services on the existing network. Both short and long-term actions are needed to, in a sustainable way, stay equally competitive with the existing and rising mega regions in the USA and Asia.

Legend
⊛ OECD defined mega regions in Europe
⊛ EC Macroregional Strategies
sources: OECD and EC website



OECD mega regions and EU Macroregional Strategies are cross border, the high speed rail network not so much.

— high speed operators, every colour represent another operator.
○ high speed station or capital
source: networks of major high speed rail operators in Europe, July 2019



2. The just transition mechanism

In the seven European mega regions (home to almost half of EU population) not only will the larger metropolitan areas benefit, but as well the medium sized cities and towns located nearby or between larger metropolitan areas.

Benefits

We found three possibilities on how medium sized cities and towns can benefit from an European high-speed rail network, them being:

1. a new high-speed station will be developed,
2. the existing station starts functioning as a hub between different high-speed operators or
3. they borrow agglomeration economies from the nearby larger metropolitan areas. The first two options can be applicable on medium sized cities, where as the third can be on medium sized cities and towns.

One of most well known examples of the positive impact of a new high-speed station development in a midsize city is the city of Lille in the North of France. The station got fast connections to Paris, London and Brussels. The original masterplan provided a clear framework for development, yet a number of the original aims, such as attracting International firms and reducing commuting to Paris, have not occurred. Over time, the plans for Lille have adapted and it has instead become a tourist and cultural centre

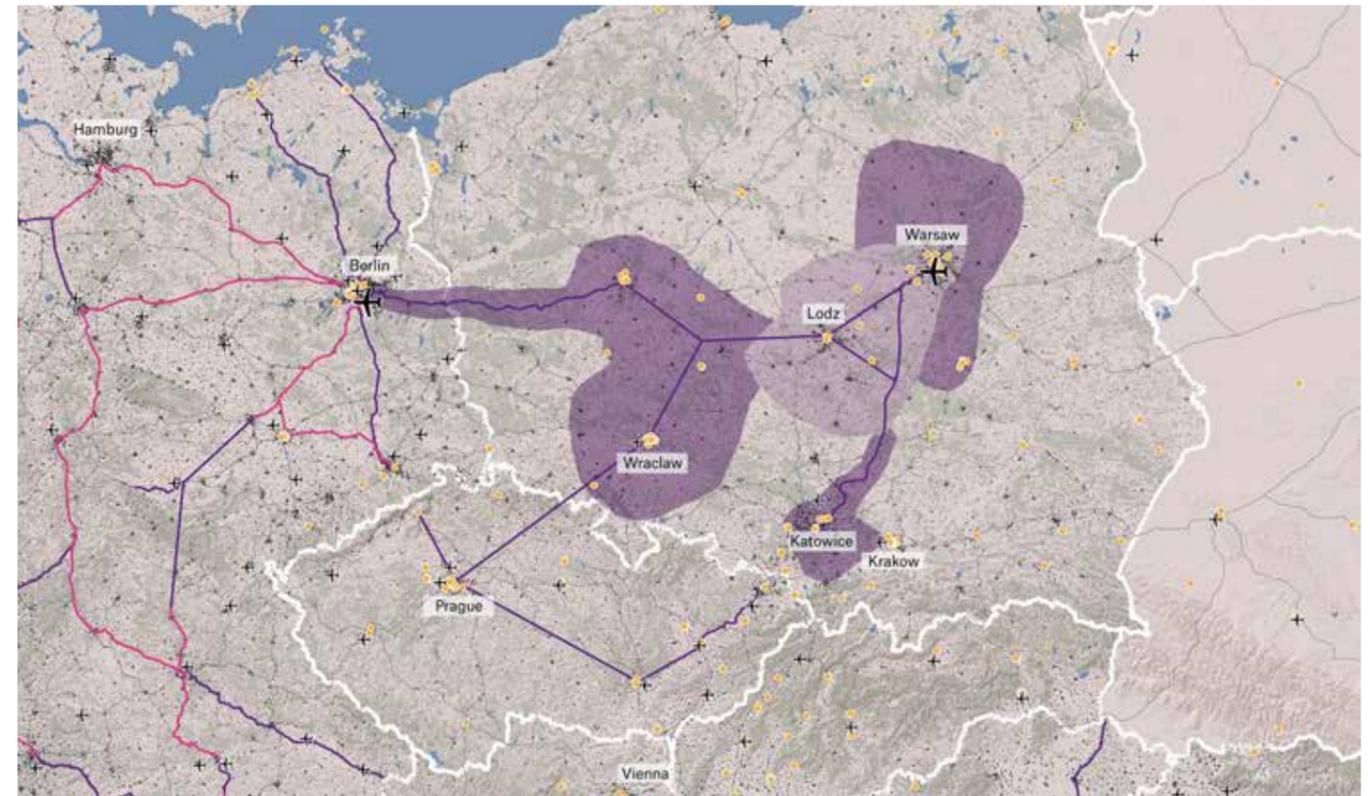
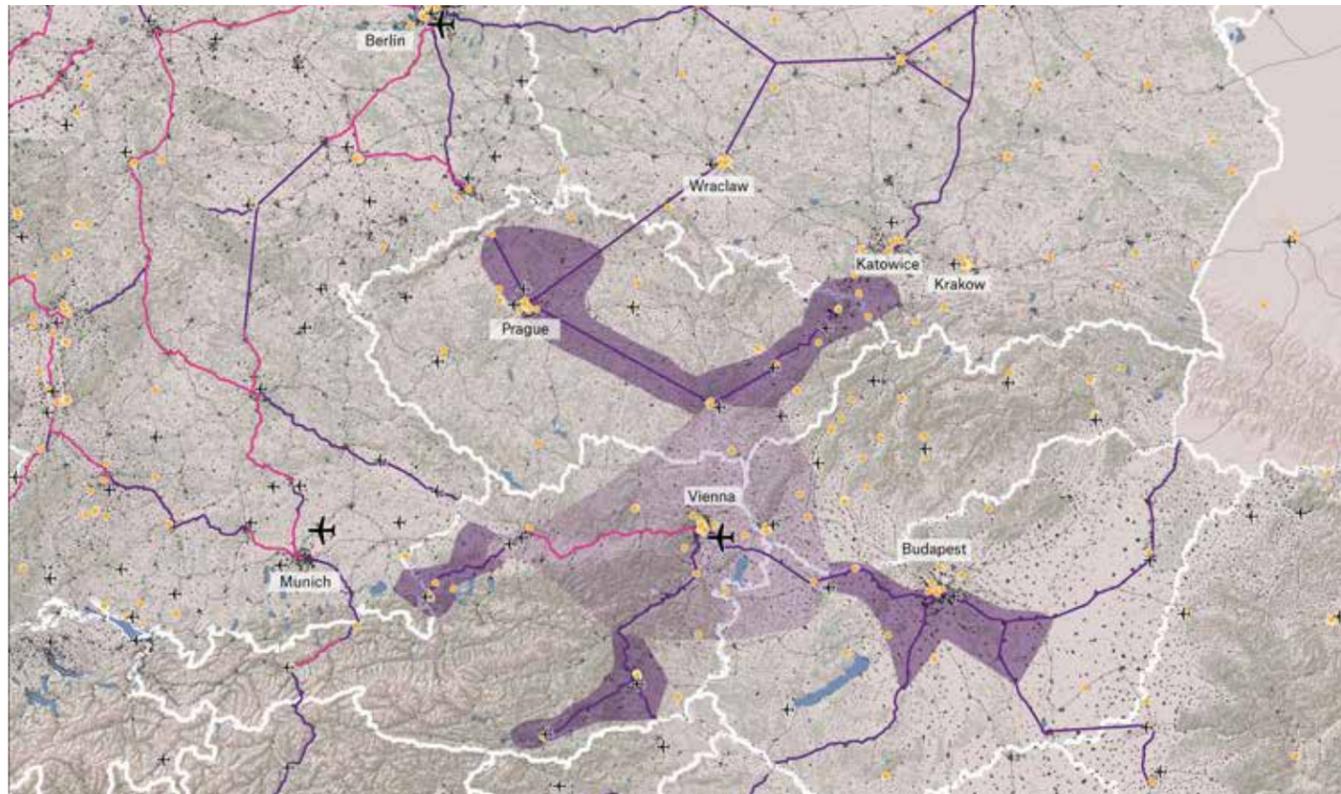
with a rejuvenated historic quarter, a growing higher education sector, and a centre for logistics (ITC, 2014) This shows us that a high-speed station generates new opportunities, even if the goals are different than originally aimed at.

According to the core EU network, proposed by the EC in 2011, especially in the east of Europe, where high-speed lines are currently still scarce, several new high-speed lines and thus stations will be added to the European high-speed rail network. A strategic planning of these new stations, could also give medium sized cities similar opportunities as Lille.

As a test, we looked at the population and knowledge institutions reachable within a two hour time travel by train for cities in the East of Europe, if the core EU network would be fully operational. These cities were Vienna, Budapest and Lodz, the latter being a medium size city. The map and tables on this page illustrate the results. Where as for the larger cities, the population or knowledge institutions reached would double or triple, for the midsize city of Lodz, there would be a six fold rise in knowledge institutions reached, showing how a midsize city

two hours train travel	population	higher education institutes
current	7,4 million	87
high-speed scenario	19,4 million	178

new opportunities for Vienna, if the European Core Network would be fully operational



legend

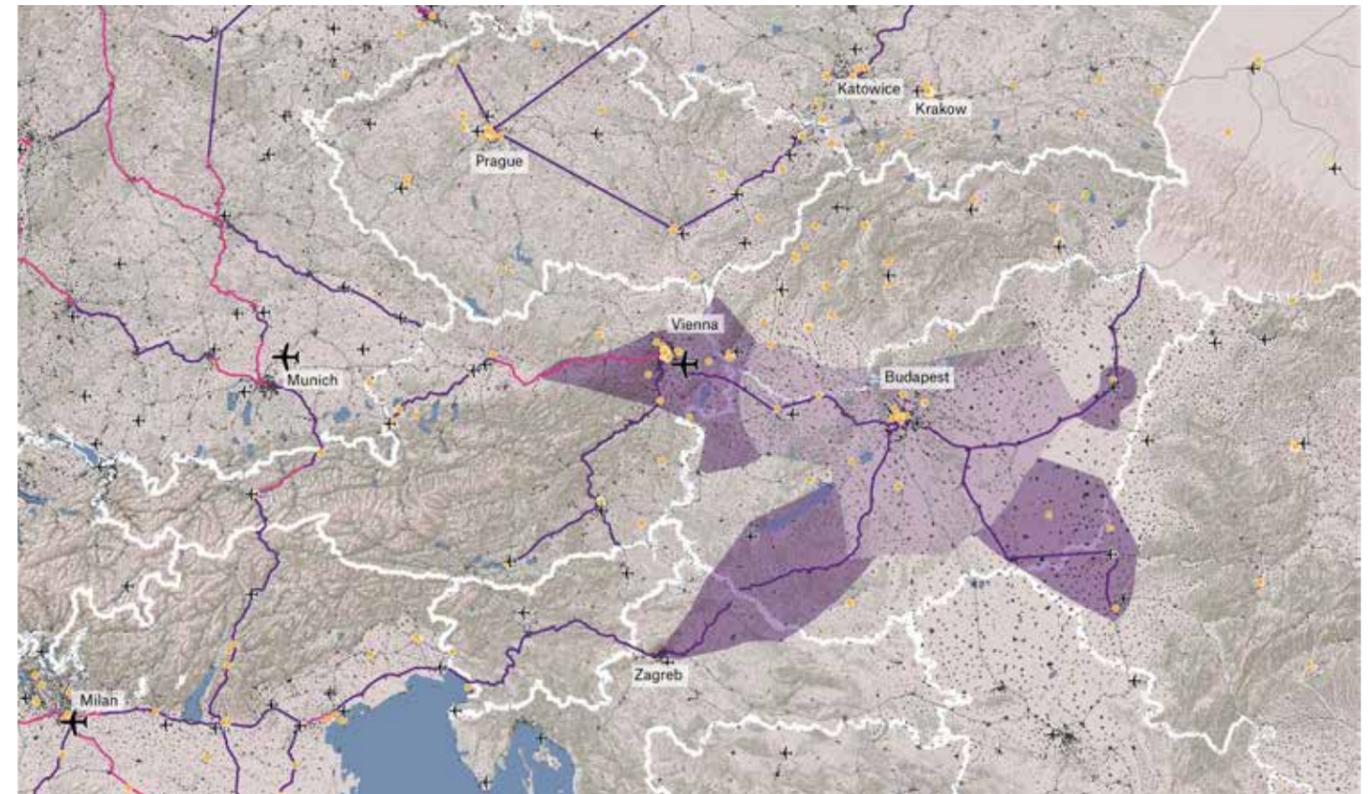
- European Core Network
- existing high speed lines
- planned high speed lines
- existing conventional railline
- current reach within 2 hours
- potential reach with planned HSL upgrades (avg. speed of 210 km/h)
- major airport
- airport
- higher education institutes
- urban area

new opportunities for Lodz, if the European Core Network would be fully operational

two hours train travel	population	higher education institutes
current	6 million	28
high-speed scenario	22 million	177

two hours train travel	population	higher education institutes
current	6 million	35
high-speed scenario	14 million	115

new opportunities for Budapest, if the European Core Network would be fully operational



- Legend
- high speed operators, every colour represent another operator.
 - big high speed station or capital city
 - hub high speed station
 - ✈ big airport
 - ✈ hub airport
- sources:
- top 20 European airports,
 - ACI Airport Industry Global Connectivity Report 2019
 - networks of major high speed rail operators in Europe
 - Situation July 2019



can especially benefit of a new node development. Here we keep in mind that adding more stations to the high-speed network, will slow down the international connection, so strategic choices need to be made. Besides the international connections, the high-speed line can also be used for a secondary fast train network, having more stops in the mega region.

Second, we take a new look at the European map of operators. We noticed that some high-speed stations in mid-sized cities start operating as a hub station. According to our definition, a hub station is an international well-connected node that has at least three different high-speed train providers, of which at least one is cross-border. Referring back to the fast and frequent connections between cities in the mega region, these cities could form a “feeder” network. By creating an inner mega region network, connected to an international well-connected node, we can ensure that the benefits of the investment in the hub station are distributed into the greater area.

Lastly, we explore how medium sized cities and towns can borrow agglomeration economies from the nearby larger metropolitan areas. In the part on EU as a global leader, we discussed the potentials of international well-connected nodes for the knowledge or service economy. However as these nodes and their cities benefit in terms of higher productivity, this may be offset by higher house prices, congestion, pollution, or higher crime rates (Ahrend & Schumann, 2014). A network of cities with a higher connectivity between the urban areas, within a mega region, could mimic agglomeration economies reaping the benefits without accruing the costs. Key is the last mile from the high-speed stations to the small and medium sized cities.

Looking at the current European high-speed lines, two forms of networks seem to appear, the French and Spanish focus on one major city, and the German network of cities. Within the first there is a one to one connection between a medium and a major city. In some case this drains the medium cities and towns as the borrow agglomeration effect works only one direction. In a network of

cities, this latter effect does not seem to happen so easily. Research of Meijers (2013) has shown that a network of cities, located nearby other relatively similar sized cities, can even outperforming mono-centric, single cities when controlling for the size of urban population, urban density, human capital and the structure of the metropolitan economy. For the medium sized cities or towns, which face limitations in their agglomeration power, connectivity seems to be more relevant for productivity than size (Dijkstra, Garcilazo and McCann, 2012; McCann and Acs, 2011). Travel time between the node and the medium sized city or town, is of the essence here. If travel time increases, the effect of proximity on regional economic performance will decrease (Ahrend and Schumann, 2014).

The following three examples illustrate how borrowing agglomeration economies have played out in practice. For the high-speed connection between Frankfurt and Cologne, the intermediate stops benefited substantially in terms of economic activity, and more importantly as potential places to live, offering new commuting possibilities towards the main centres (Ahlfeldt and Feddersen, 2015).

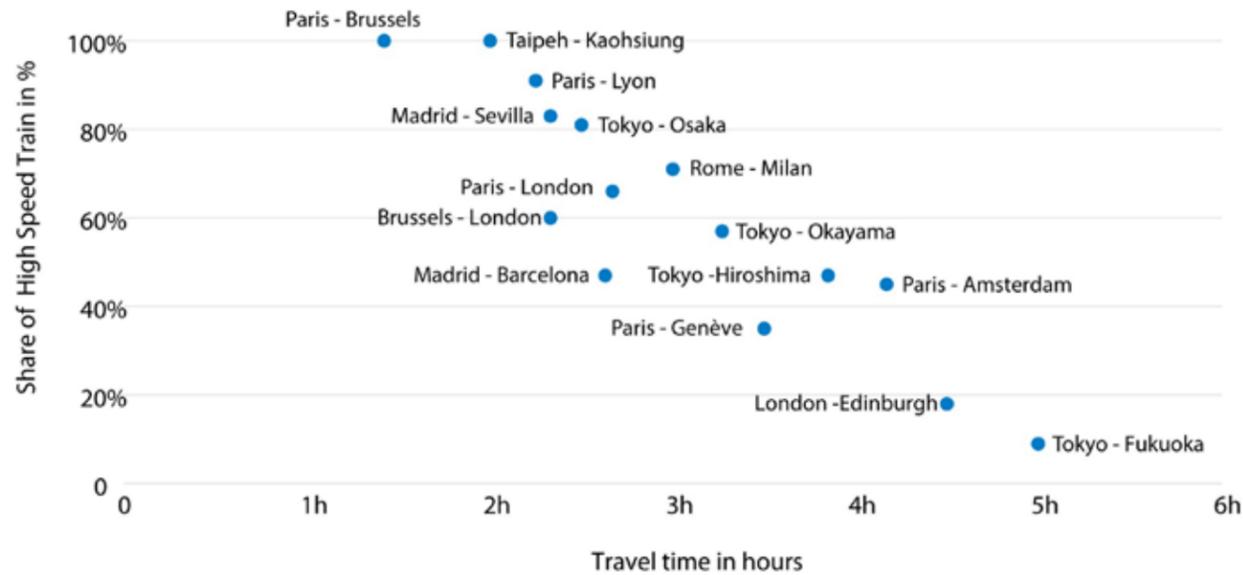
A similar example we can see in the Netherlands, in the city of Breda. By the development of the high-speed intercity direct train between Amsterdam and Brussels, Breda became a stop in the inner mega region connection. This has spurred a redevelopment of its station and housing development surrounding its station, and Breda could reap dividends from the arrival of this fast connection. Thus medium sized cities or towns may be able to significantly increase their market size through better infrastructure, while providing the benefit to its population of living in a smaller sized environment.

Lastly, also the tourist economy in medium sized cities or towns seems to profit. Preliminary results have shown that the Spanish High Speed Rail system seems to have a significant effect on the tourists’ choice to visit other cities close to Madrid (Pagliaraa, La Pietra, Gomez & Vassallo, 2015).

In sum, some of the stations of the trans-European high-speed network are also medium sized cities or towns and some are even hub stations, opening opportunities to reposition their city. Furthermore fast trains can use the high-speed network and have more stops in a mega region, a borderless system is however a precondition. For medium sized cities or towns near a metropolitan area, the last mile connections from the high-speed stations in that area, to these cities need to be smooth and frequent. Our plea is to focus on mobility on all scales (European scale to last mile).

3. Investing in a climate neutral economy

Infrastructure has been a key to support our economy, and by investing in more sustainable mobility options, we will subsequently invest in a more climate neutral economy.



substitution possibilities versus travel time

this graph shows that, with an high-speed travel time between one and two hours, the market is completely dominated by the train, for example, between Paris and Brussels or between Taipei and Kaohsiung (Taiwan). A travel time between three and four hours results in a market share between 50% and 70%. The travel time of 4 hours between Amsterdam and Paris applied before the HSL South came into use. With longer travel times, the market share of the train decreases sharply.

source: Nash (2013) and Cheng (2010)

an equal level playing field is needed, to change consumer behavior

to assess how competitive high-speed rail really is, total travel time from city centre to city centre and the prices of the available options analysed, such as high-speed rail, conventional rail, air and road, thus including the cost of private cars and long-distance coaches. The fastest or cheapest option versus slowest or most expensive option

source: European Court of Auditors, 2018

	MADRID, Puerta del Sol – BARCELONA, Plaça de Catalunya		ROME, Piazza del Campidoglio – MILAN, Piazza del Duomo		BERLIN, Potsdamer Platz – MUNICH, Marienplatz		PARIS, Place de la Concorde – STRASBOURG, Place du Château	
Distance	607-698 km		572-661 km		587-654 km		466-548 km	
Mode of transport	Time	Price (euro)	Time	Price (euro)	Time	Price (euro)	Time	Price (euro)
Car	10:40-18:20	138-190	10:40-18:40	180	10:00-16:40	95-142	8:40-12:20	44-79
Air	6:30-8:00	227-253	6:30-7:00	140	6:30-8:00	146	N/A	N/A
Coach	16:20-18:00	36-49	15:00-21:00	40	17:00-23:00	45-79	13:00-22:40	33-55
Conventional rail	11:30-12:00	124-128	9:00-23:00	61-103	N/A	N/A	N/A	N/A
High-speed rail	6:00-8:20	159-181	6:50-9:00	23-205	8:30-10:30	66	5:10-5:30	158-165

sustainable planning

As SURE is a network of cities and metroplottian regions, we start from the benefits of sustainable mobility for sustainable urban planning. As more data on the benefits of sustainable planning is becoming available, several researches have looked at social cost-benefit analyses that are frequently used for rail infrastructure investments and notice that many benefits were not included. Van Gent, Vegter, Steegman and de Boer (2019) compared planned rail infrastructure investments in South Holland with a situation without the planned investment. They did this on topics such as: integrated area development, accessibility and mobility, quality of life, energy efficiency, social housing and borrowed size. Taking into account these topics, they concluded that the benefits exceed the costs.

substitution

Furthermore there are climate gains that sustainable mobility brings. Air travel will stay a valid means of travel, in particular for intercontinental flights. Concerning long distance sustainable mobility for passengers, the EGD focuses on a Single European Sky. Concerning short haul flights, the EGD does not support consumers to choose a sustainable mobility alternative, instead of the plane.

What could be easily substituted from plane to train? Research from Barron (2007) has shown that high-speed trains dominate the market for trips less than two hours or about 200 kilometres (figure p 16) The research further shows that if travel times become three to four hours, the high-speed train still has a market share of 50 to 70 per cent. 800 kilometres or a 6 hours journey is seen as the max for substitution (IENW/BSK-2020/2302). The airport being a stop at the high-speed network adds significantly for substitution to take place.

The much-debated hyperloop could even decrease time-travel even more. This technology is however still in development and we can't wait for it. We assume that in due time, this infrastructure will be looked at, at least from the scale of a mega region and with a limited number of stops in the mega region, it will take its rightful place, next to existing infrastructure.

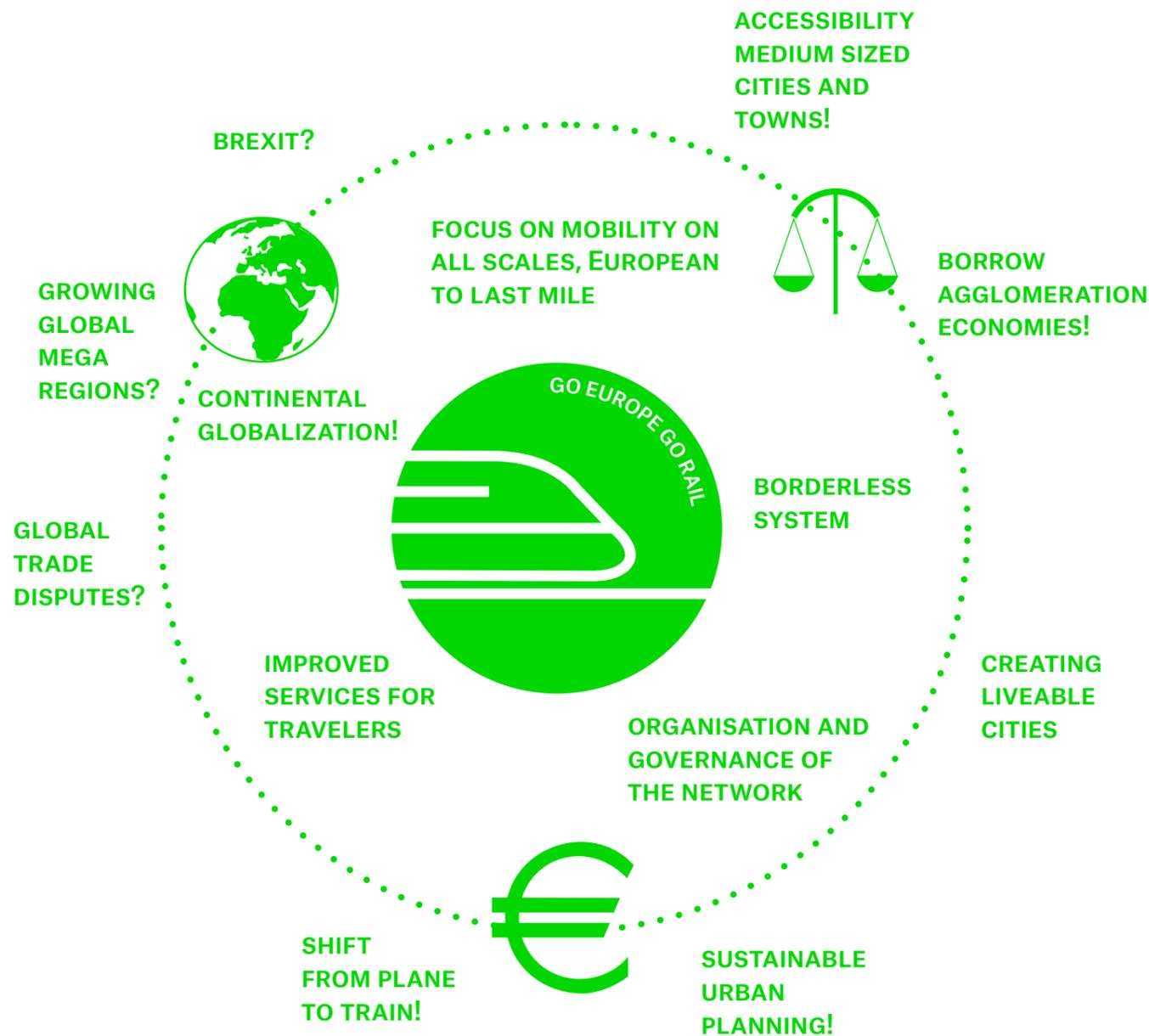
How can our airports benefit from substitution? For larger hub airports, substitution will free up much needed capacity and they will be able to connect Europe even better for long distance flights. The Royal Dutch Airlines (KLM) and the Dutch Railways (NS) have developed an AirRail ticket. This ticket allows you to check in and board in Brussels on a train, which brings you to Schiphol, where you can take the long distance flight to your destination.

A study on substitution from plane to train (Savelberg and de Lange, 2018) also looked at some Dutch regional airports and found that most of their destinations took more than four hours train travel, making substitution not an realistic option.

Other benefits for the government, related to this are shown in the research of Huijbregtse, Moorman and Savelberg (2019). Next to the investments cost, they looked at the cost for the use of the rail infrastructure. This public cost per passenger is, compared to other modes such as plane, car or coach, the highest for rail. In order to give the full picture, the researchers added external costs, which also demand public funding, such as: climate, sound disturbance, the use of space, nature and landscape, air-, soil- and water pollution and road safety. By taken also these costs into account, the overall cost per passenger for using the rail infrastructure became on average lower than the overall public cost for plane or car.

For the last benefit, we focus at the consumer. In the earlier mentioned research of the European Court of Auditors in 2018, the researchers assessed how competitive high-speed rail really is to other transport modes and analysed the total travel time from city centre to city centre and the prices of the available options. They further refined their data analysis for four selected lines between 466 and 698 kilometres and compared time and price for high-speed rail, conventional rail, air and road, thus including the cost of private cars and long-distance coaches (table p 16). Both high-speed rail and air were each two times as well the fastest options as the most expensive one. So both high-speed rail and air are already rather comparable. An increased cooperation between flight and train, e.g AirRail ticket, and an equal level playing field (thus taxing flights if even only short distance travel within the EU) will support a change in consumer behaviour to the more sustainable alternative.

In conclusion, we need to look at the broader benefits of a trans-European high-speed network can give, such as benefits for urban planning (integrated area development, accessibility and mobility, quality of life, energy efficiency, social housing and borrowed size), for the climate (substitution for short distance flights) and for the consumer (shift to a sustainable alternative).



Yes, we can!

The European Green Deal has been dubbed as Europe's man on the moon project for the global economic, social and climate challenges we are facing in the EU. Non-surprisingly increasingly there are voices to use the EGD as the map for EU in the post-corona crisis.

For the several actions of the EGD the trans-European transport network is a means to an end. Therefore the EGD should:

- Call for action to regions and nations, especially them being a part of European mega regions, to enhancing the internal connectivity in their mega region and to reposition their station areas and airports. The latter so they can accomplish their full potential as nodes for the surrounding medium sized cities or towns and the other larger metropolitan areas at some hours travel distance. As a whole, this will benefit the global position of EU.

- Support the EC ambitions to expand the trans-European transport network, by connecting the current mainly national oriented high-speed networks across borders. By encouraging modal shift from plane to train, the EC can in particular address climate change and local air quality (ECA, 2018).

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Redesigning the Eurodelta high-speed network

Introduction

As the previous chapter revealed, a well-developed high-speed network has the following benefits:

- Supporting the exchange of knowledge and services in the European mega regions. So the EU, post Brexit, can (at least) consolidate its position in the global knowledge and service economy.
- Opportunities for small and medium size cities, as they can borrow agglomeration economies from the nearby larger metropolitan areas. Provided that the high-speed network is also used for internal mega region connections and a smooth last mile network from the high-speed stop is set-up.
- Accelerating sustainable urban planning. It gives a boost to the development of dense and mixed urban hubs. Between these hubs, international or internal mega region trips can be made in a sustainable way.
- Supporting a change in customers' behaviour to a more sustainable transport alternative. Especially for a short distance (800 kilometers), the network can be a substitution for flights.

Eurodelta

The Eurodelta is one of the seven remaining European mega regions, which consists of the Benelux countries, added by North Rhine-Westphalia and the North of France. Although it is a cross-border mega region, its cross border public transport is still scarce. Applying the method used by the European court of Auditors (2018) we looked at the Eurodelta high-speed stations and this reveals that most areas in the Eurodelta have an international high-speed station in a 60 minute travel time, except for parts of the Netherlands. In the Eurodelta several high-speed stations, for instance Lille, Brussels and Cologne, function as a hub station¹ and allow passengers to change to other destinations. Although Amsterdam can be defined as hub station, in reality there is only a strong connection to the South. Its connections to the East are suboptimal.

No doubt all countries and regions experience challenges with their high-speed network. We did notice that France, Germany and Belgium have been investing in several high-speed lines, whereas the Netherlands only has one high-speed line. In this quick scan, we therefore focused on the future potentials for a Dutch high-speed network. We hope the method used, will inspire others to do a similar quick scan of the situation in their country as putting this together might help to increase the overall narrative of the need for a good high-speed network in the Eurodelta.

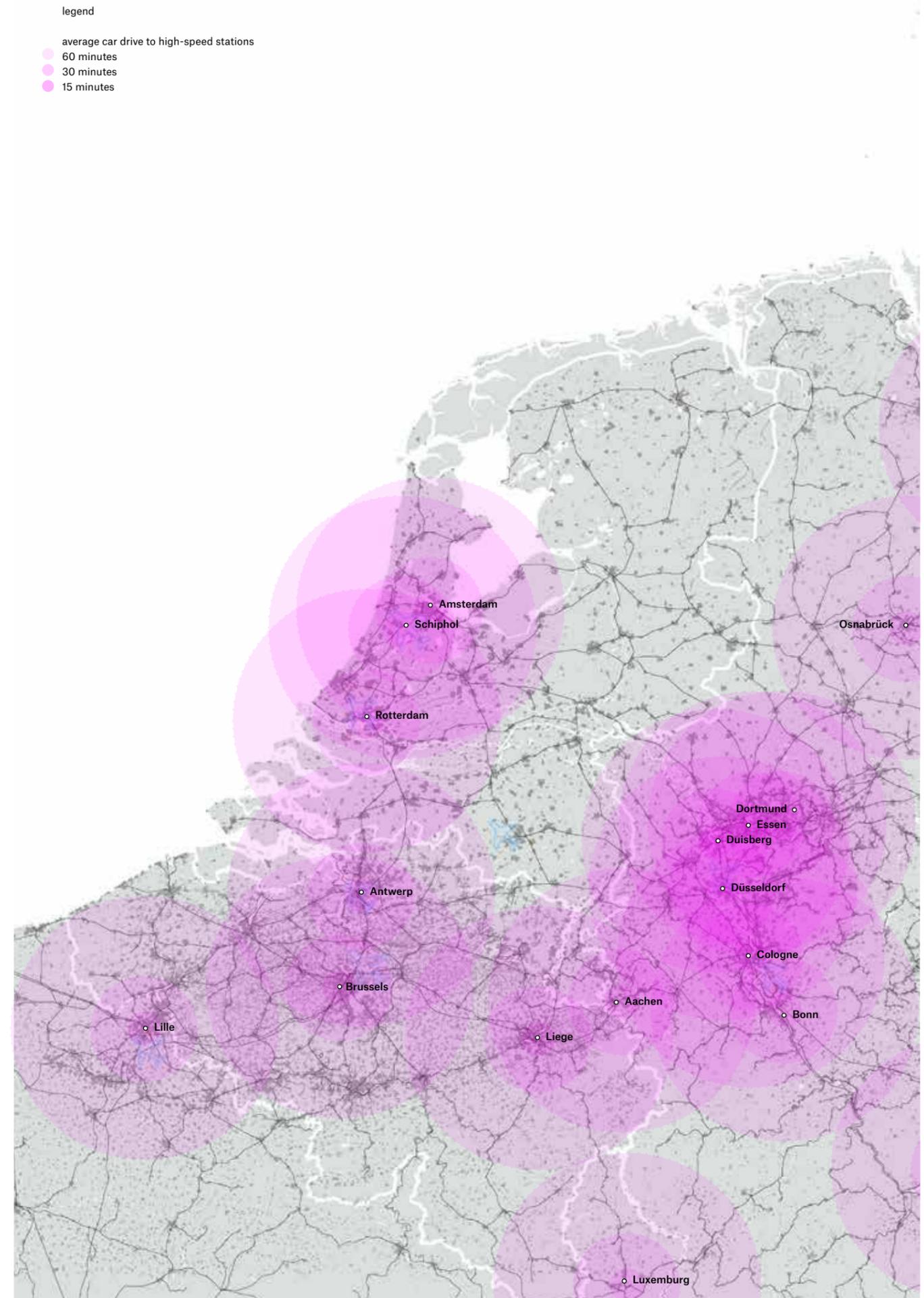
We scanned four directions from Randstad Holland:

1. to Brussels, Paris or London;
 2. to Frankfurt and Basel;
 3. to Berlin and
 4. to Hamburg and Copenhagen,
- on how high-speed or fast cross-border connection can as well work at

a trans-European as an internal mega region scale. Hereby, we looked at what are the benefits (position mega region in the world, opportunities for medium size cities and tyowns and strengthening a climate neutral economy), the bottlenecks and the governance.

For this quick scan, we looked at several other researches on related topics and at ambitions set in policy documents concerning a better cross-border or high-speed network. The aims of this scan is to, in a clear and compact manner, give an overview of several gains (for each direction and at the Eurodelta scale) that an improved trans-European and an internal mega region network can bring.

¹ According to our definition, a hub station is an international well-connected node that has at least three different high-speed train providers, of which at least one is cross



1. To Brussels, Paris or London

EU as a global leader

This high-speed line connects several capital cities and connects the Netherlands to larger metropolises such as London and Paris. The many European institutions make Brussels an interesting stop, however the Dutch Governmental institutions at The Hague are not smoothly connected to Brussels. Brussels furthermore is an interesting hub, allowing transit to Cologne, in time almost fast as the connection along Utrecht. Furthermore there are plans to make a high-speed line (Euro Cap) to Luxemburg and Strasbourg.

In 2014, around 1 107 000 passenger travelled (back and forward) between the Netherlands and Antwerp via the intercity and around 115 000 via HSL. To and from Brussels and UK around 1 485 000 via intercity and around 184 000 passengers via HSL and to and from Paris around 2 000 000 via high speed lines. In 2017, for Brussels and Paris there were 14 trains a day, taking almost three hours to Brussels and a bit more than four to Paris. To London there were seven trains a day, taking 6 hours travel, including check-in at Brussels and London (Savelberg & de Lange, 2018). In the short term, more Dutch stations will offer a check-in point.

Even though Lille is located as a hubstation between Paris and London, the high-speed connections to these cities are minimal. Currently, there is a growing co-operation between Lille and Brussels as they are so closely located, and as a cross-border metropolitan area, Lille increasingly looks more to Belgium, the Netherlands and Germany.

A just transition

These high-speed lines connect several medium and larger cities to metropolises such as Paris and London. Along these lines there are also several hub stations, such as Brussels and Lille, giving these cities a new position in the urban network. Next to the high-speed trains, there are two cross-border trains that connect more medium sized cities to this international network and increase the internal connectivity in the mega region along this high-speed corridor.

The first cross-border connection is the intercity direct train between Amsterdam and Brussels, which runs once ever hour. This train uses for the main part the high-speed tracks between these cities and makes extra stops in Breda, Noorderkempen, Mechelen and Brussels international Airport. The first connecting also several cities in the province of North Brabant to the high-speed line, the latter creating opportunities for substitution from air to rail. For commuters living North of Antwerp, this train also stops in Noorderkempen, a station that mainly functions as a regional bus transfer. If most of these commuters are regional oriented, for example Antwerp or Breda, a more regional solution, for instance prolonging an existing regional train cross-border, should be looked at, in order to minimize the stops of this intercity direct connection.

This cross-border connection was not considered when developing the high-speed tracks, but it has increased the economic feasibility of the line. For the future, a connection between Eindhoven and Brussels is also looked into, partly along these high-speed tracks (Govers, 2020).

A second cross-border alternative is the intercity train between Antwerp and Lille-Flanders, which runs once every two hours. This train runs via cities such as Ghent en Kortrijk, connecting the provinces of West and East-Flanders to the high-speed stations of Antwerp or Lille. Between Kortrijk and Lille, this trains becomes a local train, having several stops at a short distance. Similar to the case of Noorderkempen, there seems a lack of sufficient cross-border trains, which resolves in local stops being added to the line. Where separating (inter)national and local lines, is business as usual at a national connections, concerning cross-border connections, this seem to mingle.

Climate neutral economy

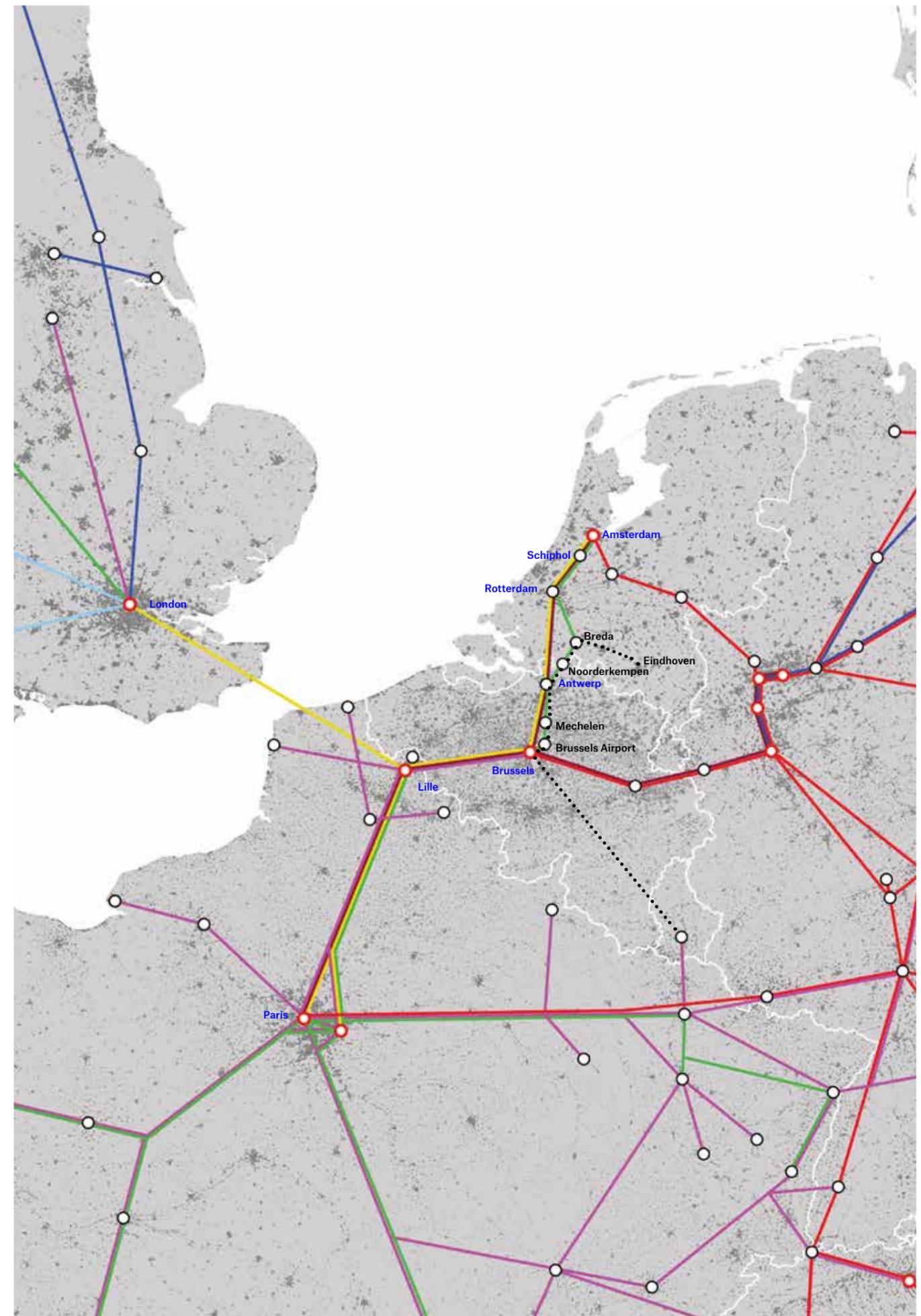
The high-speed train stations on this line were redeveloped to be able to handle larger passengers flow and some, have even used this redevelopment to prolong metro lines, for instance Amsterdam and

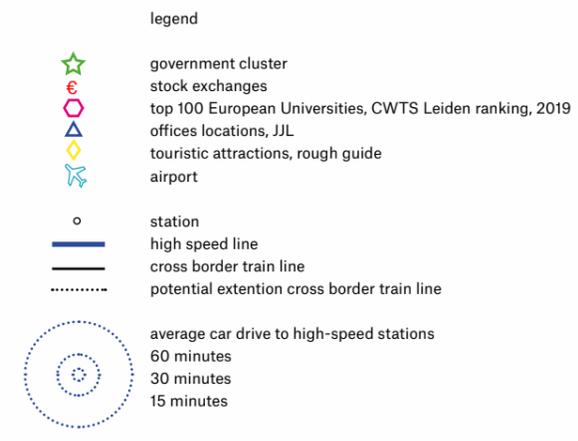
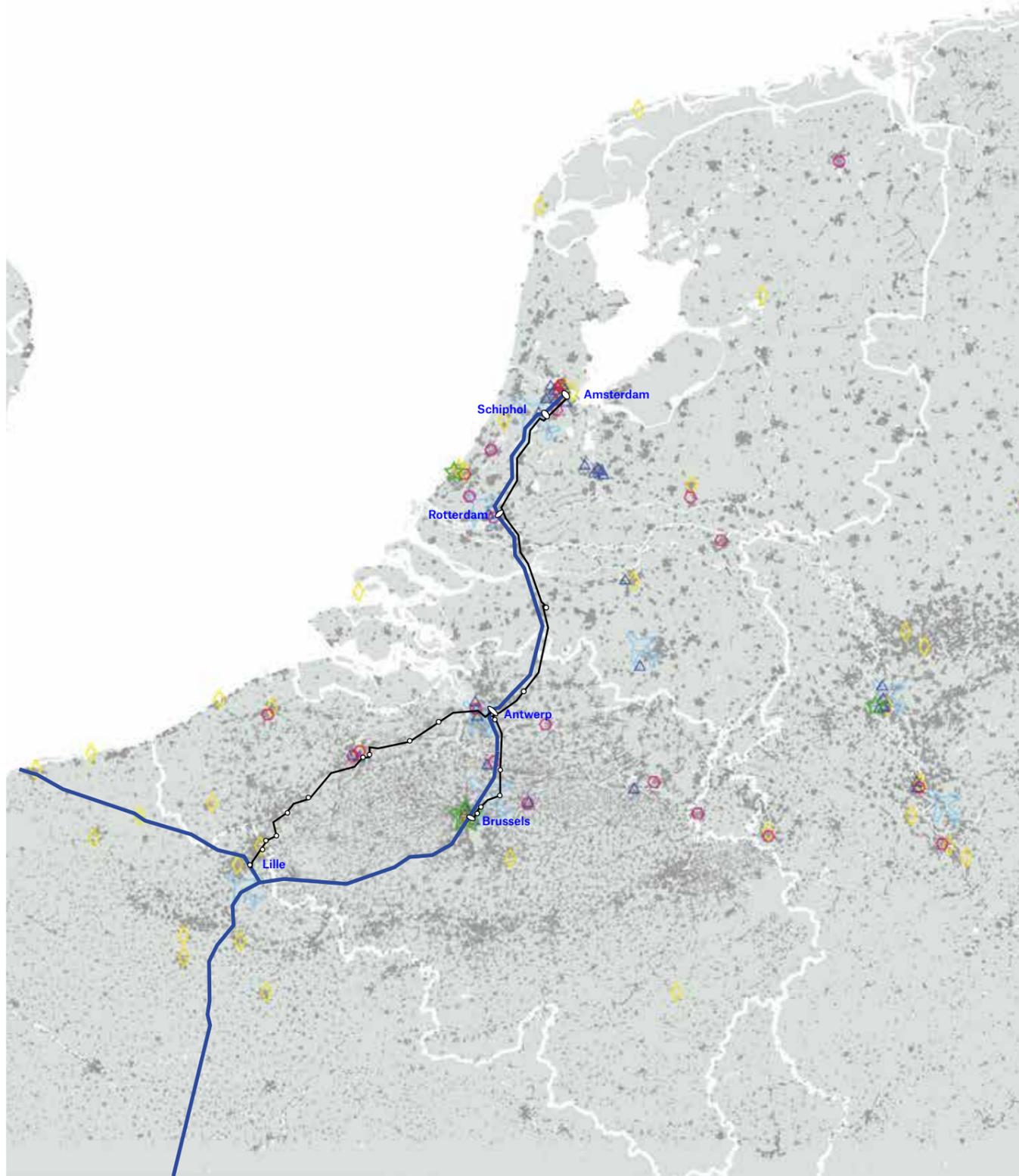
Rotterdam. Similar, Lille (Hauts-de-France Express Network) and Brussels (Regional Express Network) have plans or are working on a regional rail network. As a result these stations serve also their wider surrounding region.

Moreover, there are large housing and office developments nearby these stations, strengthening their positions as nodes for sustainable transport. Several stations along the two cross-border connections, that were discussed earlier, are also in the process of redevelopment, such as Mechelen, Ghent or the mixed developments near the newly station of Breda.

Research of Savelberg and de Lange (2018) has shown there is very high potential for substitution on this corridor. A faster and more frequent HSL connection and cheaper prizes would make 1 930 000 passenger per year use the train between Schiphol and London, 598 000 passenger per year between Schiphol and Paris and 156 000 passenger per year between Schiphol and Brussels. The high-speed line however does not stop a Brussels Airport, only the intercity direct train between Amsterdam and Brussels, stops at both airports. For the potential of London to be fully used, a direct connection from the Netherlands and a passport checkpoint at the Dutch stations are essential, which will be applied soon.

Since April 2019, Thalys runs twice a day to Charles de Gaulle Airport, with no stop in Lille. This stop makes an increase in substitution from plane to train between Schiphol and Charles de Gaulle possible.







destinations future operator: Green Speed

Bottlenecks

First some of the bottlenecks concerning the hardware. The main investments in the high-speed line are finished and for the Dutch part of the line ProRail and NS will work on the development of measures that can further increase the reliability in the medium to long term (before 2022) of this corridor. This includes investments to prevent failure of the train due to strong winds and to achieve a better transition between high-speed rail and conventional rail. Also extra investments will be made to reduce sound pollution.

In Belgium, the final part of the high-speed line is currently under development, this being a rail by-pass near Mechelen. By creating two more tracks, the high-speed train will go faster between Antwerp and Brussels. This by-pass is planned to be operational at the end of 2020. These extra tracks are also part of the earlier mentioned Brussels Regional Expres Network (GEN). Owing to the GEN project, the main tracks surrounding Brussels will be doubled, as a result local and fast trains will run on separate tracks. Furthermore, a new station for Mechelen will be build, expected to open in 2027.

Concerning the software, already the bottleneck of check-in to travel to the UK, has been mentioned. Also in Dutch stations, it will be possible to board the Eurostar, Therefore these stations need spaces for passport controle, so boarding on the Eurostar is possible at their station. It remains to be see how controles will develop with a looming Brexit.

Another point is that having an existing high-speed infrastructure is not all, there also needs to be enough frequency of trains. For instance, despite an existing high-speed line, there is no train between Lille and Brussels from nine o'clock in the morning until noon. The link to London is limited and the direct high-speed train between Amsterdam and Paris does not stop at Lille. Lille has the wish to be better connected to Brussels, beyond the airport, to the Netherlands and Germany. The capacity on the line from Lille to the Eurodelta might offer more opportunities, also for freight, as it does now.

Governance

As most of the needed hardware is in place for this corridor, there is no added value to discuss the cross-border governance needed for the constructions of this corridor.

Concerning new investments in and maintenance of the French network, two recent laws have clearly asserted priority for daily transportation, and in the case of railway, to existing lines. One of the pillars of the Law for a New Railway Pact (June 27th 2018) to reform the rail system is investing to restore the rail network to good condition; "Our rail network is now ageing and not sufficiently maintained, it is twice as old as in Germany: this is the consequence of the choice to have invested firstly in the TGV network for decades, at the expense of the resources for everyday trains." € 3.6 billion will be invested each year (2017-2026), i.e. € 10 million a day, to modernize the network, and € 3.8 billion from 2022. With the Mobility Orientation Law (December 24th, 2019), the French government wants to profoundly transform mobility policy, with a simple objective: everyday transport that is either easier, less expensive and cleaner. This law brings € 13.4 billion investments over the 2017-2022 period, with priority given to daily transport.

Concerning the service on the high-speed lines, there are three operators on this corridor: Thalys, Eurostar and NS international. Two of these operators see opportunities in an alliance. In September 2019, the directors of SNCF, NMBS and Patina Rail LLP (consortium consisting of the Caisse de dépôt et placement du Québec (CDPQ) and Hermes GPE LLP) have presented the "Green Speed" project as an alliance between Eurostar, the high-speed train operator through the Channel Tunnel, and Thalys, the Belgian-French high-speed train operator. Green Speed will lay the foundation for a European high-speed sustainable mobility company. As both operators have lines to Amsterdam, Cologne, Paris and London, this new alliance can be framed as an operator at Eurodelta scale.

Currently there are several seasonal trains from the Netherlands to France, for instance for skiing or summer

vacations. To decrease flights, the Dutch ministry for Infrastructure and Water Management has the wish to expand the locations that can be reached by direct train from the Netherlands.

Similarly, the French government has just announced that its aid to Air France is conditioned by the airline becoming the most environment friendly air company in the world. The short-haul division of Air France was already unprofitable before the COVID 19 crisis and it is only more weakened by the crisis. What will this entail for the relationship of Air France with the French high-speed train providers?

Conclusion

The northern part of the corridor shows that a high-speed train and a faster intercity direct train can use the existing high-speed infrastructure. This shows potential for a broader use and gains of a made investments, as it supports as well the larger nodes as medium sized cities in their mixed urban development. Here a point of attention is that fast cross-border connections have their own logic and should not become suboptimal by, for parts, making them a local cross-border connection.

A similar approach could be taken for the connection between Brussels and Lille, maybe even adding freight options, optimising the capacity of the connection.

As several airports are a stop at this line, there is a great potential for substitution from plane to train, especially a direct train to London, with a passport control at the boarding station adds more potential for substitution.

The new alliance of the two operators could increase efficiency at the scale of the Eurodelta. However the Dutch Railways are not part of the new operator and thus have not a strong position in the future operation of this alliance.

Overall, this corridor is a well-developed and shows several gains of which we can learn for other corridors.

2. To Frankfurt and Basel

EU as a global leader

There is an economic growth in the Rhine-Ruhr area. This growth is however not in the area as whole, but is concentrated in cities such as Düsseldorf, Cologne and Frankfurt. The Ruhr area is, due to the connection via the harbours, an interesting location. Due to Brexit, and especially losing London, the importance of both Amsterdam and Frankfurt as financial centres in the EU grows.

In 2014, around 180 000 passenger travelled (back and forward) between the Netherlands and Düsseldorf, Cologne around 696 000 and Frankfurt around 156 000 passengers. In 2017, for all of these cities there were seven trains a day, taking three hours to Düsseldorf and almost five to Frankfurt (Savelberg & de Lange, 2018).

For the future connection between Eindhoven and Düsseldorf, this connection was a part of the EU Project RoCK¹: Regions of Connected Knowledge, period 2007-2013. The overall aim of RoCK was to improve connectivity within and between regions of knowledge, this by development of railway connections into high quality efficient and user-friendly interoperable systems.

A just transition

Currently, there is a high-speed train from Amsterdam to Frankfurt, once every two hours, which has three stops in the Netherlands. This train has a long turnaround time at both endpoints. If a shorter turnaround time could be accepted, it would be even possible to add more cities to the connection by continuing this train, via Schiphol, to The Hague Central (van der Kooij, 2015). As the latter is an endstation, the train does not need to turn.

Next to this high-speed line, there are two cross-border trains that connect more Dutch and German medium and small sized cities to the Dutch national train network or the German high-speed network and in addition increase the internal connectivity in the mega region.

First, parallel to the high-speed train from Amsterdam to Frankfurt, there is an hourly local train from Arnhem to Düsseldorf, which has stops at several small size cities and Düsseldorf Airport. This local train stops in Duisburg and Düsseldorf, both hub stations and thus allowing access to several other German destinations via high-speed lines.

A second cross-border alternative is the train between Venlo and Düsseldorf, which runs every hour. Similarly, this train stops at several medium and small sized cities. Along this cross-border corridor, the Dutch national operator NS, proposed to the Dutch Ministry of Infrastructure and Water Management and provinces of Limburg and Noord-Brabant a minimum of three direct connections a day from Eindhoven to Düsseldorf, starting from 2020. (KIM, 2018). This latter connection might be connected with the existing train connection between The Hague and Eindhoven. It is important however to make sure that the existing local train between Venlo and Düsseldorf, remains a local train and that this current train is not extended to The Hague, mixing a Dutch national line with a German local line. For a connection between The Hague and Düsseldorf, via Eindhoven, a service and speed such as the current intercity direct between Amsterdam and Brussels would be better suited.

Between the Randstad Holland, the Flemish Diamond and the Rhine Ruhr Area, the project EurekaRail² works to ensure that the missing links for borderless train travel can be provided rapidly and to remove obstacles. As they put it: "fast train connections benefit economic development and cultural exchange, with the added advantage that trains are far better for the environment than cars". The connection Eindhoven, Venlo to Düsseldorf is one of the proposed borderless train travels.

Climate neutral economy

The high-speed stations on this line were redeveloped. In addition, there are significant housing and office developments nearby these stations, strengthening their positions as nodes

for sustainable transport. Concerning the proposed south intercity direct line from The Hague, via Eindhoven, to Düsseldorf. Several stations, and their surrounding area, along this line are also strongly (re)developing their nodes, for example The Hague central, Breda and Eindhoven.

There is a large potential for substitution from flight to train between Schiphol, Düsseldorf Airport and Frankfurt Airport. Research of Savelberg and de Lange (2018) has shown that a better HSL connection and cheaper prizes would make 177 000 passenger per year use the train between Schiphol and Düsseldorf Airport and 423 000 passenger per year between Schiphol and Frankfurt.

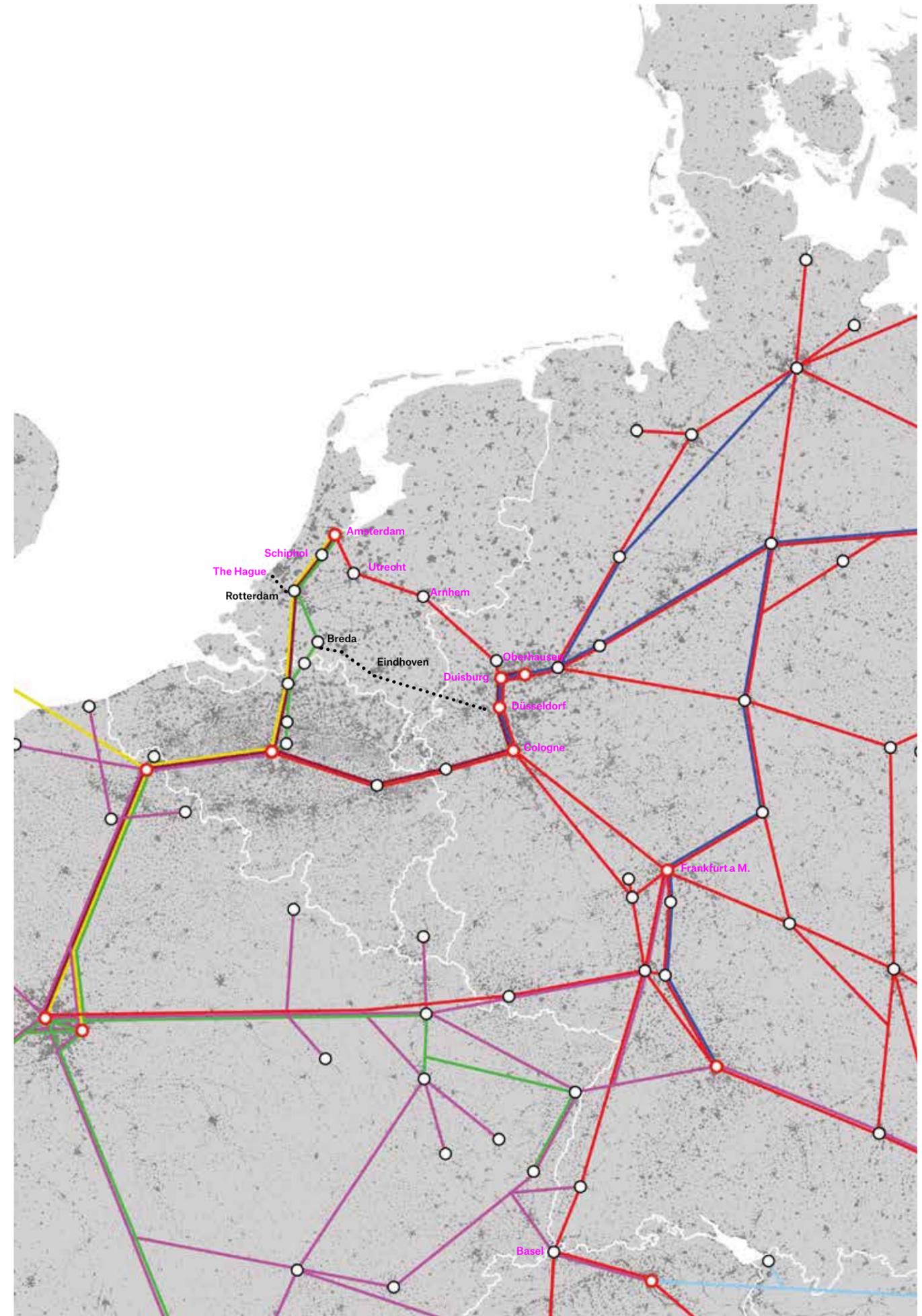
All airports are well connected to the high-speed train network, but Schiphol is not connected to the current high-speed connection to Frankfurt. Extending the line, via Schiphol to The Hague would add opportunities for substitution at this corridor. Although Düsseldorf Airport has a stop along the high-speed line, the current train to Frankfurt does not stop there. If the current high-speed line would be extended with Schiphol, clearly a stop at Düsseldorf Airport needs to be added. A better connection between these airports is also a wish of the Metropolregion Rhineland. From Cologne and Bonn the connection to Düsseldorf Airport and Frankfurt Airport is highly essential. Already some airlines provide that your luggage can be checked in at Cologne, if you fly from Frankfurt Airport.

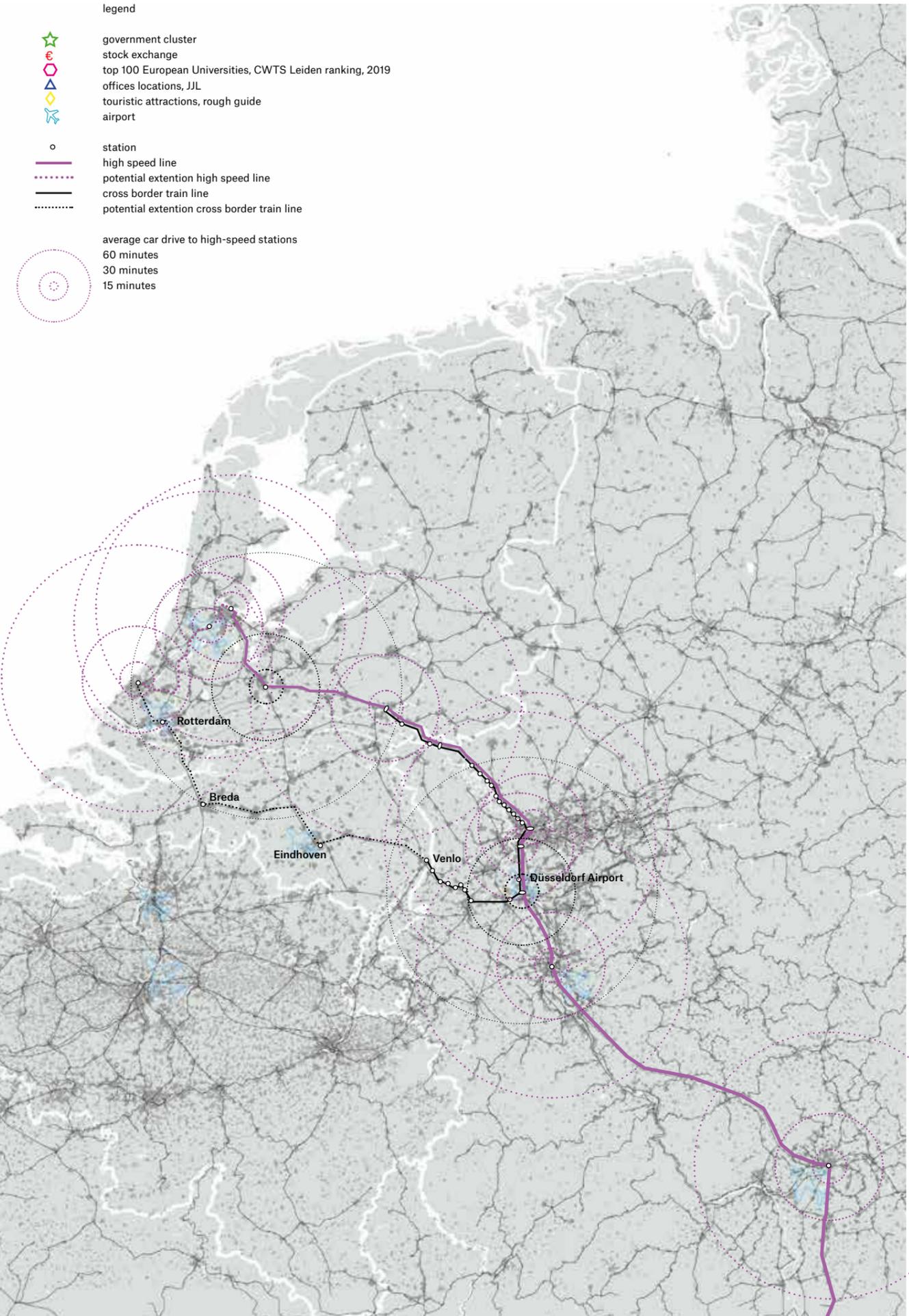
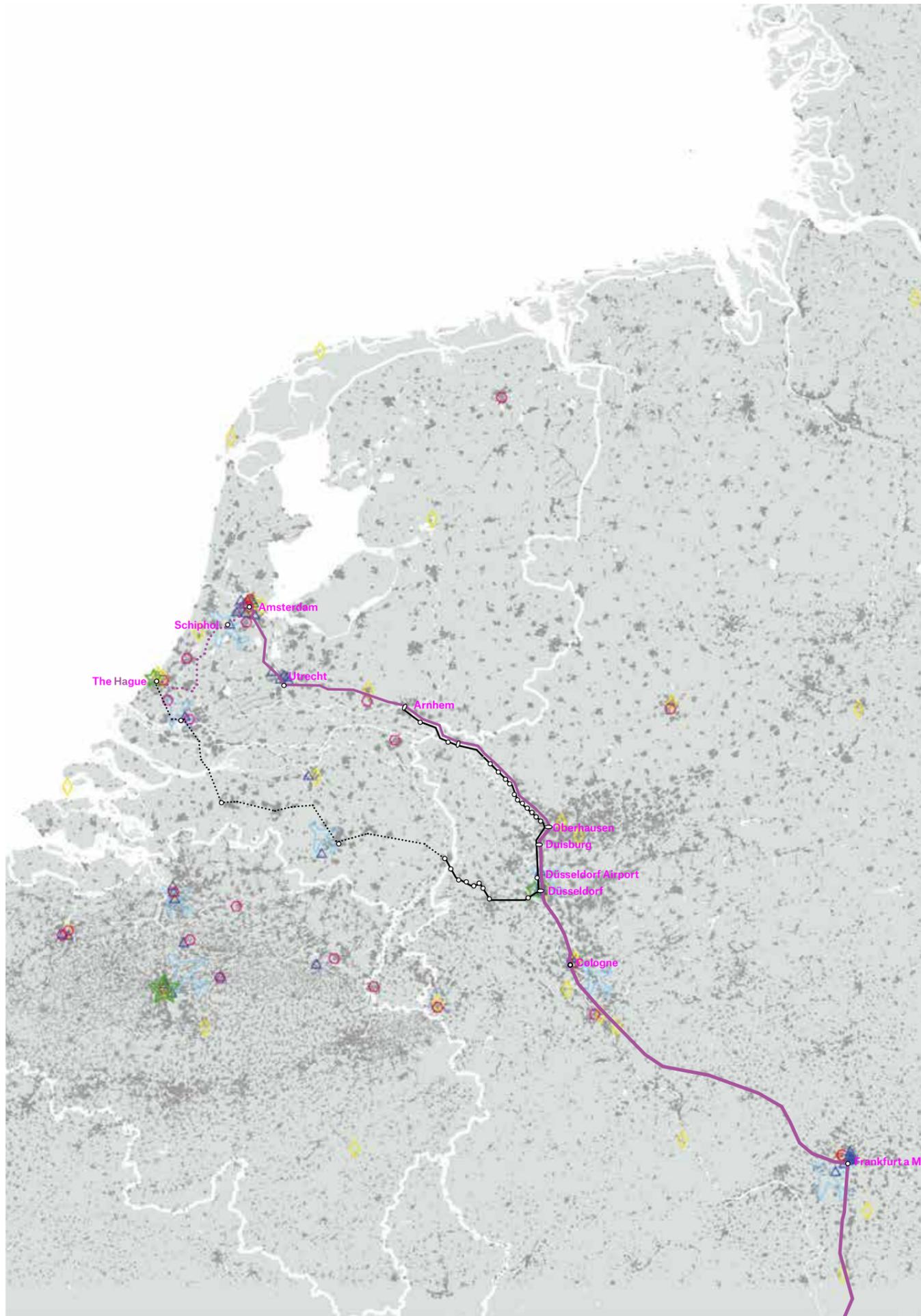
¹ more information, website: <https://keep.eu/projects/7088/>
² more information, website: <https://eurekairail.net/>

legend

- high speed operators, every colour represent another operator.
- future connection
- high speed station or capital cities
- high speed hub station

source: networks of major high speed rail operators in Europe, July 2019





ICE-Netz 2020

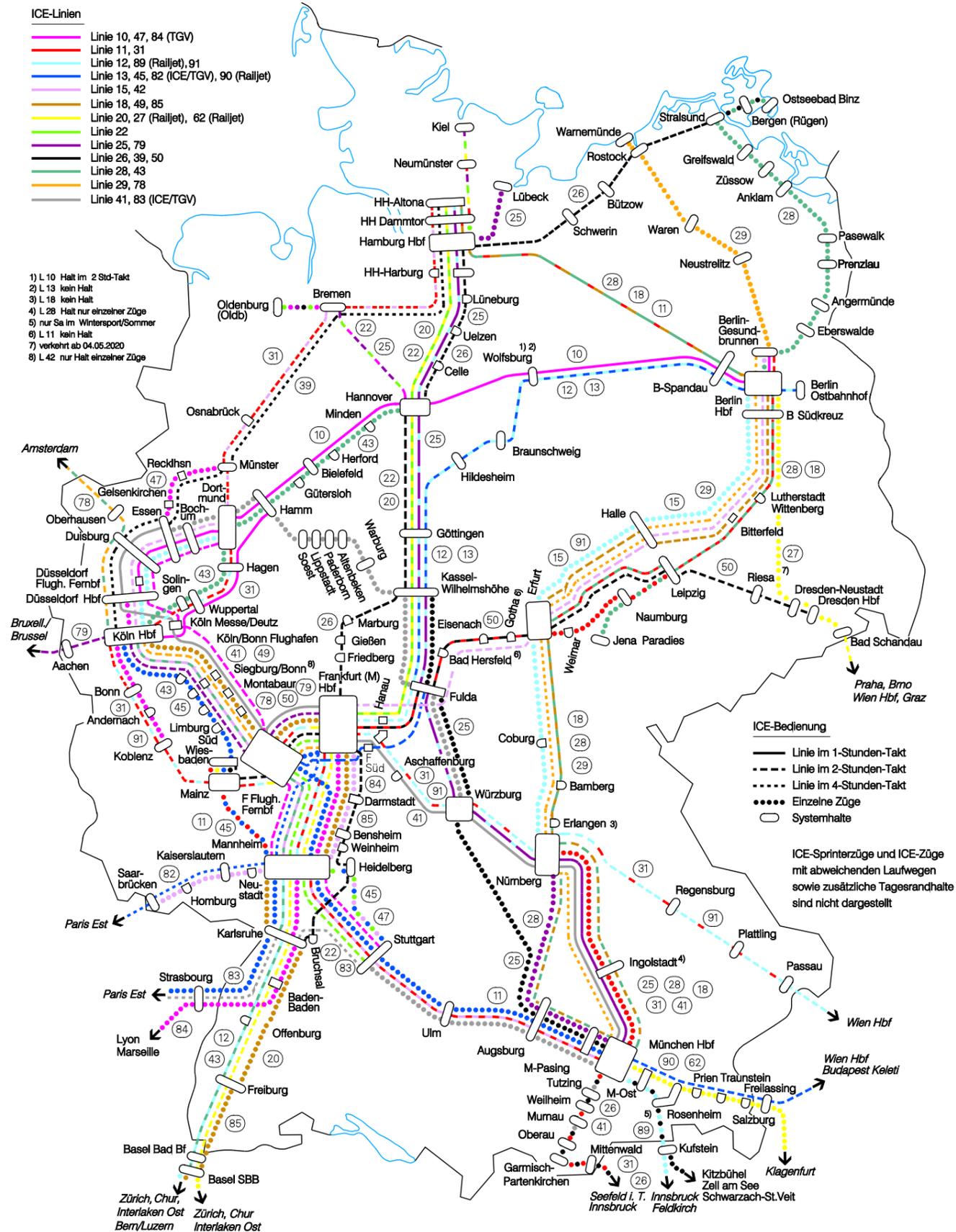
Gültig vom 15.12.2019 bis 12.12.2020



ICE-Linien

- Linie 10, 47, 84 (TGV)
- Linie 11, 31
- Linie 12, 89 (Railjet), 91
- Linie 13, 45, 82 (ICE/TGV), 90 (Railjet)
- Linie 15, 42
- Linie 18, 49, 85
- Linie 20, 27 (Railjet), 62 (Railjet)
- Linie 22
- Linie 25, 79
- Linie 26, 39, 50
- Linie 28, 43
- Linie 29, 78
- Linie 41, 83 (ICE/TGV)

- 1) L 10 Halt im 2-Stad-Takt
- 2) L 13 kein Halt
- 3) L 18 kein Halt
- 4) L 28 Halt nur einzelner Züge
- 5) nur Sa im Wintersport/Sommer
- 6) L 11 kein Halt
- 7) verkehrt ab 04.05.2020
- 8) L 42 nur Halt einzelner Züge



German ICE network in 2020, Rhine Ruhr area as a heavily used rail network

Bottlenecks

Firstly the bottlenecks concerning infrastructure, the main one being the absence of a high speed line on Dutch territory. Between Amsterdam and Utrecht a speed of 160 km/h is possible, once past Utrecht towards Arnhem, this becomes 140km/h. Works to increase speed on this part are planned (Govers, 2020). As a result, the current high-speed train between Amsterdam to Frankfurt is not running at full speed. Investments in new high-speed tracks (so regional or local trains can be separated from faster trains) are needed. On German territory, the possible speed is 160km/h until the Duisburg, 200 km/h until Cologne and increase to 300km/h until Frankfurt. The Bundesverkehrswegeplan (2016), set up by Bundesministerium für Verkehr und digitale Infrastruktur, shows planned infrastructural improvements, until 2030, that will allow higher train speeds. A high priority project (and thus funding) is a third track between Emmerich and Oberhausen. Due to this new track and other minor improvements in infrastructure or exploitation, 15 minutes can be saved on this route.

For the proposed line between The Hague, via Eindhoven, to Düsseldorf, the Dutch Ministry of Infrastructure and Water Management has recently invested € 10 million in infrastructure in order to make a direct connection between Eindhoven and Düsseldorf possible, from 2026 onwards. On the larger part of the track between Eindhoven and Venlo a speed of 160km/h is possible, between Eindhoven and Breda this is mostly 140km/h. From Breda until Rotterdam, the existing high-speed track can be used. Between Rotterdam and The Hague, the speed again becomes 140km/h. At the German side of this connection, the doubling of the railway tracks between Kaldenkirchen and Dülken is mentioned in the Bundesverkehrswegeplan (2016). However, it is not a priority project and thus does not supported by funding yet (Savelberg & de Lange, 2018).

Concerning services, the Dutch Ministry of Infrastructure and Water Management looks into the opportunities to increase the

frequency of the current 8 high-speed trains between Amsterdam and Frankfurt. When doing so, the Ministry should take into account the high potential to increase the substitution from air to rail between Schiphol, Düsseldorf Airport and Frankfurt Airport, this by prolonging the high speed train, via Schiphol, to The Hague Central, and by adding a stop at Düsseldorf Airport.

The Deutschland-Takt plan of the German Federal Ministry of Transport and Digital Infrastructure looks into how to improve the attractiveness of travel, by shorting waiting or change times at stations that offer several directions. The goal is that trains from and to different directions, arrive and leave at a similar time. For this plan to work, the current station of Cologne is lacking capacities in its urban node. This is why Deutsche Bahn is looking into developing two stations (one left and one on the right side of the Rhine) to expand capacities. However, this would be conflicting with the ambition of the Deutschland-Takt to develop smooth changing stations for trains from and to different directions at one node (Braun, 2020).

Governance

Concerning infrastructure, both countries seem to have the will, however they not always reserved the money to do the needed investments for both lines. Interestingly at the Dutch side investments are being made for the route along Eindhoven, where as at the German side, there are investment along the current corridor.

Regarding the operators, for the high-speed line, the operator is ICE International, a collaboration between the German (DB Fernverkehr) and Dutch Railways (NS International). This operator does not only run between Amsterdam and Frankfurt, but also between Frankfurt and Brussels. There is the ambition to increase frequency between Amsterdam and Duisburg to twice an hour (Govers 2020) as from Duisburg several German destinations can be reached.

A major political achievement of transnational relevance of the EU Project RoCK: Regions of Connected Knowledge, is the successfully adopted extension of the Dutch main

rail network concession 'Hoofdrailnet concessie' 2015-2025. In the new concession the Dutch Railways (NS) actively tasks to offer services to the first major rail hubs with frequent long distance and High Speed services across the border. RoCK managed that Düsseldorf and Aachen are part of the concession.

For the connection between Eindhoven and Düsseldorf, legal issues make that some in between steps need to be made in governance. The Dutch Ministry of Infrastructure and Water Management agreed with the Dutch Province Limburg and the German Verkehrsverbund Rhein-Ruhr (VRR) to pay for the exploitation of the service between Venlo and Düsseldorf, from 2016 until 2025. From 2025 onwards the Dutch Ministry of Infrastructure and Water Management is the grantor of the concession for a direct connection between Eindhoven and Düsseldorf (IenW/BSK-2018/125735).

Conclusion

On both sides of the border there are investments being made to better connect both countries. Surprisingly both countries are investing in another route. The current high-speed train can, post-Brexit, connect the financial centres of Amsterdam and Frankfurt better. Currently this train lacks a stop in Schiphol and Düsseldorf Airport to make substitution from air to rail to also Frankfurt Airport even more attractive. More stops make the travel time longer, however travel time can be decreased by new high-speed tracks are needed along this line.

Concerning an alternative fast cross-border connection between Randstad Holland and the Rhine-Ruhr area, the Dutch national operator NS is already pushing forward a better connection between Eindhoven and Düsseldorf. In phases this will be prolonged to The Hague. Several Dutch cities redeveloped, or are in the process, their station and nearby station area, making these interesting stops along this line. For this cross-border connection, it is pivotal, at both side of the border, to not add local stops to the fast connection. These should be served by local or regional connections.

3. To Berlin

EU as a global leader

This line connects capitals and connects the Netherlands better to several larger German cities. Both Osnabrück and Hannover allow changes to the German high-speed network.

In 2014, around 80 000 passenger travelled (back and forward) between the Netherlands and Osnabrück, Hannover around 100 000 and Berlin around 740 000 passengers. In 2017, for all of these cities there were seven trains a day, taking almost five and a half hours to Hannover and around seven to Berlin (Savelberg & de Lange, 2018).

A just transition

The current train from Amsterdam to Berlin is not a high-speed train, but an intercity train and has thus several stops in Dutch medium sized cities. Yet the question is, if in the future, this intercity train will continue to stop at all these stations as this lessens the quality of a fast connection. What's more, the corridor between Utrecht and Arnhem could become a high-speed track. If so, a high-speed train to Berlin, along this route might become an option to further look into. Even in such a future scenario, an intercity direct connection could still connect the Randstad and other Dutch medium sized cities to Hannover. As Hannover gives several high-speed options to other parts of Germany.

Then the question is, which route should be optimal for an intercity direct connection, the current route along Hilversum, Amersfoort, Apeldoorn, Deventer, Almelo and Hengelo or a more north alternative route, via Almere, Zwolle, Almelo or Hengelo. The Southern route might have more passengers potential, due several larger cities along the line. But also the cross-border intercity direct connections might want to lessen the stops on the line. Especially as several cities are near each other, for instance Apeldoorn and Deventer or Almelo and Hengelo. Here good and frequent regional transport needs to be put in place.

The cities along the Northern route are growing and this route has more train capacity available. Furthermore, the station of Zwolle is an important changing station for other cities in the North of the Netherlands, such as Groningen or Leeuwarden) and would thus connect the Northern part of the Netherlands better to Germany, where as the high-speed connection, via Utrecht and Arnhem, would do the same for the Southern and middle part of the Netherlands.

Next to the current cross-border intercity train, there are two cross-border trains from Enschede, one to Münster (16 trains a day) and one to Dortmund (18 trains a day). Along their routes, they connect more German medium and small sized cities. The advantages that were described in the INTERREG project for these cross-border connections were: the connection will better connect the (technical) universities at both sides of the border, improve the transport quality for cross-border commuters and increase the regional economy. Similar aspects that we have mention in the previous chapter and thus interesting to further look into the gains they further described for these projects, which got EU funding.

The connection between Enschede and Münster has grown from 4.000 users a day in 2000 to almost 10.000 users in 2017. Cities at both sides of the border have shown an interest in a direct connection between Zwolle and Münster, via Enschede. This connection could add 40 000 passengers a year between these two cities. The cities of Münster, Osnabrück, Almelo, Borne, Hengelo, Oldenzaal and Enschede have signed a letter of intent to strengthen this connection.

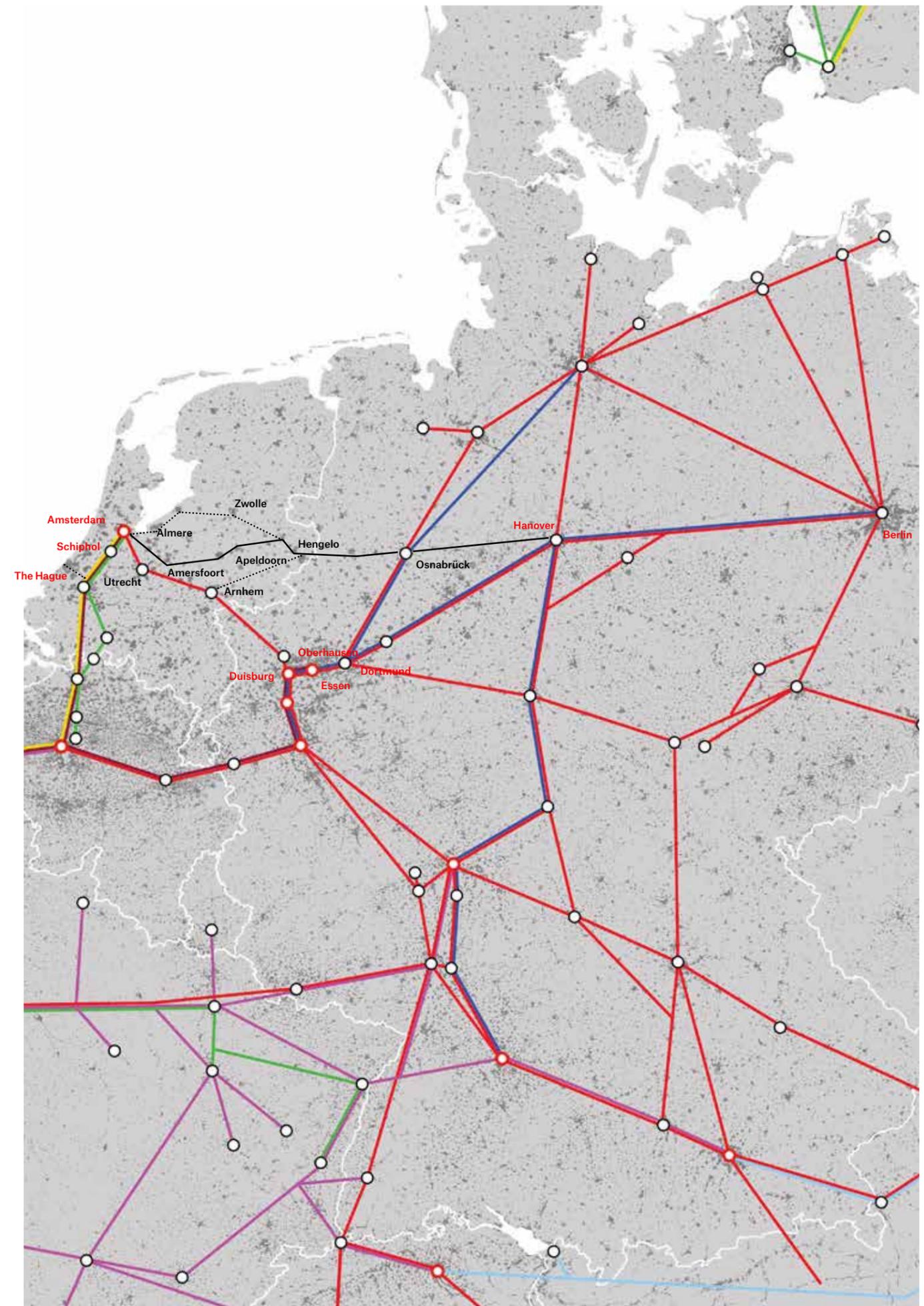
Also a better connection from Enschede to Dortmund has been researched. The most preferable option would shorten the travel time between the two cities with 25 minutes and give opportunities to increase the frequency to two trains in an hour.

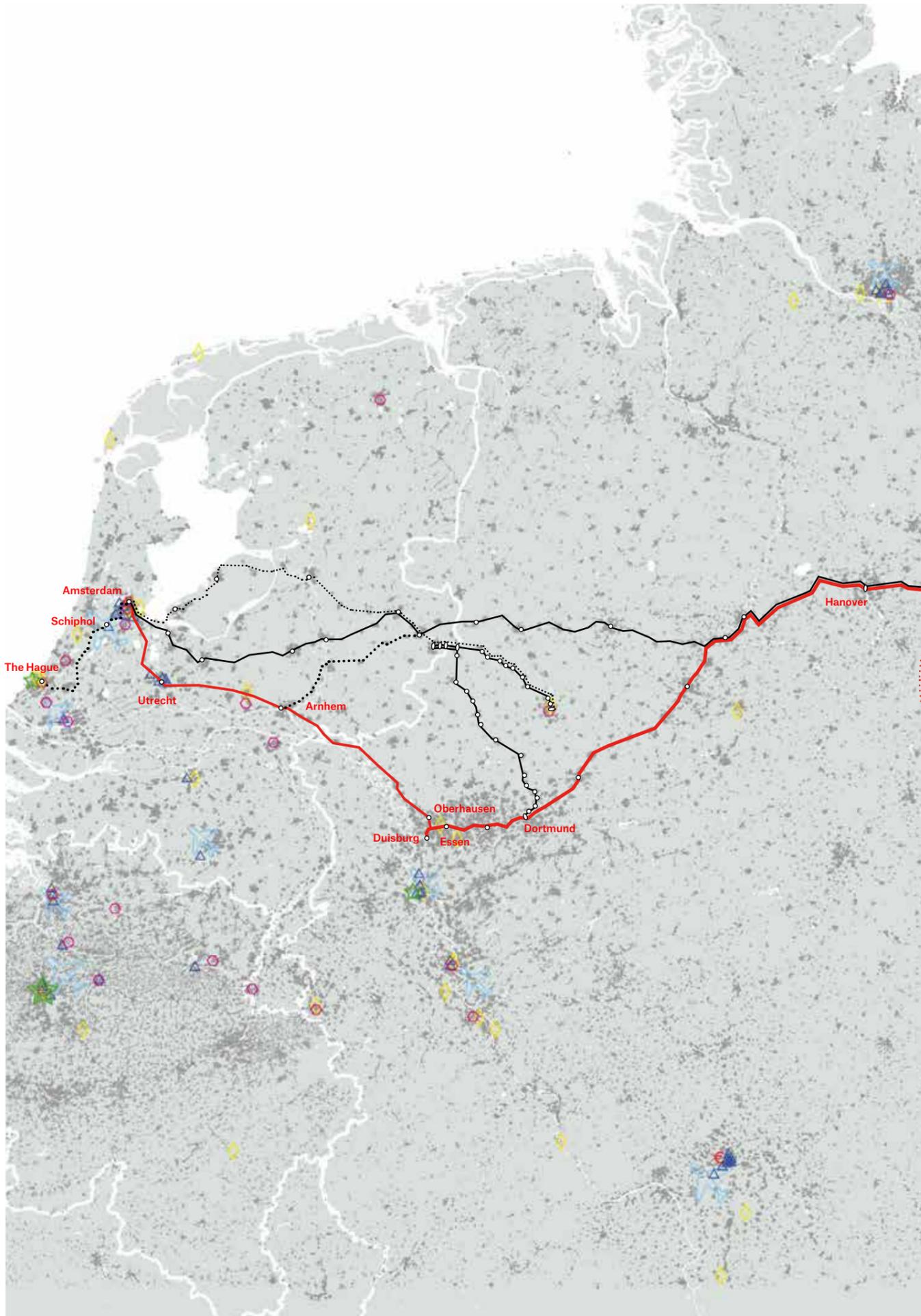
Climate neutral economy

Along the current corridor, several cities are developing areas around their station, for instance Amersfoort or Zwolle.

The cross-border connections from Enschede to Dortmund or Münster are currently diesel trains. Future investments will include electrification of the tracks.

There is some potential for substitution from flight to train between Schiphol, Hannover Airport and Berlin Airport. Research of Savelberg and de Lange (2018) has shown that a better high-speed line connection and cheaper prizes would make 102 000 passenger per year use the train between Schiphol and Hannover and 72 000 passenger per year between Schiphol and Berlin. Both German airports are not connected to the high-speed network. Currently Schiphol is not connected to the high-speed connection to Berlin. Extending the line, via Schiphol to end station The Hague Central would add opportunities for substitution at this corridor.



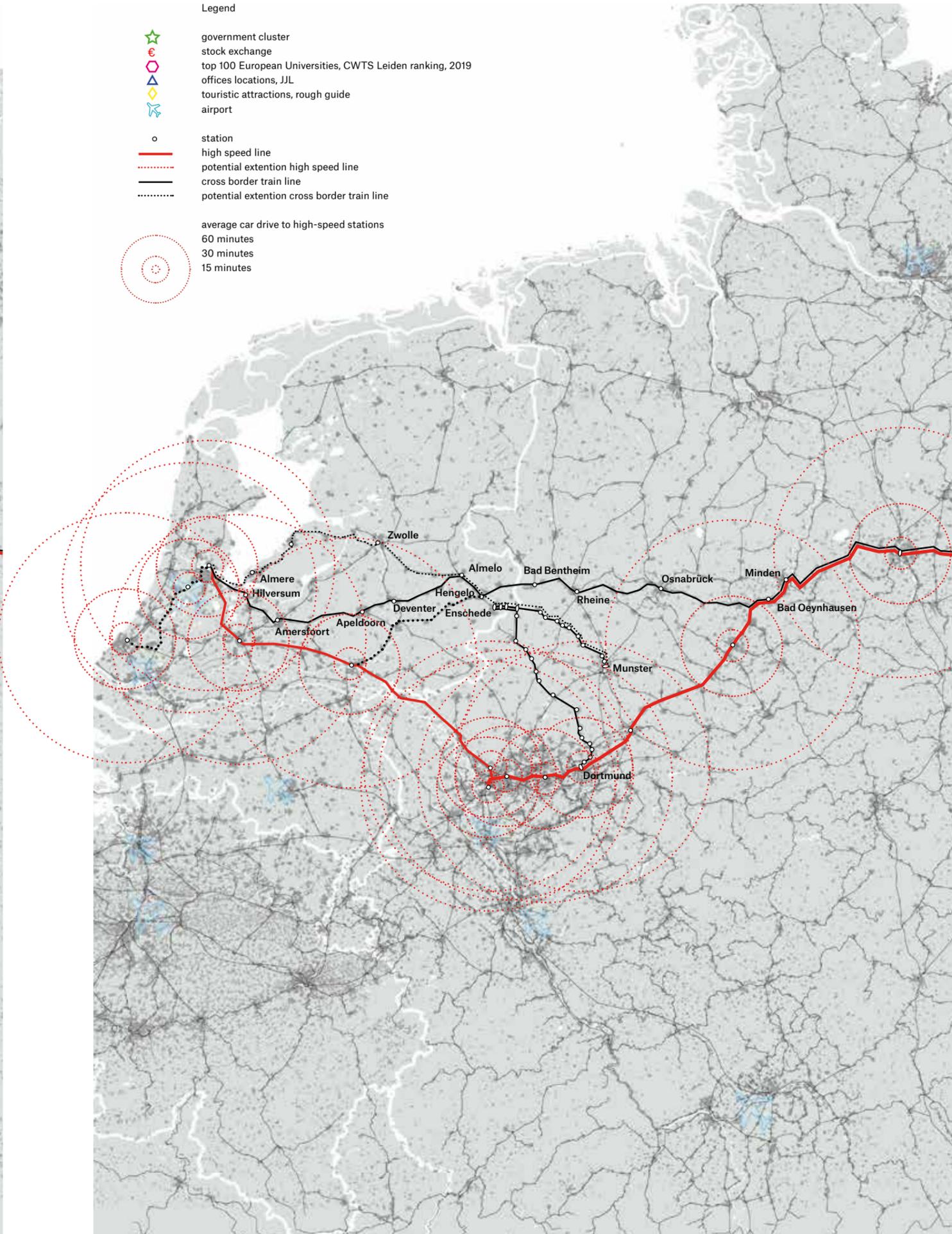


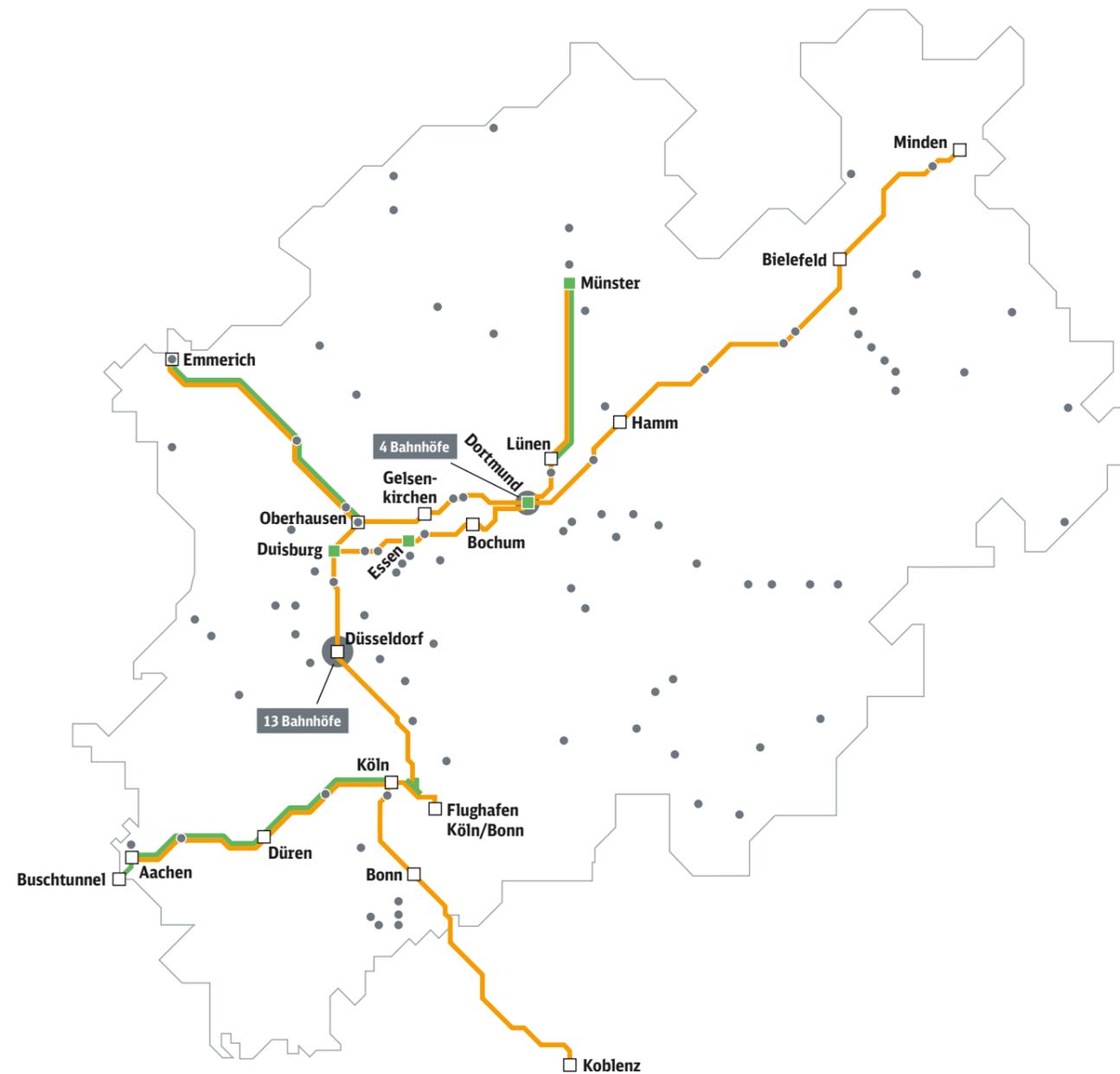
Legend

-  government cluster
-  stock exchange
-  top 100 European Universities, CWTS Leiden ranking, 2019
-  offices locations, JIJ
-  touristic attractions, rough guide
-  airport
-  station
-  high speed line
-  potential extention high speed line
-  cross border train line
-  potential extention cross border train line
-  average car drive to high-speed stations

average car drive to high-speed stations

-  60 minutes
-  30 minutes
-  15 minutes





Masterplan Nordrhein-Westfalen.2008, planned projects with financing

Bottlenecks

We start with the bottlenecks concerning infrastructure. For the current route, there is a lack of a high-speed track from Amsterdam to Bad Oeynhausen. At the Dutch territory the maximum speed for the track between Amsterdam to the border is 130 km/h. and the current corridor is not seen as an international main corridor (Programma Toekomstbeeld OV, 2019). The alternative route along Almere and Zwolle shows interesting potentials. It allows higher speeds at some parts: 140 km/h between Almere and Lelystad and even for the large part 200km/h between Lelystad and Zwolle. After that 130 or 140km/h is again the norm until Hengelo. As a result, a train from Enschede can reach Amsterdam half an hour faster than then via the current route.

For the German side of the line, the German Bundesverkehrswegeplan (2016), infrastructure investments between Bad Bentheim and Löhne are mentioned in the plan. However, these have not the status of a priority project and are thus not supported by funding yet (Savelberg & de Lange, 2018). Recently there have been some improvements made on the current corridor from Amsterdam to Berlin. From December 2019, the locomotives do no longer need to be switched at the border, which saves almost 10 minutes of travel time.

For the train connections from Enschede to Dortmund or Münster, also infrastructure investments, mainly in the German network are needed. A faster and more frequent connection to Dortmund would cost 51 million euro. For the needed funding, the EU region is negotiating with Germany and the EU. Most of the needed investments could be done by 2027, so this faster connection, together with the connection between Zwolle-Enschede-Münster could be part of the Euregio-railplan.

Concerning services, in order to make this current connection to Berlin more appealing time wise as an alternative to flying, the first minimal option would be to delete some stops and at the same time add Schiphol as a stop. Currently the Amsterdam-Berlin intercity train is, in the Netherlands, used as a substitute for a national

intercity train and has thus many stops. The new classification of the Dutch stations at several levels, could help to select more HSL convenient stops. Upgrading this train however, entails that there might be a new national service need for the no longer served station, lowering the network capacity for the faster HSL train. In Germany this train has a similar use as a more national intercity train (Donners, 2018). Also here limiting stop should be considered.

To illustrate the slow speed of the current connection: the travel takes up 6h and 20 minutes, while if one should take the high-speed train from Amsterdam to Frankfurt and change in Duisburg to a high-speed train to Berlin, the in-train travel time would only be 5 hours 50 minutes. Unfortunately, there is a waiting time of about 40 minutes in Duisburg. The Deutschland Takt plan, as described in Frankfurt corridor, could improve this waiting time. Furthermore there is the wish for The Netherlands to double the frequency between Amsterdam and Duisburg, decreasing the changing time to 10 minutes. If a higher frequency is set, the corridor from Randstad-Holland to the Rhine-Ruhr area, via Utrecht and Arnhem, will be the route for a high-speed trains to Berlin. The current route will diminish and an alternative route, via Zwolle, will end in Hannover (Govers 2020).

However, this high-speed option also has its pitfalls. The high-speed tracks in the Ruhr area are at full capacity and it needs further research if an extra train would still fit in. So adding more trains from the Netherlands to this network might not be possible.

The regional cross-border connection from Enschede also brings an interesting dilemma to the table. Currently a German provider organises both train services and thus the service is under German regime, different from Dutch Law. As a result the current trains are unable to continue on the Dutch rail network, there is even a blockage on the tracks to prevent the trains of doing so.

Governance

Concerning infrastructure, in the near future both countries seem not to be willing to invest in high-speed infrastructure in the current corridor.

However, the governments and rail operators are looking into which stops along the line can be eliminated in order to decrease overall travel time (IenW/BSK-2018/125735).

Regarding the operators, for the current intercity line, the operator is a collaboration between the German (DB Fernverkehr) and Dutch Railways (NS International).

To improve the connections from Enschede to Dortmund and Münster, the INTERREG project EuregioRail¹ has been set up by the EUREGIO, together with the province of Overijssel, the Zweckverband SPNV Münsterland (ZVM) and the Zweckverband Nahverkehr Westfalen-Lippe (NWL). Together they have starting an investigation into the possibilities of a direct train connection between Zwolle and Münster from 2027. The study focuses on sustainability, accelerate and make the train connection more comfortable. The first results will be available at the end of 2020.

Conclusion

At both sides of the border, there is no intention to further invest in the infrastructure to speed up this connection. What is being looked at, is eliminating some stops along the line to reduce travel time. There is some potential for substitution for air to rail along this line, however, it currently lacks a stop at Schiphol. Depending on the developments for the corridor along Utrecht and Arnhem to a high-speed track, the connection to Berlin might take another route in the future.

However, what we could learn from this corridor are the actions taken to better connect Dutch and German cities cross-border (Zwolle- Münster) or to speed up the current more local connections (Enschede-Dortmund) . What are the gains they have put forward to get these connections on the agenda and could similar points be used for other cross-border connections in the Eurodelta?

¹ more information, website: <https://www.deutschland-niederland.eu/en/project/spoorregio-schienerregio/>

4. To Hamburg and Copenhagen

EU as a global leader

As German largest harbour, Hamburg is an important cities with a strong economy. There is currently no direct train to Hamburg or higher up North. From Amsterdam one can take the IC train to Berlin, and switch in Osnabruck to a train to Hamburg. The travel time is about five hours and ten minutes.

Together with the development of the Fehrman belt tunnel, this line allows a better connection with several Scandinavian cities, such as Copenhagen or Stockholm.

A just transition

From the Dutch side, there are two main routes for a direct connection between Randstad Holland and Hamburg or even more Scandinavian cities. There is the current route via Osnabruck, with two options to get to Schiphol, via Zwolle and Almere or via Apeldoorn and Amersfoort. This route has been discussed in the section: To Berlin and I refer back to that section for a more detailed description.

An alternative northern route is via Groningen, connecting the North of the Netherlands better to both the Randstad Holland as to Hamburg. A first step to get this connection better at the Dutch side is that the Dutch national provider (NS) is looking into a fast connection (200 kilometres an hour) from Breda, partially along the current high-speed line, to Groningen. This train would connect Breda, Rotterdam, Schiphol, Amsterdam South, Alemere, Lelystad, Zwolle, Assen and Groningen and would become operational in 2023. It will connect several medium-sized cities to the cities in the Randstad Holland. For several medium-sized cities this connection may give these cities, and their surrounding cities, a better position in the Dutch urban network. However, there has been a debate if a fast train between Groningen and the Randstad Holland would positively or rather negatively affect Groningen. The Sociaal-Economische Raad (SER) looked into this matter and concluded that it could have a positive effect, if there is also an improved connection to bigger cities in Germany.

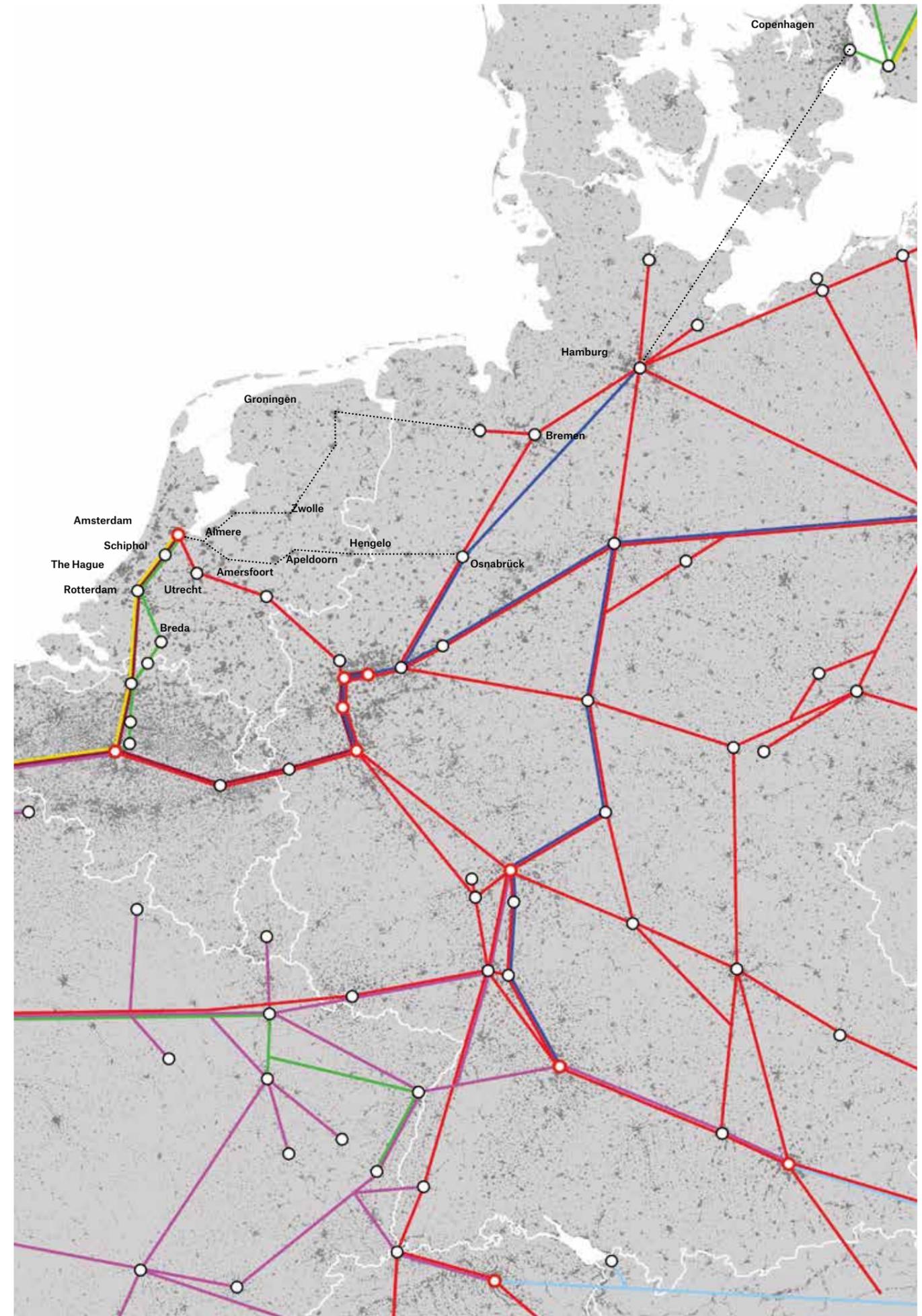
The project Wunderline aims for a better cross-border connection from Groningen to Bremen, along several German medium sized cities and towns. The project thus focuses on the gains for Groningen from borrowing size with cities across the German border. At the beginning there was resistance against this project. By giving the project a broader scope, more partners supported the project. This broader scope can still be seen in the projects' aims, which are: growth and development in the northern parts of our countries – economic as well as societal and exchange of scientific and creative ideas between the northern parts of the Netherlands and Northern Germany. However only from 2024 onwards, this connection will be operational. In other words, by 2024 Groningen will be better connected to both Randstad Holland and bigger cities in Germany, however not due to a high-speed line.

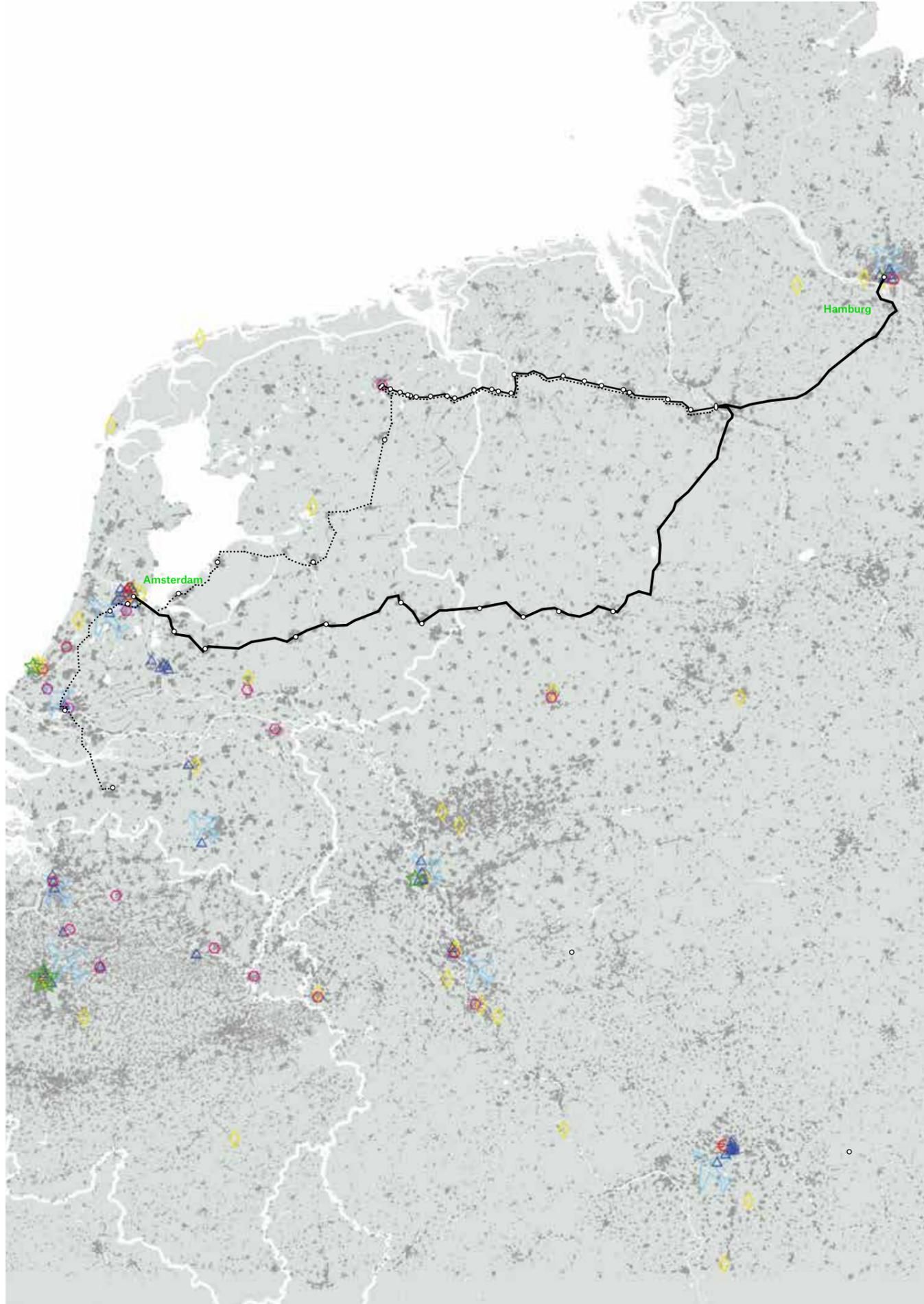
Climate neutral economy

Cities along the proposed fast train from Breda to Groningen redeveloping their station areas to mix urban hubs and are increasing the regional accessibility. Several of these cities have already been discussed in the section: To Brussels. As an example for the northern part of this line, the city of Zwolle is a fast developing city and the development of the Hanzelijn, between Lelystad and Zwolle, has improved its regional accessibility.

There is some potential for substitution from flight to train between Schiphol and Hamburg. Research of Savelberg and de Lange (2018) has shown that a better HSL connection and cheaper prizes would make 119 000 passenger per year use the train between Schiphol and Hamburg. In the study, the travel time to Copenhagen was considered too long for substitution from air to rail, even with the cut in travel time due to a new tunnel between Germany and Denmark.

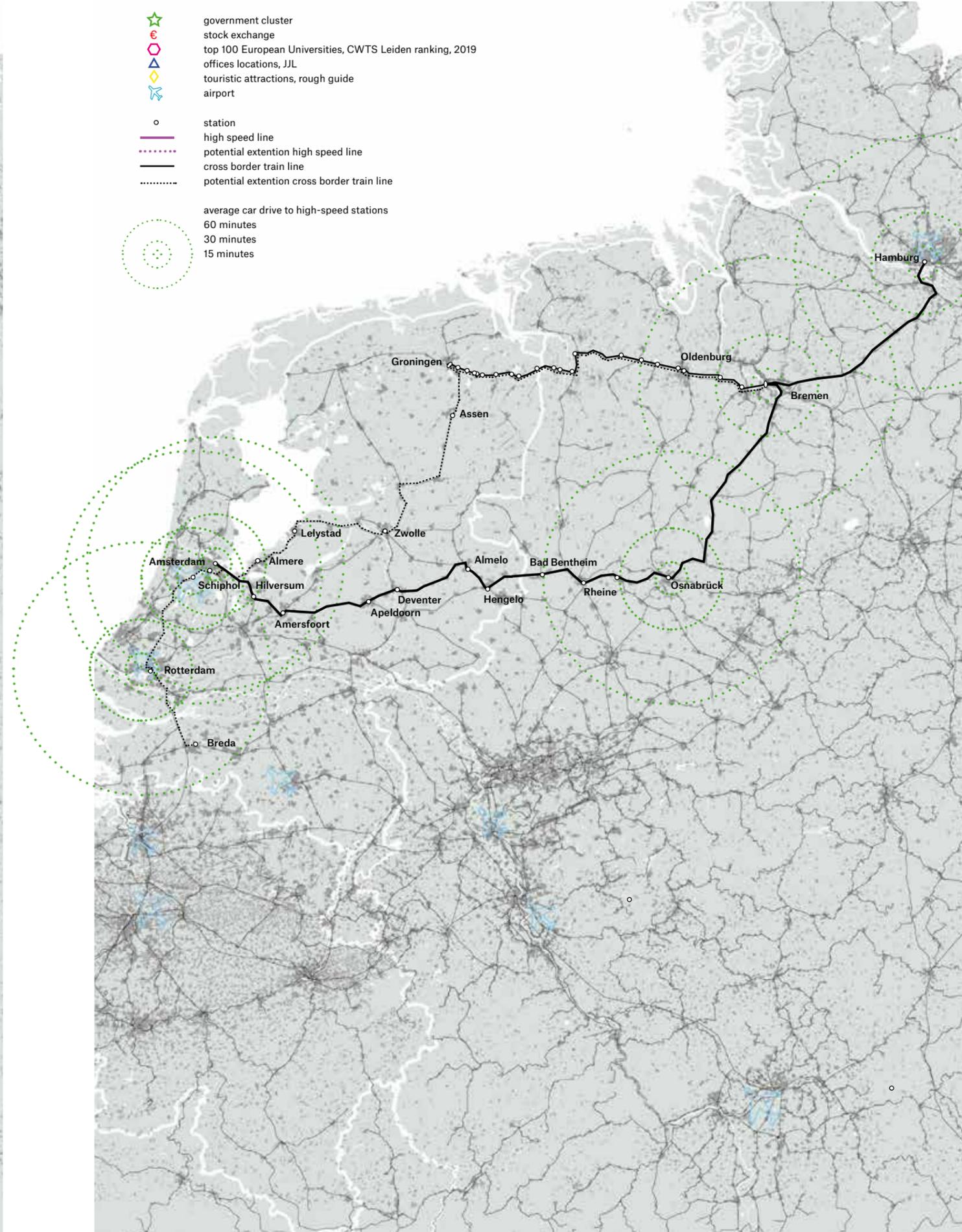
At the regional level, the Wunderline will switch from diesel fuel to hydrogen gas and as such will be experiment to learn from.





Legend

- government cluster
- stock exchange
- top 100 European Universities, CWTS Leiden ranking, 2019
- offices locations, JIJ
- touristic attractions, rough guide
- airport
- station
- high speed line
- potential extention high speed line
- cross border train line
- potential extention cross border train line
- average car drive to high-speed stations
 - 60 minutes
 - 30 minutes
 - 15 minutes



Bottlenecks

First infrastructure, as this is the last of the corridors we look at, a lot is already been described. For the route along Osnabrück, I refer to the bottlenecks described in the section: To Berlin. It is good to add that from Osnabrück to Hamburg, there are already high-speed trains running. Concerning bottlenecks at the route along Groningen, only these from the north of Amsterdam will be put forward, as others are described at the section to Brussels.

The Groningen route lacks a high-speed track. On Dutch territory, there is the ambition to create a faster train from Breda to Groningen and the NS wants to use locomotives that run 200 km/h for this route. As the CEO of the NS puts it: "We invest in faster trains and we hope that this is an extra reason for the Netherlands to invest in tracks that allow such a speed" (van Boxtel, 2019). Most of the tracks along this line and North Amsterdam allow 140km/h, at the Hanzelijn (between Lelystad and Zwolle) for the largest part 200km/h is possible. In the short term, a rail investment near Hoozeveen will already decrease the travel time to Groningen with some minutes.

For both lines, the Fehmarnbelt tunnel between Germany and Copenhagen will be of influence for more North connection to Scandinavia. The tunnel should be completed by 2028. Furthermore, Germany is investing in the connection Hamburg and this tunnel (German Bundesverkehrswegeplan, 2016).

From Groningen to Bremen, there will be many investments on the tracks, connected to the Wunderline project. It is however vital to mention that these investments are set for a maximum speed of 130 km/h and the line will not be electrified, but use a hydrogen gas. Currently there are ICE's running from Oldenburg. Another bottleneck for the Wunderline is that in 2015 an essential rail bridge got broken due to ship traffic and this bridge will only be repaired by 2024.

Concerning service, for the existing option to Hamburg we refer to the section: to Berlin. For the Northern route, much is still unknown, concerning a service, so there is no

point further exploring this option already now.

Governance

Concerning infrastructure, in the near future both countries seem not willing to invest in high-speed infrastructure in the current corridor or the new more northern corridor via Groningen.

The cities Hamburg, Copenhagen, Stockholm and Helsinki are looking into the possibilities of developing a high-speed line that will connect their cities to Amsterdam. Amsterdam is not member of this initiative, but in contact with the other members. It is currently unclear how this line will run to Amsterdam. This will be influenced by the infrastructure available. Also who will be the operator might be of influence on this choice. If the operator (one operator or a consortium) will be the Deutsche Bahn, we can presume they will want to use their existing high-speed network in Germany as long as possible, as there is a lack of high-speed tracks in the Netherlands.

In sum, looking at the current cards at the table, so both infrastructure and potential operator, the route along Osnabrück has more chance to be selected for this connection between Hamburg and Amsterdam.

To improve the connections from Groningen to Bremen, the Province of Groningen, the Dutch National Government, the German state Niedersachsen and the European Commission (Connecting Europe Facility programm) will invest in the needed improvement for the Wunderline. Province Groningen is the grantor of concession for the connection to Bremen.

Conclusion

The initiative of the cities Hamburg, Copenhagen, Stockholm and Helsinki has fuelled an old debate on whether Groningen should be added to a high-speed line. By 2024 Groningen will be better connected to both Randstad Holland and bigger cities in Germany. These developed might give extra arguments to do so. However, looking both at the current infrastructure and potential provider, a connection between Hamburg and Amsterdam via Osnabrück has a better chance.

Similar to other sections, the goals and approach for developing a cross-border regional connection are inspiring and could help other cities to develop cross-border connections in the mega-region.

Conclusions

So where are we now? The different researched directions are clearly in another phase of development. The line to Brussels, Paris and London shows the potential a high-speed line can have for trans-european and internal mega region connections. With the looming Brexit, a better connection to Frankfurt seems the next direction to further invest. At the same time we need to check how the investments in this connection can be used for other directions to the East.

Overall a better overview on what are future infrastructure investments and urban developments in the Eurodelta would help to make better strategic investment in our mega region. The forthcoming ESPON research Sustainable Transport Infrastructure in the Strategic urban region Eurodelta (STISE), could help us get this Eurodelta overview.

In brief, there are some pivotal points to take home or look into further concerning the development of high-speed lines, arranged by partner in the process.

European or national governments

The economic, social and climate arguments have shown the benefits of investing in a complete European high-speed core network. Smaller countries, such as the Benelux countries, are lacking behind. As the European court of Auditors (2018) showed: the European high-speed rail network is not a reality, but an ineffective patchwork. To counter this we see three actions: First, if we want a trans-European core network that will support our future European Green and Just Economy, this network needs to be back on the investment agenda of the national governments. Referring to the earlier ambitions of a European core network set in the Roadmap to a Single European Transport Area – Towards a competitive and resource-efficient system (2011) in coming European Green Deal would be first step to keep the importance of the network on the each investment agenda.

Second, next to the trans-European destinations, these high-speed lines can also be used for fast direct cross-border trains, linking also medium sized cities to the internal mega region network. To start building the internal mega region network in the short term, the current cross-border connections, of which some of them

will be redeveloped, could play a vital role. However, the line speed of the new tracks are in many cases oriented for the operation of a slower local or regional train. At the Eurodelta scale, which cities could be connected by faster cross-border direct intercity trains? Taking the example the direct train from Amsterdam to Brussels as a reference of the benefits this can bring to more medium sized cities and towns.

Lastly, there are several soft- and orgware issues to be tackled. A level playing field between rail and air and the smooth use of crossborder networks should be the ambitions to go for.

Cities in the Eurodelta

Both chapters have shown the several gains a high-speed network can bring. No-regrets for the long term are to create near the (planned) high-speed stations a dense, mixed program and to invest in a robust regional public transport network, with frequent connections and smooth transitions at the high-speed station. The latter in order to let locations, at a distance, also benefit from the stop and to let the stop benefits of a good feeder network.

Furthermore at the short term, cities could evaluate the (new) position in the network: which are the cultural, knowledge or services links companies or institutes have with other connected (or to connect with) regions?

How could these links be strengthened by fast direct (in short term) or high-speed trains (in long term)?

Airports

Also after this crisis, airports will stay important. Due to the crisis, this is the time to put in to place actions to decrease their CO2 emissions, one of the actions being a connection to the high-speed network, so substitution from plane to train can take place. In the short term, airports can re-evaluate the landside of their node and look at what systems or spaces are needed for a smooth transition for passengers from air to rail? For example how to handle luggage or passport controls.

Providers.

In the first chapter, it was pointed out small countries, such as the Benelux countries are mainly depending on larger neighbouring countries for an operator to run on their high-speed lines. The second chapter has given us some food for thought how to tackle the following three aspects in the short term.

First there is the Green Speed Alliance, could this become the Eurodelta provider for international connections? Should the current ICE in time not join this alliance? As most more national providers are part of the alliance, this might lead to a smarter use of each national network and to an overall more robust system. For the users, this hopefully

leads to more flexibility, as currently it is not easy to exchange tickets between operators (Eurostar, Thalys), and a move towards an international standards for sales and ticketing systems.

Second, on the level of the internal mega cities connections, the intercity direct between Amsterdam and Brussels shows the benefits of a parallel system, adding more medium sized cities to the high-speed network and as such optimizing the gains of the high-speed investments. Several cross-border direct connections, within the mega-region have been mentioned. Along which routes could more of such fast cross-border intercity direct connections be developed in the short term? And how to make sure they do not become a substitute for an also much needed regional or local train? A further benefit this connection has, that you buy a ticket for a certain day and not a specific train, creating more flexibility for the users.

Lastly, developing and offering more combined tickets, train and air (e.g AirRail) would make substitution between the modes easier for the user. Together with airlines and airport, providers could work on the easiness for passengers as substitution and clever pricing.

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