

CONNECTING EUROPEAN CITIES BY WATER : RIVERS RE-INTEGRATION FOR SUSTAINABLE TRANSPORTATION AND CITIES ECONOMIC GROWTH

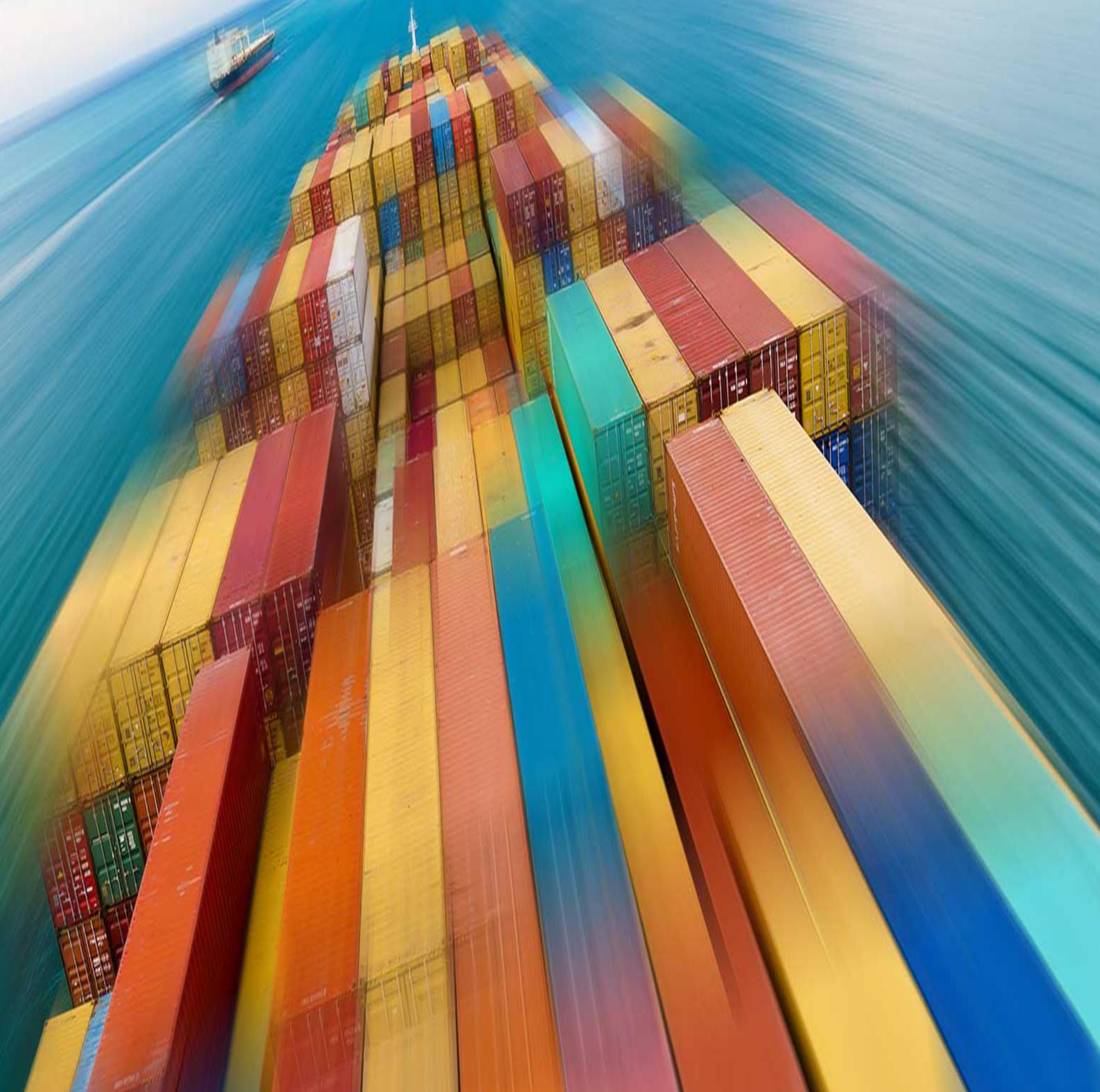
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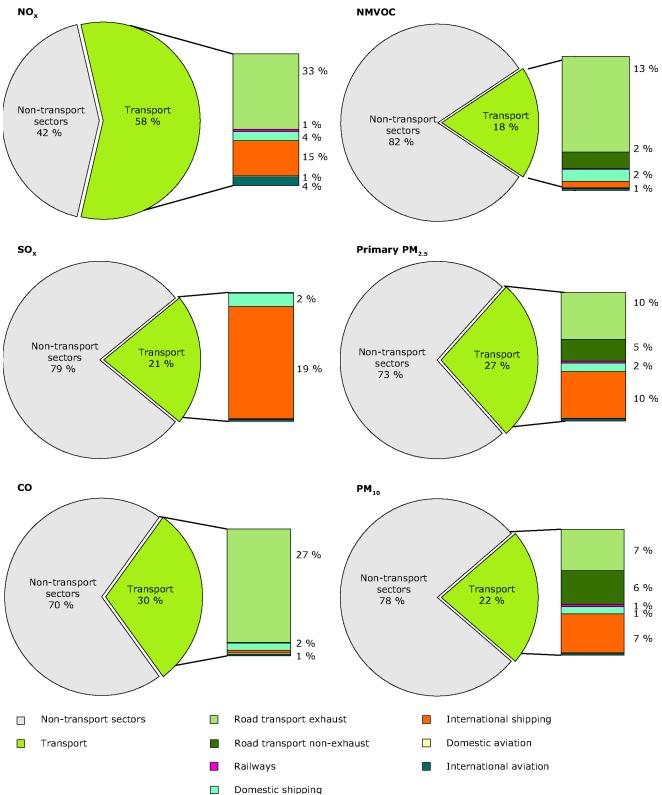
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POLITÉCNICA





According to the Intergovernmental Panel of climate change (2004), reducing environmental impacts caused by non sustainable modes of transportation remains a necessity. Nations have to take steps to limit carbon emissions and take swift actions to adapt to the impending effects of climate change and limited resources. In 2004 transport NRJ-use resulted in 23% of world energy-related GHG emissions (IEA, 2006). In 2009, the transport sector was responsible for a major party of total emissions of the main air pollutants (EEA-32). Road transport is especially damaging our ecosystems. Indeed, Road transport currently accounts for 74% of total transport CO₂ global emissions with records in terms of CO (27%) and NO_x (33%) global emissions.

Emissions are more important in developed countries, the share of non OECD countries is only 36% now, but it will increase rapidly to 46% by 2030 if current trends continue. Transport activity, a key component of economic development and human welfare, is increasing around the world as economies grow with congestion, air pollution and petroleum dependence relative problems. These problems are especially acute in the most rapidly growing economies of the developing world. Intercity and international travels are growing rapidly, driven by growing international investments and reduced trade restrictions, increases in international migrations and rising incomes that fuel a desire for increased passengers and freight travel.

Through Regionalisation and supranational alliances growing importance, the trend is at redistributing power and investments toward urbanism and physical infrastructures. Indeed transnational infrastructural networks appear to be the physical results of our international cooperations. More than one century ago, Tocqueville was claiming the decentralisation of power toward cities and local entities in order for citizens to exercise their duty. Today national planning decisions have become in many country inefficient strategies. If massive decentralisation toward cities and metropolitan areas have been very important to create efficient decision makings and to implement innovative systems of transportation at city scales, the new need is at creating growth oriented transnational networks of transportation at supranational alliance level to increase and liberalise flows within our european network of cities.

In Europe, transportation systems are very well developed but not designed to protect the environment and responsible for high cost deficits. Indeed our actual Infrastructures are creating a generalised “crisis of control” (Beniger) within the entire production- distribution-consumption system. In Latin America and Asia, transportation systems are being developed as the continent get urbanised. Indeed the debate toward the infrastructural crisis let space for the retrofitting of our western infrastructures into tools of growth and environmental recovering, and much potential for innovative development in the non developed world where nature remains the ultimate infrastructure.(Paul Edward, 2003) Therefore Infrastructures represent a constantly changing social response to environmental problems resulting from material production, communication, information, and control. Now in the era of climate change and capitalism, how to use natural response and face our precedent failures to avoid the destruction of our ecosystems, to support human life and to increase economic activities?

We will answer this question through the re-integration of rivers and maximisation of their functions as axes of communication in Europe.

Objectives :

- Identification of past, present and future transnational communication axes in Europe
- Evaluate the strategic development of a multimodal and integrated transnational network with a focus on waterways integration (Role of connections between modes or establishment of new axes).
- Evaluate a waterway system acting as a catalyst for the development of a future transnational network. (Using the good nodes/catalysing a future network)
- Evaluate the future economical and environmental impacts of rivers re-utilisation.

Method :

- The scale as a method : European urban system.
- Geopolitical context :developing the Eastern facade.
- Economical development : growth and employment.
- Designing the future by using available resources.

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PART I : RIVERS LOSS OF PRE-EMINENCE IN THE “MODERN” ERA

A. The profound imprint of river in Europe's urban and regional geography

(1) Rivers as strategic human penetration and immigration axes

In Europe human expansions as well as population settlements started along rivers systems. From the prehistoric era, human beings discovered Europe in penetrating the territory by going upriver and overcoming fluvial navigation. Indeed rivers structured the immigration axes. For instance the megalithic population spread through the going up of the Rhone and the Danube. Apart from providing fertile lands and water resources for a population made of hunters and gatherers, they also conditioned the settlements of human beings by allowing the development of a system of food production with agriculture and livestock farming. The switch to such a system allowed the different populations to settle in one specific location. At this time, small fortified villages appeared in order to develop activities and societies. It is therefore interesting to notice that most of past and present European capitals have been built on riversides.

(2) A paradoxical role of defence and exchange

During the pre-industrial era, rivers were the main commercial axes for circulation of goods. At a very early stage during the 5th century before Jesus Christ, rivers early organised trade spaces between the Mediterranean regions, Central and Northern Europe. Indeed during the prehistoric era, bronze and iron, following population colonisation throughout the continent, have been spread through the Danube channel, the Main, the Oder and the Elbe.

Rivers in Europe also structured defence and exchange axes, indeed populations were located to take advantage of the defensible or commercial advantage of a location. Until the XIXth century, and according to the geopolitical climate of tensions or peace between European countries, rivers played sometimes the role of defence borders between nations and sometimes the role of preferential axes for trade. For example during the Roman Empire, the Rhone, a main commercial axis, gave birth to cities such as Arles or Lyon. But the Rhine and the Danube played another role : they marked the border with civilisations threatening the empire. Indeed the construction of fortified camps and garrisons stations to defend the territory against barbarian and germanic invasion gave birth to Strasbourg, Mayence, Cologne, Trèves, as well as Ratisbonne, Budapest, Vienna and Belgrade. Following the fall of the Roman Empire, these cities faced a significant decline but emphasises the nuclei of future medieval cities.

Despite the mercantilism period (XV to XVIII) and until the industrial revolution, trade was mainly local and regional and alimented by limited modes of transportation in terms of capacity, time and distance. The main modes of transportation were animal labours for land transport and wind camel for maritime transport. The roman empire grew and prospered thanks to waterways. Indeed they were the most efficient transport systems available and cities next to rivers were able to trade over longer distances (Europe-China) and maintain political, economic and cultural cohesion over a larger territory. Moreover a very early form of inter-modality appears at this time, rivers were relaying animals and coastal shipping to transport products such as olive oil, spices, silk, or grains from the place of production to the place of consumption.

To conclude It is very important to emphasise the impact of rivers toward a very early form of urban hierarchy and regional trade. Moreover the premiss of a very early urban system have conditioned the actual spatial configuration of european cities.

B. The loss of rivers importance : Technological development and modern infrastructures

(1) The mechanised era, canals and trains

From the end of the XVIIIth century, transport routes in Europe radically changed and stresses the entrance into the Modern World system (Wallerstein, 1974) with the first industrial revolution. Indeed the combined effect of scientific methods, capital markets and mechanised transport systems gave birth to innovations to distribute ressources (mainly raw materials and finished goods). With the establishment of large mechanised transport systems and propelled vehicles, it became possible to move people and freight faster, in greater volumes, over longer distances and more conveniently. At the same time, paved roads in cities started being developed for stagecoaches.

Canals, by linking existing rivers, allowed the emergence of 4,250 navigable miles in England by 1850 and came to increase regional trade. In the Netherlands this preferential mode has been well developed too. The canal era did not last long due to physical obstacles which made their construction expensive and inefficient in terms of spatial extensions as well as international trade. Indeed the competitive advantages of railroad transport came to replace canals. More flexible in terms of coverage, allowing heavier loads, and despite their enormous cost, extensive networks of rails have been built everywhere in western Europe. In 1850, 10,000 km of railways were operating in England, leading to the closing and disrepair of the previous canals. Indeed rail transport allowed communications between cities where fluvial connections were missing and canal buildings impossible. In terms of international transportation, the 19th century saw the development of the steamship and the establishment of the first regular maritime routes linking harbours worldwide, especially between Europe and North America.

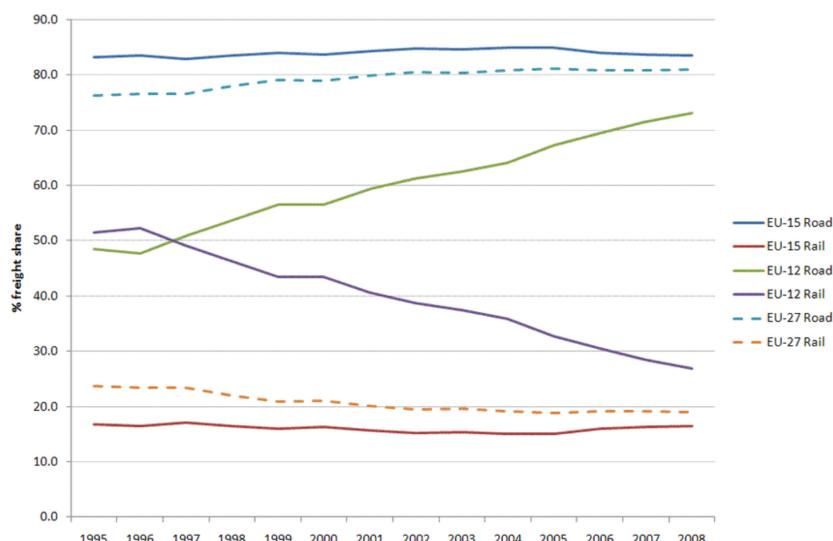
(2) Motorised frenetic development and the car oriented societies

At the city scale, the widely use of energy combined to a large urban population growth resulted in tramways development as the first public transit system. The first bicycles (Paris exhibition, 1867) got used by rich europeans, soon followed by the working class at the end of the 19th century. These premiss of sustainable modes of transportation existed at the very beginning of the so called “modern era” and are now coming back after a century of frenetic infrastructural deployment.

At an international level, with the switch from coal to oil and engine propulsion technology, maritime transport and industrial coastal harbours grew with bigger ships, tonnage and docks. Between cities trains got extremely specialised between passengers and freight vehicles. But with the arrival and fast expansion of the car in the 20s, as well as the air travel mode in the 50s, the tramway disappeared and the train lost of its prominence in terms of both freight and passengers transports, the two other modes being extremely competitive. Indeed the European railway transport network, despite being the most energy efficient modes today as well as the most extensive rail system around the world with 212 500 km of railway lines (Eurostat), is declining for the last 30 years.

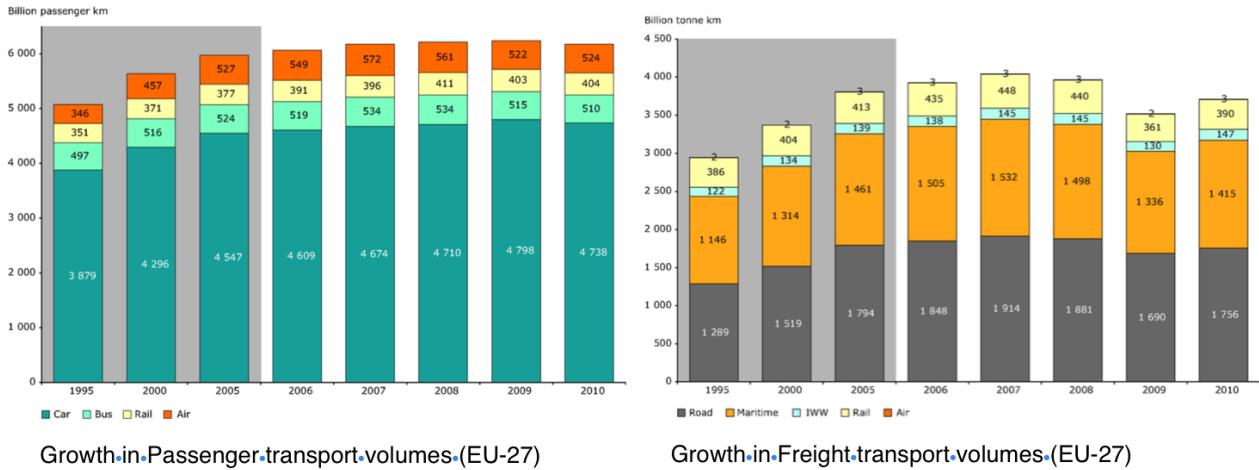
The setting of global systems represents a period of nature soumission to human will. Rivers have been planned and regulated in order to control flooding and produce energy but their role for transporting goods and people and communicating ressources is quite inexistent. From a very active role of structuration of spatial settlements and movements, the potential of river axes became passive and did not lead to further human innovations or collaborations. (some exceptions, cf The Netherlands).

Today exchanges are mainly made with motorised vehicles on european roads which cover a total of 4.5 millions km (Eurostat), the E-road network of 150,000 kilometres of international routes includes every regionally important road in Europe until Central Asia. This dense network reflects the flagship infrastructural network of the modern period.. The stronger communication axes between our cities are therefore extremely polluted and crowded.



C. European crisis and the need for retrofitting our distribution system

(1) Growing flows of goods and passengers between european cities



Facing the growing demand for cargo and passenger transport within globalisation, european passengers and freight traffic flows increased and especially between european cities. Exchange of goods and passengers are now made at continental level and require powerful transnational systems. Concerning the future, freight transport is projected to increase by around 80% by 2050 compared to 2005, while passenger traffic should grow by 51%.” (Source: PRIMES-TREMOVE and TRANSTOOLS transport models [2 MB] (Appendix 5 of the Impact Assessment accompanying the White Paper, SEC(2011) 358)). As seen below, What is alarming is that the growth is totally predominated by road transport for both people and goods, apart from maritime shipping for freight, the development of other modes for national or cross-border travels remain in decline. Since the importance of freight transport will be a significant European economic growth factor during the next decades, redressing the balance between transport modes is a necessity.

(2) Economic crisis and lack of retrofitting solutions

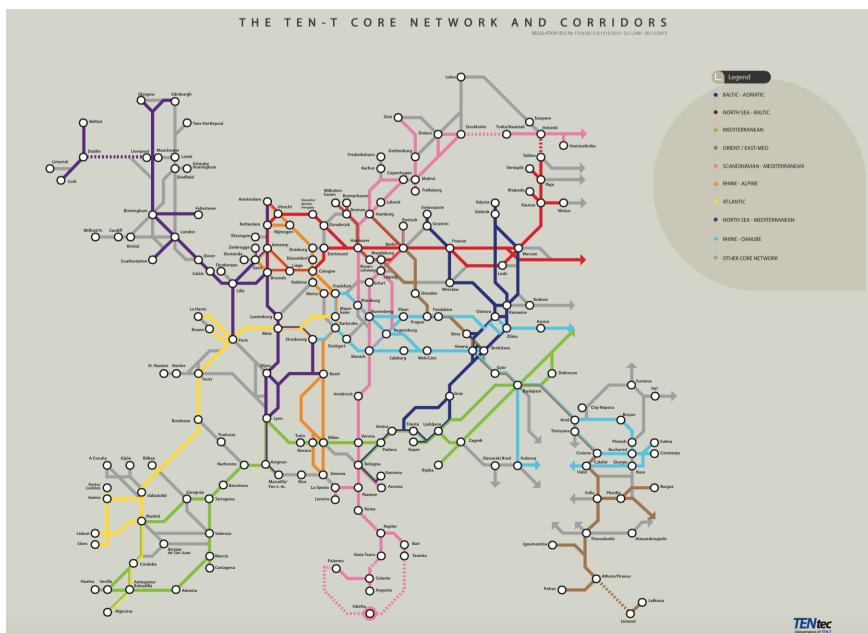
Our actual Infrastructures are creating a generalised “crisis of control” (Beniger) within the entire production- distribution-consumption system.

Indeed Europe's freight system is dominated by trucking with a market share of 72% (tkm) in EU-25 countries, while rail's market share is just 16.4% despite its extensive network. Indeed the economic cost of road congestion across the EU is approximately one per cent of GDP, according to the International Association of Public. Road transport is responsible for one-fifth of the EU's total emissions of carbon dioxide (CO2), the main greenhouse gas. While these emissions fell by 3.3% in 2012, they are still 20.5% higher than in 1990. (source : europa.eu) and will keep growing. Road transport is also responsible for habitat loss and species disparition. The growing congestion of road as well as the pollution it produces stresses the need for transferring good and passengers to sustainable modes of transportation.

What to do with these thousands kms of segregative highways? In the future highways will maybe become ecological corridors opening new migration axes for animals and vegetal species. For now reorienting flows toward rails and waterway networks represents a rational answer and could progressively take over some part of road transport loads, hence reducing congestion as well as on a long term, costs of transportation. The demand for cargo transport carriages could in this sense favourably contribute to the development of road transport.

In addition to high maintenance costs, trains become unattractive. Too often orientated toward passenger transport and not enough used, train companies in Europe are facing budget deficit. High-speed international services have difficulties to compete with low-cost airlines which remain the cheapest way to make people travel over long distances and way less investments of money for developing new lines. Concerning rivers they need to be re-integrated in a sustainable way.

(3) The TEN-T network : Re-integrating rivers



Redressing the balance by creating a system linking all our different modes is a necessity. The European Union changed its transport policy since 2007. Indeed the TEN-T (transnational European Network) policy was launched in order to repair European infrastructures and create a grid of 9 corridors, aiming at integrating different modes of transportation, and passing through different national networks. In 2014 the new policy CEF "Connecting Europe" came up with a supplementary fund of 26,4 billion euros (2014-2020) to complete the development of the future "European backbone" by the end of 2030.

The TEN-T system is a challenge since it has to unify national infrastructures developed according to different "technological styles". (Paul Edward, 2003) and solution bottlenecks caused by congestion and topography irregularities. Indeed a transnational network can be made only by progressively interlinking and integrating different national networks composed of different modes of transportation such as land, sea and air national networks and thus for freight and people.

Multimodality and interoperability are key words of first importance for the future of our union since the implementation of a global network could be of great benefices if it allows us to upgrade our priced infrastructures which are physically installed and difficult to remove. The TransEuropean inland waterway network will integrate Waterways at the continent level by promoting new interactions between cities through existent water potential. This is the most interesting approach elaborated within the future transnational network.

PART II : POTENTIAL OF RE-USING OUR NATURAL INFRASTRUCTURES

A. Internal market integration and geopolitical strategy

(1) Solution disparate axes of communication between low and high performers



SOURCE : EU TRANSPORT SCOREBOARD

On a regional scale, the enlargement of Europe created economic and social growing regional disparities between the different 28 members. Territorial discontinuities are high between western, central Europe and the new annexations of eastern countries less developed in terms of axes of circulation and transportation networks. For instance eastern European countries such as Romania and Poland are considered as being low infrastructure performers in all modes with less developed Road, Rail, Maritime and Air infrastructures of transportation than their neighbours. Therefore the Union wish to unify and develop its all transport network with optimal uses of each country existing capacities and the development of new corridors. The transnational network will maximise the liberalisation of services, goods and people and therefore play a role of integration and cohesion within the common internal market. This network should cover the whole territory of the member states and facilitate accesses in general between link islands, landlocked and peripheral regions to the central regions. An interesting point to stress here is the presence of rivers in western Europe where modern infrastructures are missing or inefficient (cf central and eastern Europe).

(2) Increase exchanges of goods with China, Russia, Turkey and central Asia

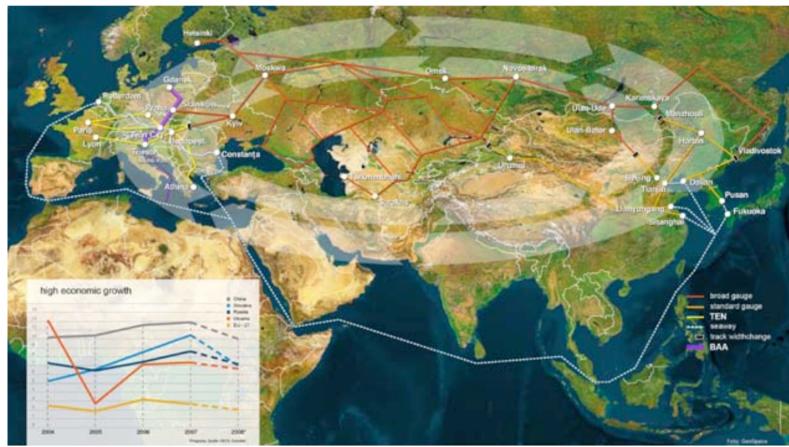


Figure 8 International trade routes by land and sea

Source: The Baltic Adriatic Axis, Federal Ministry of Transport, Innovation and Technology 2nd Edition

On the global stage, the development of a European transnational network is of first importance for the Union to be competitive within the world economy. On the first hand repairing EU transport network is crucial to economic growth. On the other hand, despite its well developed western facade, the European Union seek to reposition itself regarding the fast development of eastern markets such as Asian, Russian and Turkish emerging economies. Therefore the improvement of EAST-WEST (territorial connection between the Atlantic and Asia) and South-North (Connection of northern Europe with the Mediterranean, Baltique and Adriatique) Europe throughout Inland axes of communication would be very strategic to intensify exchange, reduce transport cost and increase harmonised growth inside and throughout European borders.

"The combined GDP of China and India is projected to exceed that of the major seven (G7) OECD economies in 2025. Despite this, leading cities in Western countries will continue successfully to compete against fast-growing emerging-market cities." (The economy intelligent unit, 2013). Indeed in this sense inland, coastal and intercontinental could help create sustainable connections with our asian competitors. As seen on this map, continental roads from Western Europe to Shanghai could lead to more direct connection from Rotterdam to Shanghai Harbour. The United States are not our preferential partners of exchange. Indeed between 2003 and 2013 importation and exportation of goods between EU-28 and China, Turkey and Russia have increased considerably. The flexible re-orientation of our infrastructural axes according to the evolution of flows and partners is therefore a necessity.

Table 7.2: EU-28 trade in goods by partner, 2003 and 2013
(EUR million)

	EU-28 exports to partner	EU-28 imports from partner	Balance	2013		
				EU-28 exports to partner	EU-28 imports from partner	Balance
Argentina	2 687	6 358	-3 671	10 004	8 144	1 860
Australia	17 532	9 043	8 489	32 096	10 170	21 926
Brazil	12 399	19 212	-6 813	40 057	33 028	7 028
Canada	21 588	15 997	5 591	31 629	27 248	4 381
China	41 477	106 579	-65 102	148 269	280 055	-131 786
India	14 579	14 104	475	35 872	36 799	-928
Indonesia	4 236	10 576	-6 341	9 712	14 391	-4 680
Japan	41 040	72 607	-31 567	54 040	56 530	-2 490
Mexico	14 398	6 554	7 844	27 429	17 534	9 894
Russia	37 270	71 283	-34 013	119 775	206 478	-86 702
Saudi Arabia	13 661	12 997	665	33 684	30 183	3 501
South Africa	13 594	15 073	-1 479	24 488	15 541	8 947
South Korea	16 450	26 144	-9 693	39 970	35 840	4 130
Turkey	30 870	27 367	3 504	77 750	50 383	27 366
United States	227 427	158 449	68 978	288 239	195 989	92 250
World (extra-EU-28)	861 931	935 282	-73 351	1 737 022	1 682 390	54 632

Source: Eurostat (online data code: ext_lt_maineu)

B. A sustainable mode of transportation : regional scale

(1) capacity, use and environmental impact of fluvial transport

The environmental and economic advantages of river transport are numerous. In terms of low carbon and energy footprint: river transport consumes two to four times less fuel than the road for a ton of freight transported. On an equivalent distance, CO₂ emissions are therefore 2 to 4 times lower than those of road transport. Indeed 1 liter of fuel allows to carry 127 tons of cargo on a distance of 1 km, whereas road or rail transport means would carry only 50 and 97 tons of cargo respectively.

The cost of 1 ton transported by waterway is half the cost of the same ton transported by train and 6 times inferior than the cost of the same ton transported by road. The level of noise and air pollutions are both reduced for residents, the level of Secure transport conditions is very high, accidents are very rare on waterways which provide safe transportation for both activities linked tourism and freight. Unlike road, waterway networks do not suffer from congestion and can provide optimised time delivery on short distances. Finally with its high capacity and low cost potentials, one big river vessel or a push barge set can replace even a few hundred trucks.

Inland and maritime shippings as well as rail systems are at all point the most environmentally friendly and cheap way of transportation regarding freight transport. Also many Studies assessing both technical and operational approaches have concluded that energy efficiency opportunities of a few percent up to 40% are possible with this mode. Despite the presence of navigable canals in 18 out of 28 UE members, this mode is however badly exploited or underexploited.

(2) The problem of the private companies engagement regarding the factor time

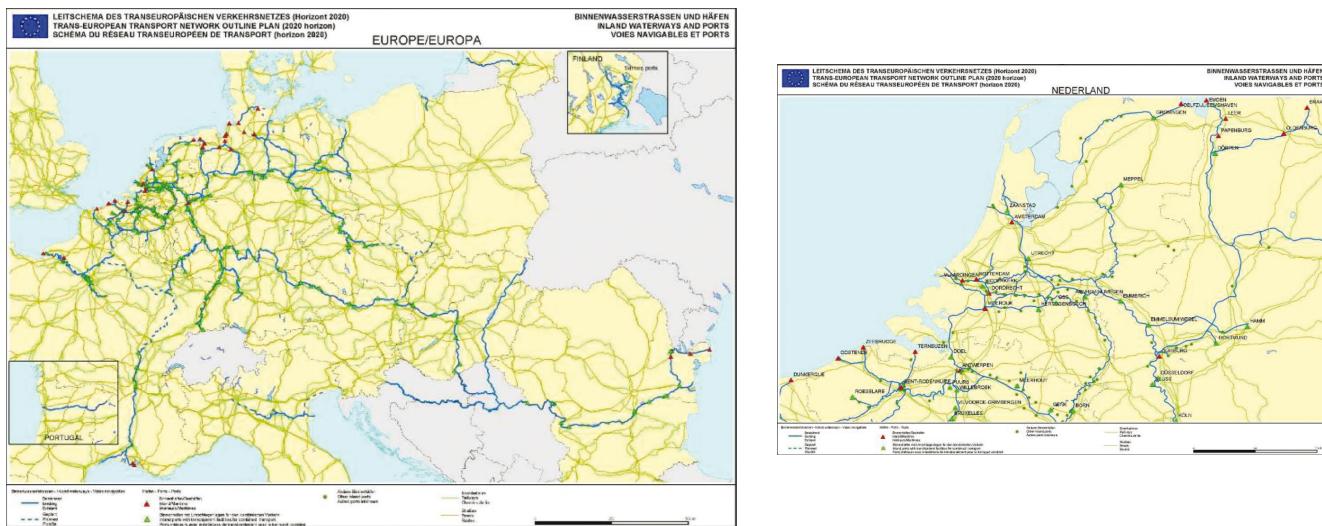
To be sustainable our river utilisation have to be economically viable. Indeed a network of rivers is competitive mainly on short distances or to transport certain products. Indeed for companies which are looking for quick deliveries at low cost, the fluvial mode has to be extremely well designed, promoted and understood. The only and very important variable which could dissuade companies to use rivers even if infrastructure are present is the time factor since fluvial transport is slower than any other mode of transportation.

Imagine a french internationalised design company with relocated factories in India producing hand bags for women. If this factory is very famous with products and shops all over the world, its goal is to send these bags in the shortest time as possible in order to not stock products in warehouses. Indeed stocking products is synonym of stocking money which is sleeping somewhere without making benefits. One the one hand the shop of Shanghai will stock the most minimum amount of articles. On the other hand the same shop will need a quasi immediate restock after the sale of one article.

In this sense, a network of rivers and canals would not be an inefficient investment if private partners don't use it. Inefficient as well if they waste money by using vessels. It is why European Rivers can relay other modes by being directly interconnected to infrastructural support. Being connected, not only to use our existing infrastructures, but also to be economically viable. This can be allowed by extremely organised and quick multimodal platforms present at each river rupture and presenting train stations and an airports.

C. Connecting European industrial and financial sites and beyond

(1) Catalysing the existing navigable urban region



Indeed the presence of a very extensive river system in Europe needs to be exploited in order to allow the combined optimal use of existing infrastructure capacities. Despite the existing 41 000 km of navigable rivers and canals, fluvial transport is concentrated mainly between international ports between 6 countries: the Netherlands, Belgium, Germany, France, Switzerland and Luxembourg. As seen on the map, the major part of wild rivers and old canals remain non used and many connections have to be developed as for instance the connection between the Randstad and Paris, and possibly Marseille.

Transport de marchandises par voies navigables intérieures en milliers de tonnes					Source : Eurostat
Pays	2010	2011	2012	2013	
UE 28	525 062	521 252	526 402	527 654	
Belgique	161 594	172 906	190 288	187 404	
Allemagne	229 607	221 966	223 170	226 864	
France	72 632	68 434	68 568	68 721	
Luxembourg	10 467	8 956	8 506	8 967	
Pays Bas	346 901	345 469	350 069	356 062	
Autriche	11 052	9943	10 714	10 624	

The evaluation of freight transport by modes in the countries with well developed waterways canals (class V for contenders), train networks and roads is interesting. For instance in the Netherlands, which has modernised its canals at a very early stage, the different systems of transports are very well developed: air, water and rail systems exist and could work in a multimodal way. However the Netherlands has a very functional water system for freight transportation. The country also includes the highest number of freight road traffic in Europe. Indeed Rotterdam harbour is the main industrial port in Europe and the Randstad motorways are supporting increasing flows of trucks coming to and from the harbour in order to deliver goods within Europe.

The ring of motorways (A4 [Amsterdam-The Hague- Rotterdam- Antwerp (Belgium)], A2 [Amsterdam- Utrecht-Eindhoven-Liege (Belgium)] and the A2/A12 (Amsterdam-Utrecht-Arnhem-Ruhr area (Germany)]). is one of the biggest road infrastructure in Europe, the A2/ A12 (Amsterdam- Utrecht-Arnhem-Ruhr area (Germany)].) has recently been provided with a 14th lane because of problems of congestion between Amsterdam and Utrecht. However the Governance in the Netherland is hardly fighting to reduce congestion and motorised traffics with high pricing policies and dissuasive measure but the traffic is not manageable. Modal shift, especially towards rail transport is one of this measure but it is not working as expected. Therefore the fact that other countries did not develop systems able to send and receive flows and passengers in a sustainable way underestimate the actual infrastructures present in the Netherlands that can't be optimised due to other national networks.



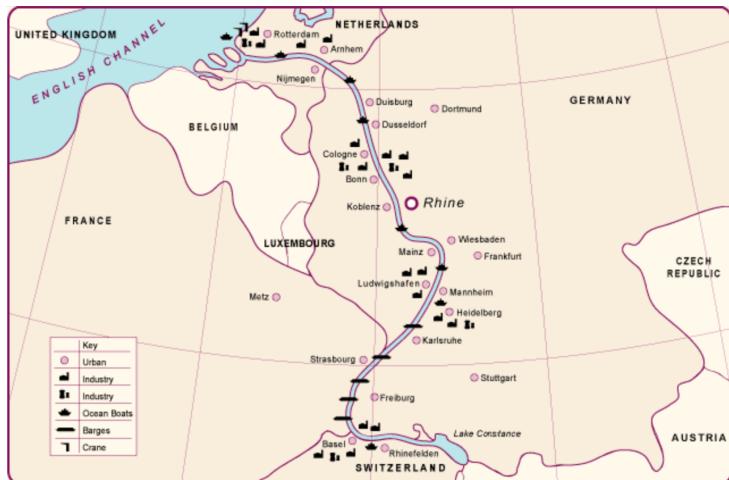
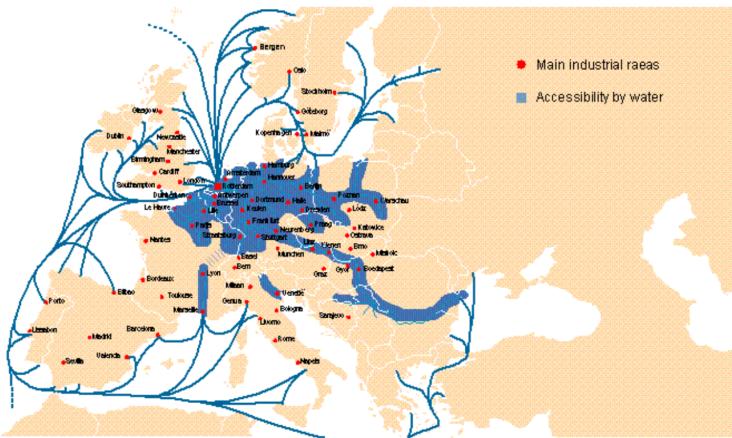
Indeed the arrival of goods in Rotterdam, to be split over Europe through waterways and rails, would need a complete system of rail and waterway ramifications. The system of rivers and canals is quite well connected in Northern Europe and especially between Germany, Belgium and the Netherlands. This system is also well disconnected from the rest of Europe. Indeed a truck leaving from Rotterdam to Italy has for now, no other choice than using roads. Indeed this same truck would have to cross the Alps which remains the most important bottleneck in Europe.

This example illustrates well the need to plan according to the new vision: the international approach. Indeed, in northern Europe the system of canals of one region won't be efficient, if working on his own. Isolate political choices within Europe are not economically viable. The Italian truck cargo should be able to reach any city from any main seaport, inland port airport or rail platform from any European country. Therefore very developed water system and multimodal national platforms are not enough, since infrastructural discontinuities at the borders impede good communications on well developed and planned axes. It is why road traffic calming measures, as well as trail and waterway developments in Europe should not remain anymore on national decision making and law but on coherent infrastructural development between european cities.

Cities are the physical reflect of our societies, connecting Europe in terms of nations is not viable anymore. A modern governance at union level with a strong decentralisation of power, competences and functions toward european cities is a necessity.

(2) Linking eastern, central and western european cities through waterways

Cities were defined as being “large, dense and permanent settlement of sociably heterogeneous individuals” (Louis Wirth, 1938) but not only. Cities are also high concentration point of massive resources, physical infrastructures and concentrated technologies. Connecting an extremely high percentage of European cities, population, supply and productive areas could lead to a complete deregulation within our fragmented and non collaborative european markets. A City should be “seeing like a state”(J. Scott, 1998). Indeed if “The 19th century was a century of empires, the 20th century was a century of nation states. The 21st century will be a century of cities.” (Wellington).



Linking European cities through existing water axes is possible. From a geographical approach the extremely important quantity of navigable water in Europe as well as the location of cities next to these axes let place for a lot of innovations. As seen previously western and eastern European regions are, from an infrastructural point of view, well disconnected. The most important cities to connections are situated in eastern Europe. Here the Danube and the Rhine will play an extremely important role.

The Rhine, going from the Alps to the North Sea and passing through four countries, aliments six different country borders and links important European cities and second regional nodes. Indeed industrial cities such as Basel (Switzerland), Strasbourg (France), Ludwigshafen, Cologne (Germany) and Rotterdam (The Netherlands) benefit from this axe.

Moreover the Danube forms a very interesting navigable axe, flowing southeast from the black forest in Germany to the city of Sulina in Romania (Danube Delta of Romania, Black Sea) and crossing 4 important capital cities : Vienna, Bratislava, Budapest and Belgrade.

More than linking capital cities, it plays an extremely important rôle regarding european exchanges. Already used for transporting goods, it can help integrating second regional cities to develop their economies, which are not on its routes. Indeed the Danube drainage bassin extends to 9 different nations and go through an extremely high number of central and eastern other european cities. Moreover since the opening of the Rhine–Main–Danube Canal and the Danube-Black Sea Canal, the Danube links the North Sea and western Europe with the ports of the Black Sea.

Imagine the potential of this network if extended to cities that are not present on the Danube and Rhine roads. Indeed these two axes could be connected to every single important financial and industrial centres in Europe and beyond. In this sense waterways present a lot of potential for further interconnections between industrial regions and major conurbations at a regional, national, transnational and international scale.

PART III : CONNECTING EUROPEAN CITIES BY 2030 : THE SMART SYSTEM HYPOTHESIS

A. The integrated approach : Regulation, Economic growth and Employment

(1) Standardisation of laws toward a European Bassin

Following Goal 9 of the Sustainable development goals defined by the UN (Rio+20 Summit, 2012) and representing a framework around which european countries could develop policies , one of the 17 initiatives that could transform the world by 2030 is the following :

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries

9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets

9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States

9.b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities

9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020

According to the 4th last Intergovernmental Panel of Climate Change, our ecosystem and its inhabitants are threatened, our natural resources are being depleted and the planet gets warmer (Garvey, 2008). These consequences have been attributed directly to greenhouse gases as a result of human activities. Since cities concentrate economic and industrial activities (Friedman, 1986) and distribute resources among World economic hubs through non-resilient infrastructural networks, they are also the main variable to have the most to do with the extent of climate change. The smart upgrading of our infrastructures starts by using our natural resources in a sustainable way and at their maximal potential (Giffinger, 2009). Regarding these elements, the role of governments and regulation is very important. Nothing will evolve in Europe if our governments do not start acting in a rational way by enforcing regulation with strong and inflexible policies.

Moreover, the possible development of water network depends on the existence of a common regulation. Rather than using our rivers as national borders, re-integrating them as major communication axes demands a European framework. Indeed river levels of accessibility are not fairly widespread. European fluvial transport law has very little harmonisation between the different nations. Indeed Europe is facing individual and separated rules of each international river. Administration, transport rights, territorial and beneficiaries scopes, equality of treatment, freight and shipping regulations relating to vessel, safety conditions and nautical skills as well as labour and tax conditions, are all different and under different national and regional laws. The development of inland waterway navigation and its connection to other modes would be of great benefits on a long term run, but the creation of an institutional background cannot wait. Liberating flows on European navigable inland axes should start by the creation of a common water space.

(2) Planning a European urban system as a tool of growth and recovery

Planning a network of fragmented and uncertain environments (Le Galès, 1998) is very complex, therefore it has to involve many experts, from planners, architects, economists, to engineers, sociologists and political scientists. By connecting cities by water, planners should not focus only on the renewal of potential attractive cities but on the sustainable development of a collaborative network of European cities as a whole. Indeed changing the way we move inside cities is important, however changing the way we produce, distribute and consume to compete on the world stage but especially to preserve our resources, becomes crucial.

Rather than competing among each other, European cities should get integrated to the world economy as an urban system, a network of coexisting cities. Indeed cooperation rather than competition is a key point. By getting specialised and by increasing collaborative exchanges of knowledge, technologies, talents and partnerships, a network of European cities could lead the way and allow the European Union to enter a sustainable and innovative era of recovery.

Indeed european cities are seeking new investors to implement regeneration policies (Harvey, 1986). Since the 60s the physical regeneration of urban areas has been the centre point for promoting places (Brian Doucet, 2009). The decline of manufacturing let abandoned industrial district such as waterfront and old docks vacant for new activities. The loss of employment, investment and residents has been addressed by pursuing pro-growth policies (Brian Doucet, 2009) aiming at transforming old places of production in new places of consumption and leisure. The revival of economic activities can be addressed in a different way. Indeed instead of welcoming foreign investments and companies to regenerate our aesthetic environment, maybe we could start thinking our cities as being part of a network. In this sense different network of cities according to their sizes, development and specialisation could start competing within the world economy. Moreover vacant industrial sites can be re-used in order to connect this same network (see Part III-B on Multimodal platforms).

Moreover if european cities are the main entrepreneurs of this new network and collaborate between each-other and with the private sectors, via co-financing and co-managing agreements, they will be therefore the main beneficiaries. The construction of a network of european cities will involve different contracts relative to different projects. These contracts have to be very flexible and to allow a coherent evolution of each projects. Future multimodal and multifunctional zones, if coherent, will revive growth and employment.

For instance in Marseille (France), the succession of different urban projects (Euromediterranée 1 et 2), as well as the “European Culture 2013” event, aimed at gentrifying the central neighbourhood and vacant industrial sites of Marseille. The European Union in collaboration with foreign companies have invested billions of euros in flagship infrastructures. Indeed hundreds of hectares of lands have been transformed to create a stadium, new museums, shopping malls and hundred thousands of square meters of offices... The cleaning of the city which got rid of a consequent part of its poor inhabitants, as well as the aesthetic upgrading of the building environment, have worked pretty well. However the same amount of money could have been invested in connecting this old industrial harbour to the rest of Europe, thus by building the Rhine-Rhone canal, project under discussion for the last 50 years. While Rotterdam is dealing with import/export in northern Europe, Marseille could have been redesigned as the new multimodal platform distributing finished goods to the global South. Regarding these speculative projects, the European Union, in collaboration with local private firms could have invested money in re-connecting Marseille and creating jobs rather than welcoming foreign firms and tourists.

(3) Addressing multifunctional and flexible urban connections

Addressing mutifunctionality is also important. A lot of canals are used for instance in France for hydro-electricity production and represent reserved areas of companies (EDF-GDF) not accessible to the public or to commercial activities. Multifunctional canals and rivers are needed to extend flows between cities and create as much benefices as possible. Indeed multi functionality, regarding inland waterways can help developing new activities such as recreational shipping and can be a tool synonym of growth and employment in the sense that each cities could develop further strategic activities around it. For instance in the Netherlands, some canals are specialised, and some others are multifunctional. Indeed according to their sizes and locations within and around cities, they can be used to collect waste, transport material goods, but also to organise public transit system for commuters and touristic trips.

If governments, at different level, should start implementing inflexible policies, the construction of an urban network through different projects (legal, physical, economic, social) has to be very well managed by european cities themselves in collaboration with private partners (local private partner are better to increase the rate of employment) through multi stakeholder partnerships, and these same contracts have to be very flexible. Indeed private public partnerships have often shown their limits regarding long term investments by being unable to adapt to the evolution of needs. Therefore the European union could lead the way in framing a network of multi stake holder partnerships regarding the development of a new european urban system. Moreover shared costs and risks through well designed private and public partnerships could decrease the amount of money to invest. Manufacturers could also gain competitive advantages through delivering their products to the right place, in the right time and in the right condition.

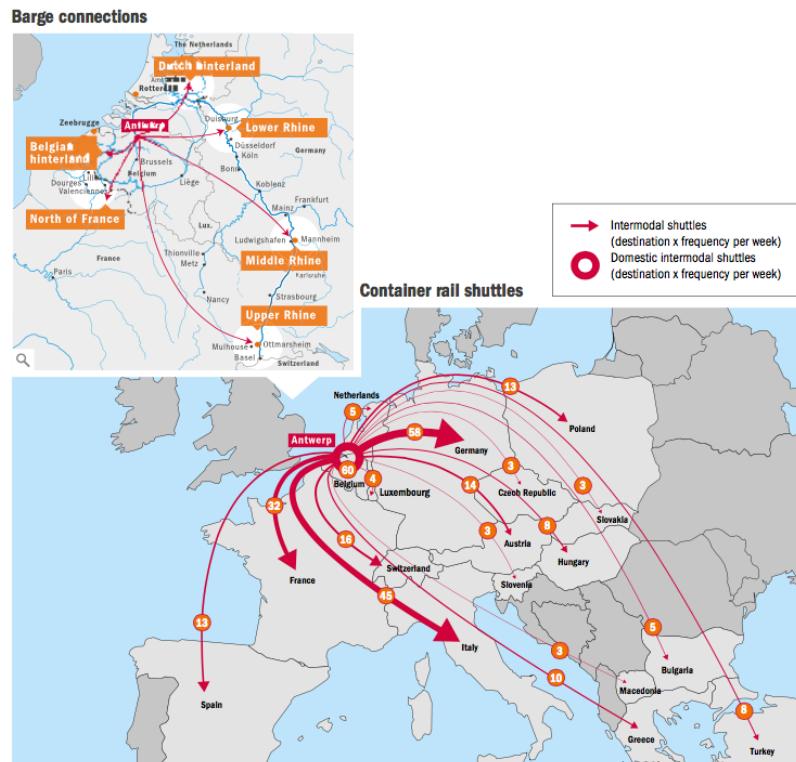
B. Transforming Cities into Intermodal platforms of collaboration

(1) Maximisation of existing conditions : Cluster fluvial, aerial, coastal and rail terminals

The goal of a transnational network of infrastructure is to connect our existing modes of transportation. Indeed rivers will need trains, airport will need buses, ports will need roads... To become inland ports, cities will have to maximise and concentrate Intermodal terminals to make strong connections and fast switch between one mode to another for freight and passengers. Therefore cities could act themselves as intermodal platforms within a larger european system.

The increase of rail access to and from other modes of transportation especially airports for passengers, maritime and road transport services for freight where appropriated, has to be designed. Fast loading and unloading between seaports, inland ports and the rail network is the future of sustainable freight transport in Europe. Following rivers and canals integration, Inland port, opened to commercial traffics, have to be progressively developed. Sea ports will turn into network ports and parts of the freight processing will take place in the hinterland (e.g. West-Brabant and Noord-Limburg with respect to the Port of Rotterdam). In this sense, the reinforcement of the collaboration between national and international seaports (cf cities), ports and rail platforms are crucial steps in the development of a multimodal system. The growing demand for new services linked to management and telecommunication within these intermodal platform will also increase employment.

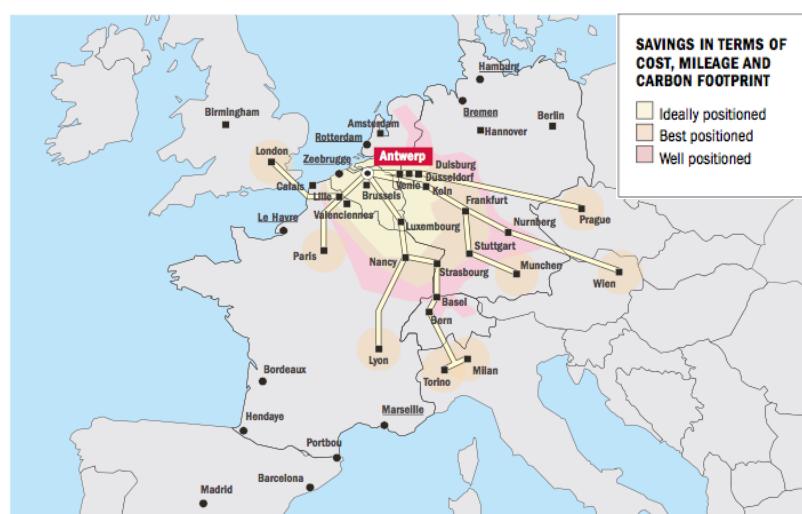
These combined network of modes and functions has to be integrated with strong physical connections between modes, strategic locations (cf industrial areas and financial second regional nodes) as well as strong management tools at all scales. The role of technology at the European level will be very important in terms of intelligent management. Existing airports, ports, and train stations will be redesigned in order to switch from passengers and vehicles from one mode to another, in avoiding at the maximum the use of road networks.



For the full list of rail and barge departures, see the **Port of Antwerp Connectivity Platform**
[► www.portofantwerp.com/en/connectivity](http://www.portofantwerp.com/en/connectivity)

"The Port of Antwerp offers you a wide range of barge, road and rail service providers for the transport of your goods in a fully deregulated market to and from every corner of Europe and beyond." Based on the example of this multimodal port, European inland cities could one after others develop cargo handling and logistics platforms. Indeed this port is leading the way regarding integrated maritime and logistics platform by providing "cost efficient and flexible transport solutions" for freight transporters and trade oriented companies with very efficient rail and barge connections. Therefore future European inland ports will be part of the network by developing logistics services, distribution centers/depots, and longer carriage distances within waterway networks. All these measures have to be thought, designed and applied at Union level with local considerations and adaptations according to the use, potential of each place, topography barriers...

Port of Antwerp, best situated port for the demographic, industrial and logistics heart of Europe

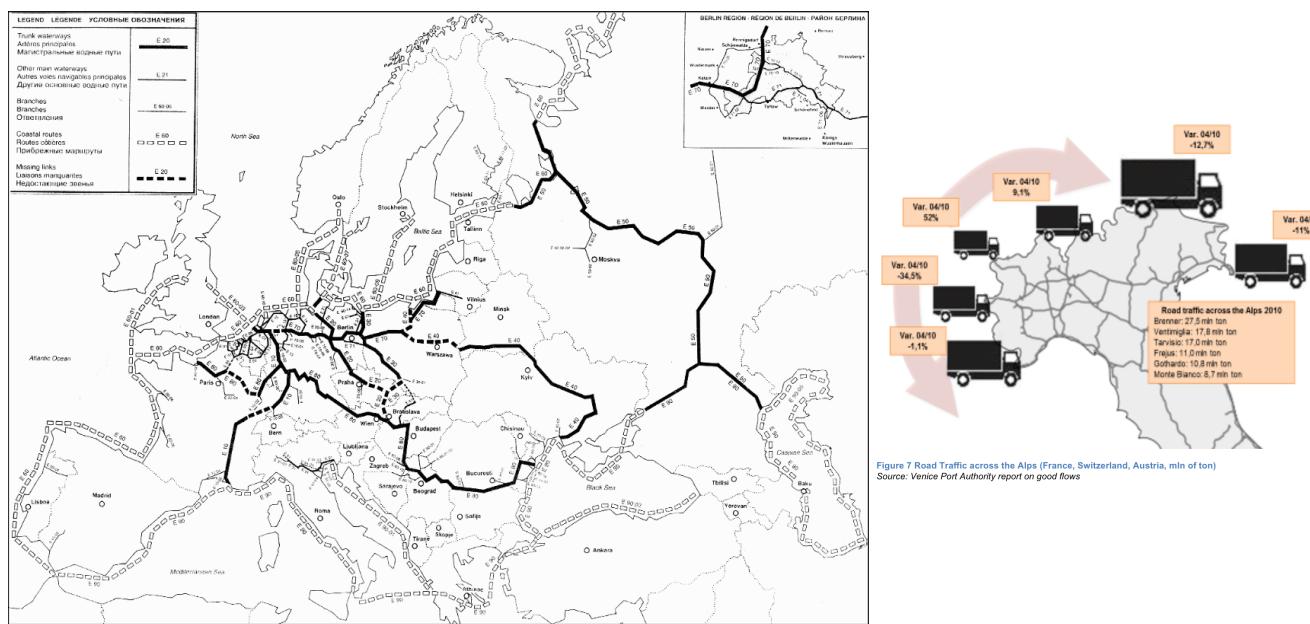


(2) A new urban hierarchy : Relay between seaports and inland ports

"If inland waterways are the new highways, inland harbour will be the new cities". A new hierarchy of harbour composed of seaport, playing the role of European "gateways", and inland port organising and structuring flows within Europe will define structural change in terms of spatial patterns, national policies and social conditions.

Associated to the prolongation of inland waterways and canals, the development of inland ports and the connection of maritime facades, the importance of regional seaports and motorways of the sea will grow. First of all this mode will improve existing maritime links which are viable, regular and frequent. But it will also establish new links for the transport of goods between Member States and improve access to peripheral and island regions and States. Indeed coastal shipping on short distances combined to inland shipping is primordial to reduce road congestion coming from freight transport.

Especially when waterways meet topographical bootlessness, in this sense the combination of fluvial and coastal shipping can solve territorial discontinuities where rail and waterways are inefficient due to topography resistance. For instance the case of the Alps represents an issue regarding the continuing flow of goods. The freight transport by road between France and Italy by the "tunnel du Mont Blanc" is very important.



Therefore it is easy to imagine a vessel coming from northern Europe by the River Rhone (on the future axe linking the Netherlands to Marseille by waterway) and it is easy to understand the problem faced by the high altitude and the impossibility to continue the cargo trip by another mode of transport than road transport. Indeed in this specific case, coastal shipping could relay inland shipping. In the future and following technological improvements, vehicles could maybe be adapted to both river and maritime waters. It is why services and collaboration between international and regional Seaports, inland ports, as well as rail and aerial terminals should start acting in interconnection regardless the distance between their locations.

(3) Soft and progressive transition : from utilisation to new constructions?

Recovering growth and employment is synonym of a slow and continuous process and lead to the implementation of sustainable measures through long term investments. Integrating modes to create a new urban system at the European scale is a more than valid objective.

On the one hand, a soft and progressive transition via resilient infrastructure, preventing the retrofitting of the future road network in ecological tools, is the first phase of a long process. New Canals and waterways connections do not need to be built immediately. Indeed the first advantage of using existing rivers and therefore our natural existing conditions is based on their infinite possible re-utilisation. Indeed since the prehistoric era and until the extinction of human beings they will remain playgrounds of innovation for further development. Their roles and functions can change in 50 or 100 years according to the new needs and integrate totally new functions that we do not expect yet. Moreover their utilisation will not need environmental and economic expensive removal. On the contrary our road network will need to be disarticulated in order to reconnect segregated lands and solve non human species habitat loss. On the other hand, a transnational of intermodal infrastructure is maybe a transitional Step which will lead us to sustainable ways of producing, distributing and consuming.

As seen previously, the majority of highly developed European areas are located close to waterways and the connections between the different maritime facades, as well as a strong waterway continental corridor to the East, are completely possible in practice. In a few decades it is a full waterway continental system which could spread from France until Ukraine.

Indeed in Western Europe the Axe Rotterdam-Marseille with the building of a canal between the Rhine and the Rhone could link the Mediterranean to the North Sea. Since Rotterdam and Paris already represents 30% of the fluvial transport in Europe and the corridor Rhin - Alps 50%, therefore the transfer of trucks to Vessels could be enormous. This project has been discussed for years in France and could one day become a reality. At an international scale, it could permit direct and uninterrupted flows between northern and southern western european cities. From London to Rotterdam then Marseille, European cities could directly trade with African and Middle east world cities by opening three seas : the North sea, the manche and the Mediterranean. In Central Europe the connection of the Danube, the Elbe and the Older is also possible.

However for now there is a cultural reticence toward the development and building of new canals. The cost of investments for enlargement or modernisation is too often judged too high. But the development of long term benefits are always under-estimated in Europe, most of the time fast buildings and immediate economic results are the priorities. An entire water network could progressively emerge and link every seas and rivers within our 28 members. New practices, experimentations and collaborations cannot wait if the all union want to recover in terms of environmental quality and infrastructure efficiency.

CONCLUSION

To conclude, the development of the transnational network in Europe is a very innovative and ambitious challenge with a lot of potential in terms of economic growth and employment. However transforming societies in a rational way (Le Galès, 1998) can be done only by planning cities and networks of cities in a rational way. “A dysfunctional governance, a political culture that seems unwilling to commit to implementing what we know we need, and know how to make” (Hillary Brown, 2010). Indeed Collaboration, management and good political choices are primordial for the development of this transnational project and to reach the Sustainable Development Goals fixed by the United Nations Horizon 2030.

The lack of physical connections and flexible organisation remain high. The re-utilisation of our infrastructures into multifunctional and multimodal ones will be very important to make benefits from our previous investments. Finally the development of an integrated and efficient growth-oriented infrastructural system in Europe depends on Political choices and members consensus toward regulation, modernisation, implementation and standardisation. Therefore the liberalisation of legal rules have to accompany the physical standardisation and modernisation in order to facilitate and accelerate the process.

Moreover the implementation of a network of cities alimented by waterways is very ambitious and will need financial and technical support at all level. However it also stresses the problem we are now facing regarding the gestion of illegal immigration. Indeed opening our seas by waterways will represent further opportunities for migrants and refugees seeking for a better future to enter the european continent.

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